David Ormiston

From: Jay White <jaywhitevt@gmail.com>
Sent: Friday, August 19, 2016 11:12 AM
To: David Ormiston
Cc: Jeff Goodrich; Daniel.Dupras@esvtllc.com; claus.bartenstein@esvtllc.com; patrick@uplandconstruction.com
Subject: Documents for August 24 Meeting with Selectboard.
Attachments: Complete set of Aug 24 presentation documents.pdf

Hi, Dave,

Please review the attached documents and call me if clarification is necessary.

COST ANALYSIS: The first and key document in the attachments related to cost is the **8 19 16 Summary of Norwich Police and Fire Project Costs and Options**. The top part in orange indicates the estimate of the Basic Design Option cost without Net Zero or Requested Options upgrades.

The building cost comes in at $786,470 which calculates to an efficient and low $133/sf. But the site development costs are estimated to come in at about $395,339, which is nearly a third of the project. Although the building cost per square foot is a little less than our project in Royalton, the site costs are much higher, primarily because we were building on the footprint of a former building and we already had parking and a driveway, but at Norwich we are building roads and parking for 41 cars, while also bringing in a new 4"water line for the sprinkler system and a separate 6" water line for a fire hydrant by the Senior Housing that Jeff Goodrich tells me is required by the Fire District, and a new electrical service to use the energy efficient Air Exchange Heat Pump System.

If we reduce the program to have 30 parking spaces instead of 41, we save about $105,000. This is because we avoid ANR permitting and can use normal paving instead of pervious paving. Since there are only 10 parking spaces now and we are not dramatically increasing staff, we may find that 3 times the existing parking is sufficient. If not, the additional 11 parking spaces could be built later at much less cost in the same location shown on Site Plan C1.

The green shaded area of the **8 19 16 Summary of Norwich Police and Fire Project Costs and Options** indicated the projected cost of each item getting closer to a Net Zero Building. The recommended options add about $87,080 (just over 10%) to the building cost. Site costs do not change.

The solid yellow shaded area, indicates the projected cost of the list of Options in the RFP. Two of those are not recommend and the chart says why.

The darker shaded area at the very bottom indicates costs for various options.

My recommended project with the parking reduced to 30 parking spaces as shown on Sheet C1 Alt, is estimated to cost **$1,345,009** and is marked near the bottom of the Summary Spread Sheet. This recommendation includes all of the recommended Net Zero upgrades as well as the recommended RFP Options, plus two others that are needed, plus normal A/E fees and permitting costs. The lowest cost project would be **$1,168,207** with none of the Net Zero Options or RFP Options. And there are options in between, with each item's estimated cost to add or subtract in the spread sheet.

The highest cost option is the same as the recommended option but adds $105,000 more to get the 11 extra parking spaces, but still does not include an additional reservoir under the underground base material Pathways Consulting specified. I don't think a reservoir will be necessary, even with the 41 parking spaces project shown on Sheet C1 and certainly NOT necessary with the 30 parking spaces project recommended shown on Sheet C1Alt. If an underground

water storage layer is necessary, it will add about $37,000 more. Jeff will be at the meeting to answer questions about the site and civil engineering proposed on the attached drawings, C2 and C3.

COMBINED DRAWINGS: Also attached are a full set of new drawings, that mainly add the civil engineering design that Pathways had to do before they could estimate its cost. We also raised the height of the building by 12" so we have more room between the ceiling and the attic floor for all of the piping required to get in more plumbing and a sprinkler system that we did not have in the Royalton project. All of these changes are factored into the cost estimates. None of them change the agreed program.

BASIS OF DESIGN: This is where you will find a description of what our estimates are based on. Those from Engineering Services of Vermont list the Basis of Design for the Base Building in the first part, and the Basis of Design for the Net Zero upgrade in the second part. The Outline Specifications and Basis of Design from me indicate what is in the building.

DETAILED COST ESTIMATES UPLAND CONSTRUCTION has two separate estimates: One for the Base Building and one for a Net Zero Building. The added cost for each item to get toward Net Zero are listed on the Summary spread sheet.

PATHWAYS CONSULTING, prepared two spreads sheet, but I am only including the one in this attachment (with the reservoir); the other is essentially the same, but omits the reservoir. They are both based on the full program of 41 parking spaces, which therefore require expensive paving (nearly double) and underground containment system. It is unknown of the Reservoir, which adds an additional 18" of base below their normal 24" of base material would be needed, but I'm guessing not because Pathways has confirmed that we have well drained soil, which is a good thing. But Jeff did work with me to get to a savings achieved by doing normal paving without an expensive ANR analysis and underground drainage work if we can live with 11 less parking spaces now, or build them as a separate project later if they are really necessary. Although the Pathways estimate includes a 20% contingency, I have reduced it in my analysis to a normal 15% contingency consistent with schematic design, which I think is safe given the amount of design and calculations that were done prior to the estimate.

WHOLE BUILDING MODELING You were very helpful in tracking down yesterday what Dan Dupras needs to finish the modeling, which he can do in time for our meeting, but not today. Without his explanation of conclusions and recommendations that can only be done when he analyses the capacity of your existing solar array system, the modeling attached here may not be clear to those not familiar with how to read the results and make meaningful recommendations from them. Dan will be at the meeting on August 24 to explain the results and his conclusions.

I have combined all of the documents into one file in the order I think makes the most sense and therefore can be printed with a single "print" click. The drawings are formatted to print at 11x17. There are 54 pages in the attachment.

Our whole team is planning to be there to answer whatever questions we can; please confirm a time when we should arrive on August 24.

Thanks.

JAY WHITE, ARCHITECT PLC
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SUMMARY OF ESTIMATED PROBABLE COST FOR DESIGN OPTIONS BEING CONSIDERED
TOWN OF NORWICH FIRE AND POLICE FACILITY
FIREHOUSE LANE, NORWICH, VERMONT
SUMMARY PREPARED BY Jay White, Architect from estimates provided by consultants
August 19, 2015

	Item Description				COST PER ITEM
BASE BUILDING (2015 VERMONT COMMERCIAL BUILDING ENERGY STANDARDS) DESIGN OPTION					
	SITE WORK (Same for Base Design or Net Zero Option)	From Pathways (option w/o reservoir)	but with 15% contingency instead of 20% contingency		$395,339
	BASE DESIGN BUILDING COST	From Upland Spread Sheet	(5913 sf building calculates to $133/sf w/o site work)		$786,470
	BASIC DESIGN OPTION, BUILDING AND SITE WORK				**$1,181,809**
	A/E fees	6%	of construction costs		$70,909
	Permit fees (omit if parking has standard pavement and 30 parking spaces)		From Pathways statement		$20,000
	Total BASE BUILDING DESIGN OPTION including Building cost, Site cost, AE cost, and 41 parking spaces				**$1,272,718**
NET ZERO DESIGN OPTION will add these additional items					
Item # from Upland Cost Estimate					
7-20-10	Slab insulation from R10 to R20			adds	$13,120
7-20-20	Rigid installation			adds	$960
7-21-10	Roof upgrade from R49 to R60, and walls from R23 to R40			adds	$25,000
7-25-20	Added Category: Air Sealing and Testing			adds	$3,500
7-46-63	Wrap apparatus building with foam panels			adds	$16,800
7-46-65	Add more apparatus roof insulation	Not recommended as the roof is fairly new and recently insulated to current 2015 code.			$16,899
8-30-15	Replace Apparatus Garage Doors with new insulated doors with vision panels in two of the panels			adds	$7,500
8-54-21	Marvin Window Upgrade	Not recommended due to cost, heavier window lift and more likely seal failure with triple glazing.			$39,951
23-72-10	12 Zone Heat Pump			adds	$13,000
23-72-20	Structural Modifications to trusses			adds	$1,200
23-72-30	Thermal Envelope at HRU's enclosure			adds	$3,000
26-00-00	Added Electrical for Low ambient ar source heat pump			adds	$3,000
26-00-95	Generator Upgrade	Not recommended, due to cost. Keep some oil heat in building for emergency and cold temp use.			$40,000
		Total RECOMMENDED NET ZERO OPTION UPGRADES			**$87,080**
	A/E fees associated with additonal Net Zero Upgrade costs	6%	of recommended net zero option upgrades		$5,225
	Total NET ZERO DESIGN OPTION including Building, Recommended Net Zero Options, Site, and AE cost				**$1,365,022**
OPTIONS LIST THAT THE SELECTBOARD ASKED US TO CONSIDER IN THE RFP					**Cost to add:**
RFP Item #					
2.5.1	Allowance for new furniture	From Exterus Business Furntiture		Recommended	$37,497
2.5.2	Concrete walks to entrance door instead of asphalt	648 sf at $3.00 more per sf than asphalt		Recommended	$2,000
2.5.3	Granite curbs	No curbs are recommended in order to get more even site drainage		Not recommended	$0
2.5.4	Traffic Control System at Main Street	LED yellow flashers on signs instead of traffic light, From TAPCO		Recommended	$9,500
2.5.6	Fire apparatus tank fill in Fire Station	Estimate from Dan Dupras email of 8/18			$5,000
2.5.6	LED lighting in place of high energy efficient fluorescent lighting	We are using LED in both design options due to their much lower cost in recent years and in order to meet 2015 code requirments on watts/sf we are allowed.		Recommended, as no additional cost	$0
2.5.7	Insulating walls of Fire Appratus Building	Listed in NET ZERO option above, so not carried here again.			see net zero adds
2.5.8	Replace Fire Apparatus windows with new windows	Request from Fire Chief is to cover windows and add glass in new garage doors			see net zero adds
2.5.9	Replace Fire Apparatus doors with new doors	Listed in NET ZERO option above, so not carried here again.			see net zero adds
2.5.10	Key care entrance control	Both design options use keypad deadbolts instead of keys of key cards		Not recommended	$0
2.5.11	Exterior Security Cameras	Work is similar so estimate is same as for Royalton Municipal Building		Recommended	$9,500
2.5.12	Interior Security Camera in interview and Lobby	Work is similar so estimate is same as for Royalton Municipal Building		Recommended	$4,000
Added by Arch.	Telephone connections in building	Work is similar so estimate is same as for Royalton Municipal Building		Recommended	$8,000
Added by Arch.	Wireless communications and computer connections in building	Work is similar so estimate is same as for Royalton Municipal Building		Recommended	$9,000
				TOTAL OF RECOMMENDED OPTIONS	**$84,497**
		PROJECT COST WITH RECOMMENDED NET ZERO UPGRADES and OPTIONS			**$1,449,519**
	SITE COST REDUCTION IF WE REDUCE PARKING PROGRAM FROM 41 SPACES TO 31 SPACES				
	Be able to use normal paving instead of pervious paving				
	Based on email from Pathways with we can use standard paving	$114,805 for pervious paving, without reservoir minus $87,210 for normal paving equal savings of			-$27,595
		Reduce amount of paving by 825 sy at savings of $80/sy equals additional saving of			-$66,000
		Remove need for Agency of Natural Reasource Permitting			-$5,000
		TOTAL CONSTRUCTION COST SAVED BY REDUCING PARKING BY 11 SPACES			**-$98,595**
		Reduce A/E fee due to lower construction cost		6% of construction cost	-$5,916
		PROJECT COST WITH RECOMMENDED NET ZERO UPGRADES AND OPTIONS, 41 PARKING SPACES			$1,449,519
ARCHITECT'S RECOMMENDED PROJECT:		PROJECT COST WITH RECOMMENDED NET ZERO UPGRADES AND OPTIONS, **BUT WITH 30 PARKING SPACES**			$1,345,009
		CHEAPEST PROJECT, **WITHOUT** NET ZERO OR OTHER OPTIONS, WITH 30 PARKING SPACES			$1,168,207

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August 19, 2016

NORWICH FIRE AND POLICE FACILITIES

Outline Specifications and Architectural Basis of Design

Division 1: General Conditions

1. Building will be slab on grade, one story and wood-framed meeting all current codes including the *2015 Vermont Commercial Building Energy Standards*. The recommended building exceeds those codes in two significant ways:

    a. The building will be fully sprinklered, even though this is not required in the codes.

    b. We have identified several additional upgrades and features to get the building closer to NET ZERO energy efficiency and the cost of doing each item. Most, but not all, of those features are included in our Summary of Recommendation Spread Sheet attached to this report, which explain why we are not recommending some options.

2. Normal General Conditions and permitting for commercial projects this size are factored into the cost estimates.

Division 2, Site Work:

1. Pathways Consulting has prepared an extensive civil engineering design and related details used in their Estimate of Probable Cost, attached to this report.

2. There are two site plans presented for consideration;
    Drawing C1 shows a total of 41 parking spaces. The seven identified for police use only are located north of the building, near the police entrance. All others are south of the building.

    Drawing C1 Alt. show the Archiect's Recommended Site Plan, which is identical to C1, except it recommends that we only build 30 parking spaces instead of 41. To build the additional 11 spaces, the Agency of Natural Resources requires a porous paving surface and expensive underground drainage and permitting process, all of which is estimated to cost an additional $105,000 to the project cost. Since the current site only has 10 spaces, it seems to us that it makes sense to consider modifying the parking program to only build 30 as part of this project, instead of 41 spaces now, with the knowledge that the other spaces could be built as shown on drawing C1 at a later date for much less money if they are truly needed.

3. Both site plans correct drainage problems at Firehouse Lane and its intersection at Main Street. The Project includes re-paving Firehouse Lane because it will be dug into to bury a new 4" water line (required by the sprinkler system), a new 6" water line required by the Fire District, and a new Electrical Service required to feed the energy efficient Electric Heat Pump System that will heat and cool the building most of the time.

4. Both site plans have a 50 foot turning radius onto Hazen Street in order for fire trucks to be able to use that entrance to the site if necessary. This is unlikely, but in the event Firehouse lane is blocked for maintenance or some other reason, it may be good to have this additional way to get fire trucks in and out of the property, since the cost is the same.

5. Landscaping is not fully defined, but intent is that what is not paved will be grass. There will be a gravel drip area next to the building. One new tree is planned near the southeast corner to add shade and interest to the design.

6. Site lighting is completely shielded and on timer controls. Color temperatures are all a warm 3000K as we are close to a residential area and we do not want this areas to look like a bright beacon, but all roads, walks and parking areas are fully lit and engineers as explained on the drawing of lighting in the Engineering Services of Vermont's Lighting Plan. The existing pole light near the southwest corner of the apparatus building will remain in place and continue to light that area, but the pole should be straightened and re-set.

   If the recommend site plan with less parking is accepted to save the $105,000 savings offered in it, the southern-most light in the Lighting Plan will be omitted.

Division 3, Concrete:

1. All of the building is slab-on-ground, 1-story, construction. The slabs are insulated to meet the current code, but add more insulation to get closer to Net Zero design as indicated on the costing spread sheets.

2. Concrete walks are recommended, but asphalt walkways will suffice. Aprons in front of both the public entrance and the police entrance under their respective porticos will not be asphalt, as concrete is required for stability at these entrances.

3. No curbs are recommended in order to reduce concentration of drainage, reduce construction cost, and make it easier for plowing and maintenance.

4. All concrete is normal, 3000psi strength.

Division 4, Unit Masonry:

1. There is none on the project.

Division 5, Metal Fabrications:

1. One steel wide flange beam, supported on two steel posts buried in the exterior walls will be required to support the trusses of the main roof ridge over the Training Room.

Division 6, Carpentry:

1. Exterior walls will all be 2x8 wood studs supporting simple wood trusses supported on the exterior walls and one steel beam across the Training Room. This will allow relocation of interior walls in the future that are not around restrooms or shower rooms.

2. All roofs will be supported with wood trusses space 24" o.c. and with a roof pitch of 8:12.

3. All trusses will have ½" thick oriented strand board applied to the underside of the bottom chord of the trusses, so it can support attic insulation.

4. All trusses will be supported at 11' above the floor,

5. All window and door exterior rough openings are at 9' above the floor as shown on the exterior elevations.

6. All ceilings will be accessible 2x2 acoustic panel ceilings, with 20" of space above the ceilings and below the OSB sheathing, so that all electrical, plumbing, sprinkler lines and small air ducts to serve the locker rooms and restrooms can be in this space, with all parts of it fully accessible above the removable acoustical ceiling panels.

7. Interior walls will be mostly 2x4 wood studs, but some will be 2x6 studs where required for plumbing.

8. Interior wall finishes will be mostly 5/8" painted sheetrock, except in the restrooms which will have porcelain tile up to 4' above a porcelain tile floor. Shower rooms will have porcelain tile walls supported on 5/8" water-proof Sheetrock.

9. All exterior walls on the new building will have Hardie Panels, pre-finished in two different colors and textures as indicated on the elevations.

10. All exterior trim will be solid PVC white trim, so it never needs painted.

Division 7, Thermal and Moisture Protection:

1. All roofs on the new building will have architectural series asphalt roofing shingles, charcoal grey in color.

2. Insulation in the roof and in the walls vary in specification; more is used and in the Net Zero Design Option but wood framing remains the same in both options. In the base option, we will achieve the require R23 with loose cellulose poured in the 2x8 wall cavities with an interior vapor barrier, and an exterior weather sheet under the Hardie panels.

   In the Net Zero option we will use a closed cell urethane foam insulation to get an R42 between the 2x8 wood wall studs, but will not need a vapor barrier.

3. Flashing will be painted aluminum.

4. In the Net Zero Design Option, we will provide Kingspan "Azetco" 4" thick urethane foam panel sandwiches between steel skins. These will be screwed to the existing apparatus building, and cover the metal as well as the concrete wall below it. We are not proposing to add panels to the brick front, as that wall is mostly doors, and energy saving in doing so would be minimal. The intent is to get daylight through two panels of the new apparatus doors, but cover all of the existing windows in the building. Intent here is to get as simple as covering as possible, with minimal detailing or texture, so the building does not compete with or try to mimic the new office building.

Division 8a, Windows:

1 All windows will be Marvin Integrity Composite double hung pairs of windows under a fixted glass upper light, as indicated on the drawings. Windows will be pre-finished both inside and out.

2. We are not recommending the much more expensive triple pane windows to get to a full Net Zero option because of the high cost and concern that doing so makes the harder to operate and have twice the risk of broken seals over the years. But we have included a price for upgrading to triple glazed windows on our enclosed spread sheets if the Selectboard wants to do that.

Division 8b, Doors:

1. Exterior personnel doors will be Therma-tru insulated fiberglass doors with insulated Low E glass.

2. Interior personnel doors will be 1 ¾" solid core composite doors. Offices will have fixed sidelights next to most doors in order to bring in more daylight to the interior spaces and provide a more open, airy feeling in the spaces. Door frames are painted wood with 1x4 wood casings.

3. Where locks are necessary, we recommend Schlage BE365CAM716, Camelot Electronic Keypad Single Cylinder Deadbolts. This technology is less expensive than maintaining a confusing master key system, and avoids the expense of replacing keys and changing locks as personnel change, and is easily programmable.

4. Where locks are not necessary we will have passage sets. Lever handles will be provided on all doors. No panic hardware is necessary.

5. Doors requiring closers will have them at the tops of the doors. All doors will have door stops, wall mounted where possible.

6. The Police garage doors will be Overhead Door Sectional Steel Doors 596, with a R value of R17.4. For privacy and security, we are not providing any vision panels in these doors but can if it is more desirable to have daylight in the garage.

7. In the Net Zero Design upgrade, we will replace the existing apparatus building doors with Overhead Door Sectional Steel Doors 596, but with vision panels the full size in two panels per door in the apparatus building. This will add more daylight between the trucks and be more energy efficient and less expensive than upgrading the windows, where leakage around the metal walls is a difficult problem to solve anyway.

Division 9, Finishes:

1. Interior walls are all 5/8" painted sheetrock except in the showers and toilet rooms. In the showers, the walls are waterproof sheetrock, supporting 3/8" thick porcelain tiles. They showers all have a fiberglass base with a flange that is an inch high behind the tile and sealed with caulking. The toilet rooms have 3/8" porcelain tile wainscot, supported on waterproof sheetrock up to 4' above the floor.

2. Floors are:
   Fire Department Kitchen and corridor leading over to the apparatus building are commercial grade sheet vinyl.
   Police garage is sealed concrete.
   Vestibule is carpet tile walk-off mat.

Police entrance is carpet tile walk-off mat width of door and its sidelight; the rest of their office area is carpet tile.
Janitor closet floor, boiler room floor, and I.T. room floors are commercial grade sheet vinyl.
Restroom floors and shower room floors (outside the fiberglass floor of showers) is 3/8" thick thin set porcelain tile.

3. Ceilings throughout are 24x24 lay-in acoustical tile set at 9' 3" above the floor, right at the top of the window casing header trim, except in the garage. The garage will have the oriented strand board exposed and not painted.

4. Wall bases are 4" coved vinyl bases throughout, except in restrooms and shower rooms where there is porcelain tile wainscot in restrooms and full height porcelain tile walls in shower rooms.

Divisions 10, Specialties and Division 11, Equipment:

1. The Fire Dept kitchen has:
   Sink
   Garbage Disposal
   Dishwasher
   Oven under 6 burner range
   Microwave oven above range
   Full size refrigerator
   Upper and lower cabinets
   Plastic laminate counter top and backsplash.

2. Police Kitchenette has:
   Sink
   Garbage Disposal
   Under-counter refrigerator
   Microwave over
   Upper and lower cabinets
   Plastic laminate counter top and backsplash

3. Police officer counters are built-in plastic laminate.

4. The reception window is a fixed glass security window with slot underneath. It is designed so it is mostly sound proof, but open in the frames so you can hear through it. This is same as Royalton Police Dept. if you want to check it out.

5. The shutter at the Fire Department kitchen is an aluminum roll down shutter that completely blocks the view when lowered; it is not a grille or grate.

6. Toilet rooms will have;
   Mirror
   Efficient electric hand drier
   Soap dispenser
   Sink
   Comfort height elongated toilet
   Grab bars in handicapped restrooms, which is all but one in the fire department.

7. Janitor closets will have:
   Mop Sink
   Hooks above mop sink
   Two fixed shelves for cleaning supplies.

8. Vestibule will have two drinking fountains at two different heights.

9. Evidence Room will have built in pass through cabinet doors with locks on each side, and shelf in between to put evidence on that is small enough to fit there.

Division 12: Furniture:

1. Cost estimate of $37,500 from Exterus Business Furniture is based on all furniture shown on Sheet A101. It is similar to what they have installed in other municipal offices recently.

Division 15 and **16, Mechanical, Electrical and Plumbing:**

1. Mechanical, Electrical and Plumbing systems are described in the "Basis of Design" from Engineering Services of Vermont.

Engineering Services of Vermont, LLC
Mechanical-Electrical Consulting Engineers

9 Washington Street
Rutland, Vermont 05701
Tel: 802-855-8091

June 1, 2016
ESVT Project No. 16092

Norwich Fire & Police Facilities
Norwich, Vermont
August 12, 2016

Proposed Basis of Design, Divisions 26/27/28 Electrical

We have prepared the following basis of design for the electrical systems for the proposed Norwich Fire & Police Facilities Norwich, VT. We have based this basis of design on the proposed concept drawings prepared by Jay White Architect and through our meetings and correspondence related to this project with the Architect.

1. General
    a. Provide a complete electrical system in accordance with all applicable codes, to include electrical service, electrical distribution, general power, lighting, lighting controls, telecommunications systems, communications and fire alarm systems as appropriate for this multi-floor senior living apartment building. Codes applicable to the electrical work on this project are the Code of Ordinances of the Town of Waterbury, Vermont which include, but are not limited to:
        i. State of Vermont, 2012 Fire and Building Safety Code
        ii. IBC-2012, International Building Code, with State of Vermont amendments
        iii. NFPA 1-2012, Fire Code, with State of Vermont amendments
        iv. NFPA 101-2012, Life Safety Code, with State of Vermont amendments
            1. Chapter 38 – New Business Occupancies
        v. NFPA 72-2010, National Fire Alarm Code, with State of Vermont amendments
        vi. NFPA 70-2011, National Electrical Code (NEC), with State of Vermont amendments
    b. Provide electrical installation, specifically lighting, lighting controls and maximum voltage drops meeting the requirements of the 2015 Vermont State Commercial Energy Standards (CBES) and the Federal Energy Code, as appropriate.

c. Provide coordination with Efficiency Vermont to implement energy savings measures that are practical and cost effective for the building and its use and to obtain maximum available incentive dollars for the measures that are implemented.

d. Coordinate with design and construction teams towards constructing this building to be passive house certified.

e. Coordinate with power and telecommunication utility companies and their requirements as necessary.

f. Coordinate with contractors of other trades (general, civil/site, mechanical, plumbing, temperature control) as necessary to provide an overall professional and complete project.

2. Electrical Service and Distribution

a. Provide coordination with Green Mountain Power (GMP) for electrical service to the building. All aspects of the service wiring installation shall be as per GMP requirements. The contractor shall obtain the latest version of the Vermont Utilities Service Requirement Manual available on line at www.greenmountainpower.com .

b. The existing overhead single phase electrical service routed from Main Street to the west to the Apparatus Building will be replaced.

c. A single phase service originating from a GMP pole top transformer on Main Street will route underground parallel with the new water line under Firehouse Lane.

i. Three conduits will be provided parallel to the electrical service wiring for telecommunications services to the building.

ii. Ductbank under the roadway will be encased in concrete.

iii. Power and telecommunications ductbank will be 10' clear from the water piping.

iv. Minimum 36" to top of ductbank conduits

v. Routing of services underground from utility pole on Main Street to the Firehouse Lane may need to be coordinated with neighbors and easements may need to be obtained.

d. Electric service is preliminarily sized as 600 Amp, 120/240V, 3 phase, 4 wire.

e. Refer to the Preliminary One Line Diagram (at end of report) for the arrangement of distribution.

i. An estimated 130KW LP Gas fired standby power generator will be provided to support the electrical load of the building in the event of a loss of utility power, replacing the existing LP Gas fired generator. Provided with Level 1 enclosure, battery charger, battery heater, block heater, remote annunciator and circuit breaker on generator.

ii. Distribution will be divided, with loads separated into circuit breaker panelboards to serve lighting loads, mechanical loads and receptacle/miscellaneous loads. This is necessary to allow for monitoring these three types of loads as required by the Efficiency Vermont Net Zero Building Guide for Commercial New Construction.

iii. Monitoring will be provided through the installation of an electronic monitoring system with web-based access and interface to a building information management (BIM) system. Basis of design will be products from eGauge, EG3000 with Powered Enclosure Kit. (www.eGauge.net)

f. Wiring Methods:

i. Follow all applicable codes and use good electrical construction practices when determining types of wiring methods and sizing of conductors and conduit. Install all power, control and signal wiring using methods as follows.

1. Underground Wiring or Beneath Concrete Slab: Individual conductors in schedule 40 PVC rigid non-metallic conduit (RNC) for direct burial; transition to schedule 80 PVC RNC (heavy wall) where conduit rises to be exposed above grade or concrete slab, from a minimum of 24" below finished grade.
2. Exposed Exterior Wiring: Individual conductors in galvanized steel rigid metal conduit (RMC).
3. Exposed Wiring in Utility Areas (Boiler, Electrical, etc.): Individual conductors in electrical metallic tubing (EMT) with set screw fittings.
4. Concealed Feeder and Homerun Wiring: Individual conductors in electrical metallic tubing (EMT) with set screw fittings.
5. Concealed Branch Circuit Wiring: Type MC (metal clad) cable with integral equipment ground conductor.
6. Final connections to mechanical/vibrating equipment will be maximum 3' flexible metallic conduit (FMC) in dry areas and liquid tight flexible metallic conduit (LFMC) in damp/wet areas.

ii. All wiring in finished areas will be routed concealed and devices will be flush/recessed mounted. Wiring in the utility areas will be exposed where no wall finish exists. Wiring routed exposed on vertical surfaces will be routed vertically; horizontal wiring will be routed at the ceiling level of these spaces, not on the walls.

iii. Service conductors shall be aluminum conductors, with type XHHW insulation. Feeder conductors shall be copper, with type XHHW insulation. Branch circuit conductors shall be copper with type THHN/THWN-2 insulation.

iv. An insulated equipment ground conductor shall be provided within all raceways, boxes and enclosures. A bare equipment ground conductor is acceptable within all cables.

3. Lighting
    a. In general, all spaces will be illuminated utilizing LED (light emitting diode) light source luminaires.
    b. Interior lighting controls will utilize occupancy sensors as well as manual switches. All spaces will have manual switches to turn lights on. Lights may be turned off manually, or turn off automatically after a set time after the occupancy sensor no longer senses presence. Upon entering the space, the lights must be manually turned as is required by the Energy Code. This operation is identified as "vacancy control" as opposed to "occupancy control" which allows the occupancy sensors to automatically turn the lights on.
    c. Exterior lighting will be a combination of building mounted and pole mounted LED light source luminaires. All exterior luminaires will be full cut-off with no lighting above 90 degrees (horizontal).
        i. Refer to the Exterior Lighting Calculation drawing EL1 prepared for permitting, dated 08/11/2016.
    d. Exterior lighting will be controlled through an astronomic timeclock controller with photocell input.
        i. Building mounted lighting will be photocell on, timeclock off.
        ii. Pole mounted lighting will be photocell on, timeclock off and will incorporate controls to dim output to 50% after a set amount of time with light coming back up to 100% output using motion sensors on the poles. Upon not sensing activity, lighting will reduce back down to 50% output.
    e. The life safety lighting within the building (exit and emergency lighting) will be provided throughout the public areas of the building and in the utility spaces as necessary. Exit signage will be LED type with integral batteries for self-powered operation upon loss of utility power. Emergency lighting fixtures will be a combination of battery packs with integral lighting heads, powering remote light head units as necessary and battery/inverters in the luminaires themselves.
        i. Self-testing life safety lighting equipment will be specified. This equipment will test itself to ensure that it is operational within the parameters of applicable Code, and will sound a signal in the event it is no longer properly operational.
    f. Luminaire selection and layout will be in collaboration with the Architect. Luminaires will be selected to be Energy Star or Design Lights Consortium listed.
4. General Power
    a. General use receptacles shall be generally spaced a maximum of 12' on center. Private offices will have one receptacle on each wall.

b. Ground fault interrupting type receptacles and/or circuit breakers shall be provided as necessary within the Kitchens and Bathrooms.

c. All receptacles will be specification grade 20A 120VAC duplex NEMA type 5-20R.

d. Weatherproof receptacles will be located around the exterior of the building as appropriate.

e. Power connections shall be provided to all new HVAC and plumbing equipment provided as part of this project, as well as all 120 VAC systems control wiring.

f. Power feeds will be provided to all building equipment.

5. Life Safety Systems

a. Life safety lighting was addressed in the Lighting portion of this design concept.

b. A manual fire alarm system will be provided with manual stations and audible/visual signals throughout the building. Automatic initiation of the fire alarm system will be provided from sprinkler system flow switch(s), smoke detectors in the storage and utility spaces and hood fire protection system in the Kitchen. The fire alarm system will provide supervisory functions as necessary to monitor the sprinkler system, corridor carbon monoxide sensors and kitchen hood fire protection system. The fire alarm system will include a remote annunciator at the main entrance to the building and will have a digital communicator to send the alarm signal offsite.

i. System audible signal with visual strobe will be throughout the building.

ii. Carbon monoxide sensors will be provided nearby fuel burning equipment and garage areas, powered by and monitored by the fire alarm system.

6. Telecommunications:

a. Service conduits with pullwires shall be provided in the conduits from the utility riser pole underground to a backboard at the telecommunications area (I.T. equipment area).

b. Voice (telephone) and Ethernet (data) cabling will be provided throughout the building from wall jacks back to punchdown in wall mount racks in the I.T. equipment area. All cabling will be complete from wall jack to punchdown and tested per TIA/EIA requirements. Each wall device will contain two jacks/cables. Two wall devices per private office as well as devices located in open offices and conference and meeting rooms.

c. CATV wall jacks and cabling will be provide complete to the I.T. equipment area similar as described for voice and Ethernet cabling.

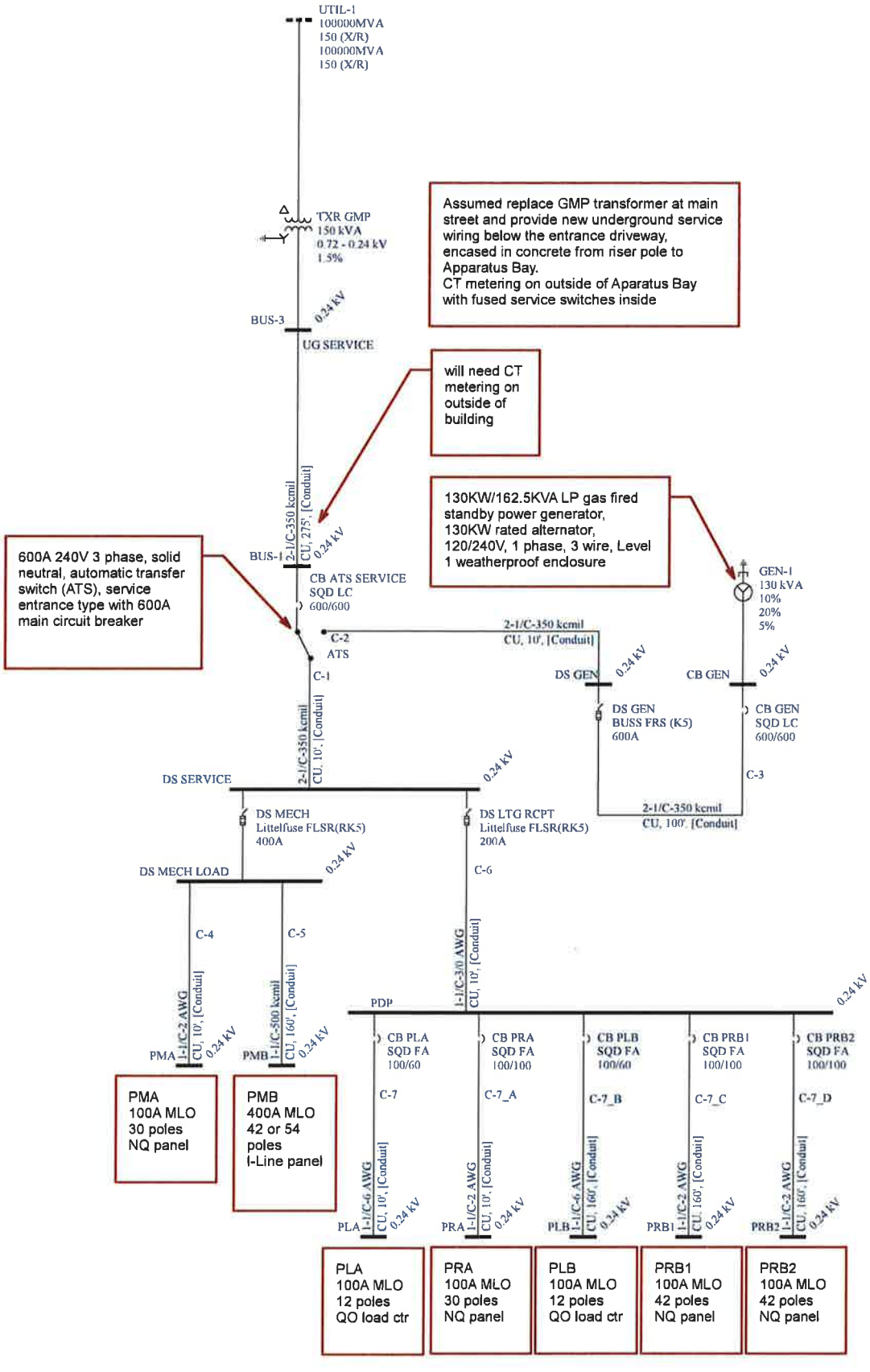
i. Telephone will utilize CAT6 cabling

ii. CATV will utilize RG6 cabling

iii. Wall racking will be specified installed on the backboard along with patch panels for both telephone and CATV. All cables will be punched down in the panels and labeled by unit.

iv. Cabling will be complete from the patch panels through to the wall devices in the units. All cabling will be tested upon completion of installation.

d. A door access intercom system shall be provided for the main public entrance door. The door access intercom system shall include outside station with call pushbutton, speaker and camera. A monitor and control will be located inside at the police admin office which will allow the visitor to be seen on a monitor and communicated with through speaker/microphone and the main door released to allow access. Basis of design is products from AiPhone.



NORWICH FIRE/POLICE FACILITY - PRELIMINARY ONE LINE ELECTRICAL DISTRIBUTION DIAGRAM
ENGINEERING SERVICES OF VERMONT, LLC 08/11/2016

Engineering Services of Vermont, LLC
Mechanical-Electrical Consulting Engineers

9 Washington Street
Rutland, Vermont 05701
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August 15, 2016
ESVT Project No. 16092

Jay White, Architect, PLC
100 State Street
Suite 230
Montpelier, VT 05602

Basis of Design – Mechanical & Plumbing Systems

We have prepared the following basis of design for the mechanical and plumbing systems for the proposed Norwich Fire and Police Facilities in Norwich, VT. We have based this on the proposed concept drawings prepared by Jay White Architect, PLC. We have included a base complaint building description as well as a NET ZERO building description.

I. BASE BUILDING – 2015 CBES CODE COMPLIANT BUILDING:

1. Building Envelope Description:
    a. Existing Fire Station- Existing building thermal envelope remains as is including doors, windows and existing thermal insulation systems.
    b. New Construction:
        i. Walls: R-23 wood framed wall with blown in cellulose insulation.
        ii. Roof: R-49 Roof with blown in roof insulation in attic.
        iii. Below Grade Walls: R-10 continuous insulation
        iv. Slab on Grade R-10 for 48" below slab
        v. Overhead Doors: R-10
        vi. Windows U Values:
            1. Fixed U=0.36
            2. Operable: 0.43
            3. Entrance Doors: 0.77
        vii. Windows SHGC Values:
            1. Orientation S,E, or W=0.40
            2. Orientation N=0.53
        viii. Building air sealed to achieve a maximum infiltration rate of 0.50

CFM/SF at 50 Pascal.

2. MECHANICAL SYSTEMS

   a. Mechanical Systems:

      i. The base building mechanical systems include constant volume single zone LP gas fired heating unit with DX Cooling. The systems shall meet the following specific requirements for energy compliance:

         1. All systems air provided with mechanical ventilation, provided in accordance with ASHRAE Standard 62.1-2013. Each system shall utilize a class 1 low leakage motorized damper for the outdoor air intake.
         2. Systems with a cooling capacity of 54,000 BTUH or less shall exclude economizer cooling. Systems with a cooling capacity of 54,000 BTUH or more shall be provided with economizer cooling.
         3. All air systems shall be constructed using galvanized sheet metal ductwork constructed and sealed in accordance with SMACNA Standards for 2" pressure class.
         4. All supply and return ductwork located in unconditioned spaces shall be insulated with 3" thick, R-8 fiberglass duct insulation.
         5. All supply and return ductwork located in outside the building envelope shall be insulated with 6" thick, R-12 fiberglass duct insulation.
         6. Supply and outside air ductwork located above suspended ceilings shall be insulated with 1 ½" thick fiberglass duct insulation.
         7. Provide grilles resisters and diffusers for distribution of air.
         8. All duct take offs shall include manual volume dampers with locking-quadrant handles.
         9. All systems shall be balanced using a certified air balancer.

      ii. Kitchen Exhaust Systems:

         1. Dishwasher Exhaust; Provide a 200 CFM exhaust fan over the dishwasher ducted to the exterior.

      iii. Propane Gas System:

         1. Provide (1) 1,000 gallon underground LP gas tank. Provide gas regulators and low pressure gas distribution to all furnaces and gas cooking equipment. All piping shall be schedule 40 black steel piping with malleable iron fittings.

iv. Controls:

1. Provide standalone programmable thermostat with economizer controls for each furnace system to control heating, cooling and fans.

b. Mechanical Zones and Systems Sizes:

i. Zone 1: Existing Fire Apparatus Garage

46,000 BTUH Heating, unit efficiency=80%
18,300 BTUH Cooling, unit efficiency= 10.80 EER

ii. Zone 2: Existing Fire Storage

13,300 BTUH Heating, unit efficiency=80%
4,800 BTUH Cooling, unit efficiency= 10.80 EER

iii. Zone 3: Fire Department Office and Day Room

46,200 BTUH Heating, unit efficiency=80%
32,800 BTUH Cooling, unit efficiency= 10.80 EER

iv. Zone 4: Fire Department Conference and Library

7,900 BTUH Heating, unit efficiency=80%
11,100 BTUH Cooling, unit efficiency= 10.80 EER

v. Zone 5: Training and Public Meetings

25,200 BTUH Heating, unit efficiency=80%
31,100 BTUH Cooling, unit efficiency= 10.80 EER

vi. Zone 6: Police Admin Office, Corridor, Toilets

22,100 BTUH Heating, unit efficiency=80%
13,500 BTUH Cooling, unit efficiency= 10.80 EER

vii. Zone 7: Emergency Operations Center

11,400 BTUH Heating, unit efficiency=80%
13,500 BTUH Cooling, unit efficiency= 10.80 EER

viii. Zone 8: Police Archives and Interview Rooms

32,900 BTUH Heating, unit efficiency=80%
19,600 BTUH Cooling, unit efficiency= 10.80 EER

ix. Zone 9: Police Garage

25,800 BTUH Heating, unit efficiency=80%
7,800 BTUH Cooling, unit efficiency= 10.80 EER

x. Zone 10: Police Chief and Supervisor Office

8,900 BTUH Heating, unit efficiency=80%
9,900 BTUH Cooling, unit efficiency= 10.80 EER

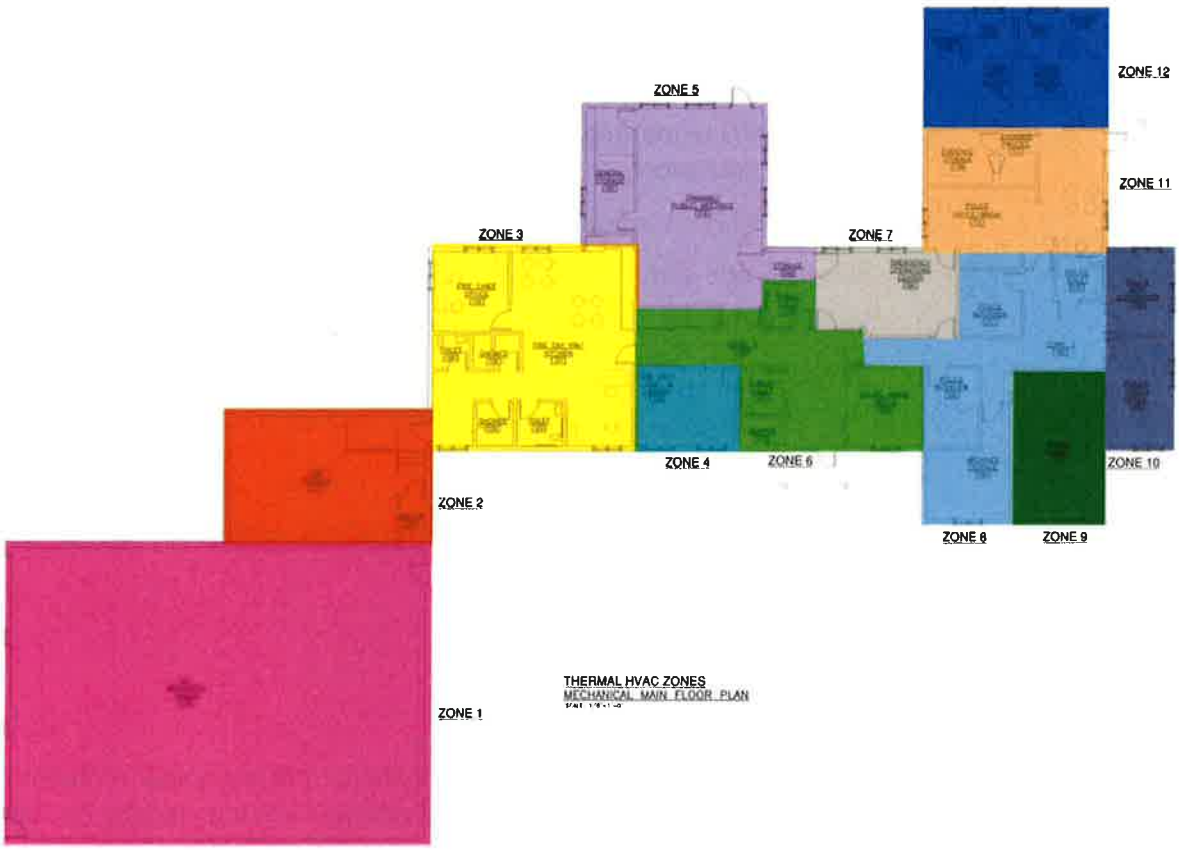
xi. Zone 11: Police Office and Break Room

23,300 BTUH Heating, unit efficiency=80%
20,300 BTUH Cooling, unit efficiency= 10.80 EER

xii. Zone 12: Police Locker Room

37,300 BTUH Heating, unit efficiency=80%
14,200 BTUH Cooling, unit efficiency= 10.80 EER

c. HVAC Zoning Plan:



a. Fire Station Ventilation System: Demand controlled exhaust and intake system which provides 0.50 CFM/SF when elevated levels of Carbon Monoxide or Nitrous Oxide exist in truck bays.

II. NET ZERO BUILDING:

1. Building Envelope Description:

a. Existing Fire Station:

i. Walls: R-18, 2.5" thick Aztec panels over existing walls with 3" fiberglass.

ii. Roof: 5" polyiso over original steel roof with original 3" vinyl faced batts insulation on the interior R-39 total.

iii. Below Grade Walls: no insulation

iv. Slab on Grade no Insulation

v. OH Doors: R-15

b. New Police Department:

i. Walls: R-40 wood framed wall 3" continuous insulation with blown in cellouse insulation.

ii. Roof: R-60 Roof with blown in roof insulation in attic.

iii. Below Grade Walls: R-30

iv. Slab on Grade R-20 continuous insulation

v. Windows SHGC Values:

1. Orientation S,E, or W=0.40

2. Orientation N=0.0.53

vi. Building air sealed to achieve a maximum infiltration rate of 0.10 CFM/SF at 50 Pascal.

vii. OH Doors: R-15.

2. MECHANICAL SYSTEMS

a. Mechanical Systems:

i. The Net Zero building mechanical systems include a low ambient air source heat pump systems with back-up electric resistance heat. Dedicated outdoor air systems with ultra-high efficiency heat recovery systems will be provided for fresh air. The systems shall meet the following specific requirements for energy compliance:

3. Dedicated outdoor air heat recovery units shall be utilized to provide fresh air. Systems shall have a 90% thermal efficiency and shall utilize ECM fan motors. All systems air provided with

mechanical ventilation, provided in accordance with ASHRAE Standard 62.1-2013. Each system shall utilize a class 1 low leakage motorized damper for the outdoor air intake.

4. All air systems shall be constructed using galvanized sheet metal ductwork constructed and sealed in accordance with SMACNA Standards for 2" pressure class.
5. All supply and return ductwork located in unconditioned spaces shall be insulated with 3" thick, R-8 fiberglass duct insulation.
6. All supply and return ductwork located in outside the building envelope shall be insulated with 6" thick, R-12 fiberglass duct insulation.
7. Supply and outside air ductwork located above suspended ceilings shall be insulated with 1 ½" thick fiberglass duct insulation.
8. Provide grilles resisters and diffusers for distribution of air.
9. All duct take offs shall include manual volume dampers with locking-quadrant handles.
10. All systems shall be balanced using a certified air balancer.

ii. Kitchen Exhaust Systems:

1. Dishwasher Exhaust; Provide a 200 CFM exhaust fan over the dishwasher ducted to the exterior.

iii. Controls:

1. Provide standalone programmable thermostat with economizer controls for each heat pump system to control heating, cooling and fans.

b. Mechanical Zones and Systems Sizes:

i. Zone 1: Existing Fire Apparatus Garage

50,100 BTUH Heating, 3.17 COP @ 47 deg. F.
12,500 BTUH Cooling, unit efficiency= 10.75 EER

ii. Zone 2: Existing Fire Storage

13,900 BTUH Heating, 3.17 COP @ 47 deg. F.
3,400 BTUH Cooling, unit efficiency= 10.75 EER

iii. Zone 3: Fire Department Office and Day Room

53,000 BTUH Heating, 3.17 COP @ 47 deg. F.
30,400 BTUH Cooling, unit efficiency= 10.75 EER

iv. Zone 4: Fire Department Conference and Library

9,800 BTUH Heating, unit efficiency, 3.17 COP @ 47 deg. F.
9,400 BTUH Cooling, unit efficiency= 10.75 EER

v. Zone 5: Training and Public Meetings

37,400 BTUH Heating, unit efficiency, 3.17 COP @ 47 deg. F.
31,700 BTUH Cooling, unit efficiency= 10.75 EER

vi. Zone 6: Police Admin Office, Corridor, Toilets

22,800 BTUH Heating, unit efficiency, 3.17 COP @ 47 deg. F.
11,700 BTUH Cooling, unit efficiency= 10.75 EER

vii. Zone 7: Emergency Operations Center

11,400 BTUH Heating, unit efficiency, 3.17 COP @ 47 deg. F.
9,400 BTUH Cooling, unit efficiency= 10.80 EER

viii. Zone 8: Police Archives and Interview Rooms

27,700 BTUH Heating, unit efficiency, 3.17 COP @ 47 deg. F.
14,200 BTUH Cooling, unit efficiency= 10.75 EER

ix. Zone 9: Police Garage

4,500 BTUH Heating, unit efficiency, 3.17 COP @ 47 deg. F.
3,900 BTUH Cooling, unit efficiency= 10.75 EER

x. Zone 10: Police Chief and Supervisor Office

7,400 BTUH Heating, unit efficiency, 3.17 COP @ 47 deg. F.
7,600 BTUH Cooling, unit efficiency= 10.75 EER

xi. Zone 11: Police Office and Break Room

22,400 BTUH Heating, unit efficiency, 3.17 COP @ 47 deg. F.
15,700 BTUH Cooling, unit efficiency= 10.75 EER

xii. Zone 12: Police Locker Room

37,900 BTUH Heating, unit efficiency, 3.17 COP @ 47 deg. F.
9,400 BTUH Cooling, unit efficiency= 10.75 EER

c. Dedicated Outdoor Air Heat Recovery Systems:

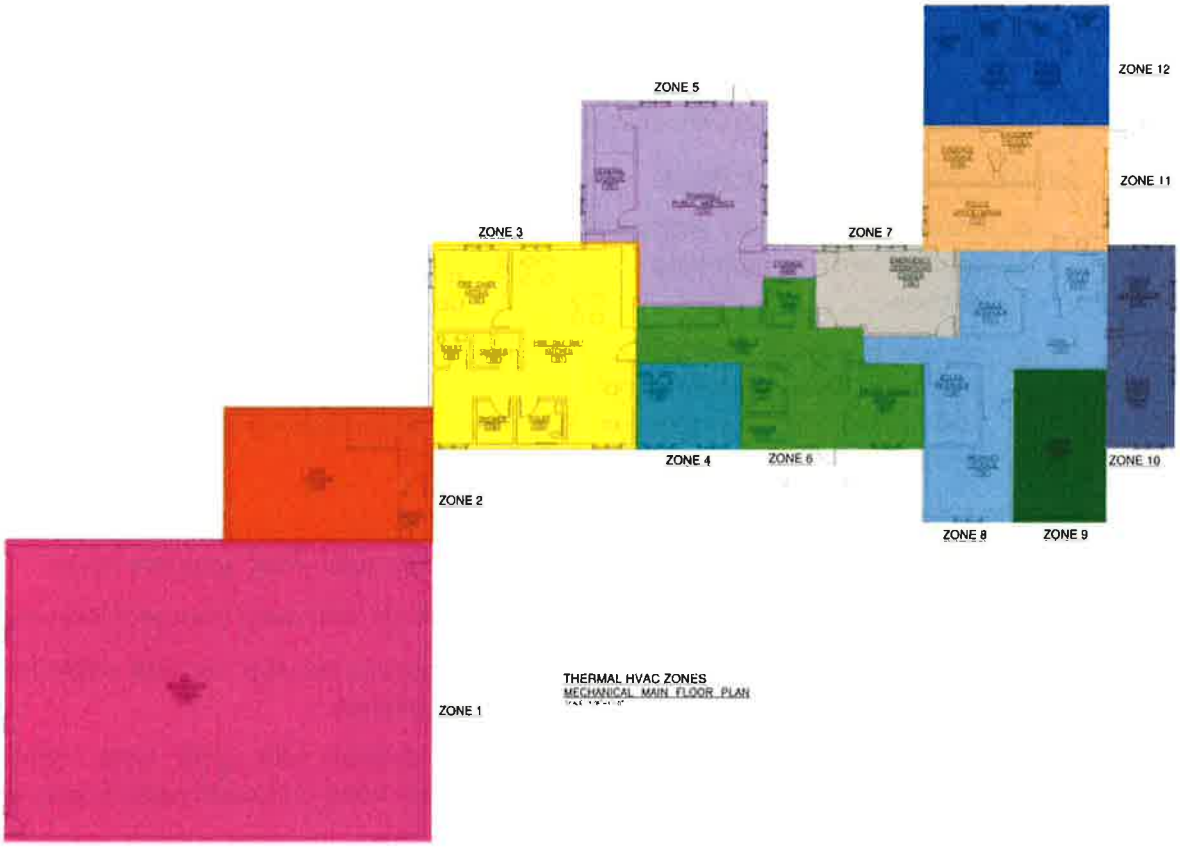
i. HRU-1: Zones Served: Zone 3,4,5 and 6.

1. 870 CFM fan at 1" ESP.

ii. HRU-2: Zones served: 6,8,9,10,11

1. 965 CFM fan at 1" ESP.

d. Fire Station Ventilation System: Demand controlled exhaust and intake system which provides 0.50 CFM/SF when elevated levels of Carbon Monoxide or Nitrous Oxide exist in truck bays.



III. PLUMBING WORK:

1. Domestic Water System:

a. Provide a new 2" domestic water service sized for 75 GPM, the service will be required to serve the proposed fixtures. This service shall be provided with a new meter PRV and backflow preventer

b. Provide new domestic water distribution to all plumbing fixtures including connections to existing branch lines serving the existing toilet rooms.

c. Domestic water distribution piping shall be type L copper using lead free solder type joints. Runouts to individual plumbing fixtures 1" and less may be PEX piping.

d. All domestic water piping shall be insulated. Cold water piping shall be insulated

with 1" thick ASJ fiberglass pipe insulation. All domestic hot water piping shall be insulated with 1 ½" thick ASJ fiberglass pipe insulation.

e. Base Bid Water Heater: Provide a 119 gallon gas fired water heater rated with a 240 gallon per hour recovery at 100 deg. F. temp. rise. Water heater shall be a high efficiency seal combustion unit. Provide new thermostatic mixing valve and hot water recirculation pump.

f. Net Zero Water Heaters: Provide two (2) Rheem Prestige 80 gallon, ProPH80 T2 RH245, rated at 86 GPH first hour rating.

2. Sanitary Waste and Vent Systems:

a. Provide new sanitary waste and vent piping systems for all plumbing fixtures, connect existing plumbing for the first floor toilet rooms to the new plumbing systems.

b. Provide a grease interceptor for the Kitchen rated for 50 GPM, unit shall be installed flush with the floor. All plumbing fixtures in the Kitchen shall be provided with 12"x12" floor receptor with ID waste drain for dishwasher and sinks located in the kitchen.

3. Plumbing Fixtures:

a. Water Closets: Flush valve standard height with open front seat less cover.

b. Accessible Water Closets: Flush valve ADA height with open front seat less cover.

c. Accessible Lavatory: Sink will be provided with counter top, provide single lever faucet with grid strainer, install for ADA compliance.

d. Shower Stall: Gelcoat one-piece roll-in shower with grab bars. Provide thermostatic mixing valve with standard shower head and hand held shower with diverter valve.

e. Kitchen Sink: Provide commercial grade three bay stainless steel pot sink with stainless steel legs. Provide drain kick drains, swing spout, hand spray and ID waste drain pipe to floor receptor.

f. Kitchen Hand Sink: Provide wall mounted hand sink with single lever faucet.

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August 15, 2016
ESVT Project No. 16092

Jay White, Architect, PLC
100 State Street
Suite 230
Montpelier, VT 05602

Attn: Jay White, Architect
Re: Town of Norwich Fire Police Facility
Preliminary Modelling Results

Dear Jay,

We have developed the following preliminary energy modelling for a base building and a NET ZERO building. This is based on the mechanical systems and construction R-Values described in the attached Basis of Design. The results will need to be compared to the available solar system capacity in order to determine if this building will meet the NET ZERO requirements.

The results of this preliminary modelling are as follows:

BASE BUILDING:

Annual Component Cost:

1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	3,200	0.346	14.3
Cooling	684	0.074	3.1
Heating	7,098	0.768	31.8
Pumps	0	0.000	0.0
Heat Rejection Fans	0	0.000	0.0
HVAC Sub-Total	**10,982**	**1.188**	**49.2**
Lights	3,189	0.345	14.3
Electric Equipment	2,253	0.244	10.1
Misc. Electric	3,365	0.364	15.1
Misc. Fuel Use	2,522	0.273	11.3
Non-HVAC Sub-Total	**11,329**	**1.225**	**50.8**
Grand Total	**22,311**	**2.413**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Energy Consumption

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	86,285	9.332	308,159	33.328
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	258,362	27.942	258,362	27.942
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**344,646**	**37.274**	**566,521**	**61.269**
Non-HVAC Components				
Electric	195,556	21.149	698,414	75.534
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	91,798	9.928	91,798	9.928
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**287,353**	**31.077**	**790,211**	**85.462**
Grand Total	**632,000**	**68.351**	**1,356,732**	**146.731**

ANNUAL ENERGY INTENSITY= 68.4 KBTU/SF OR 632,000 KBTU

NET ZERO BUILDING MODEL:

Annual Component Cost:

1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	142	0.015	0.9
Cooling	766	0.082	4.8
Heating	4,111	0.438	25.8
Pumps	0	0.000	0.0
Heat Rejection Fans	0	0.000	0.0
HVAC Sub-Total	**5,020**	**0.534**	**31.5**
Lights	2,051	0.218	12.9
Electric Equipment	2,293	0.244	14.4
Misc. Electric	6,581	0.701	41.3
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**10,926**	**1.163**	**68.5**
Grand Total	**15,945**	**1.697**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Energy Consumption

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	112,242	11.949	400,866	42.674
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**112,242**	**11.949**	**400,866**	**42.674**
Non-HVAC Components				
Electric	243,638	25.937	870,135	92.631
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**243,638**	**25.937**	**870,135**	**92.631**
Grand Total	**355,880**	**37.885**	**1,271,001**	**135.305**

ANNUAL ENERGY INTENSITY= 37.9 KBTU/SF OR 355,880 KBTU

Please call if you have any questions, or need more information.

Respectfully,
Engineering Services of Vermont

Daniel W. Dupras, P.E.
Mechanical Engineer, Principal

Transmitted: Via Email

1655 NORWICH ESTIMATE

Company Job Specifications

01 General Conditions

01-21-00 Allowances

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-21-16.50 Contingency	OTHER	1 Each	10,000	0	10,000	
		01-21-00 Allowances Totals:	10,000	0	10,000	

01-30-00 ADMINISTRATIVE REQIREMENTS

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
Plans & copies	MATERI	plans & copies: 1	600	0	600	
		01-30-00 ADMINISTRATIVE REQIREMENTS Totals:	600	0	600	

01-31-00 Project Mgmt. & Coordination

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-31-13 Project Management and Coordination	LABOR	1 Each	15,000	0	15,000	
On-site Supervision						
01-31-13.200240 On Site Supervisor	LABOR	24 Weeks	21,600	0	21,600	
		01-31-00 Project Mgmt. & Coordination Totals:	36,600	0	36,600	

01-51-00 Temporary Utilities

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-51-16 Temporary Fire Protection	OTHER	Fire Protection: 1 Weeks	325	0	325	
		01-51-00 Temporary Utilities Totals:	325	0	325	

01-52-00 Construction Facilities

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-52-13 Field Offices and Sheds	OTHER	Estimate: 6 Weeks	900	0	900	
01-52-16 First Aid Facilites	OTHER	Estimate: 6 Weeks	150	0	150	
01-52-19 Sanitary Facilities	OTHER	temp.toilets: 6 Months	690	0	690	
		01-52-00 Construction Facilities Totals:	1,740	0	1,740	

01-54-00 Construction Aids

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-54-16.500100 All-terrain Forklift	EQUIP	3 Months	5,250	0	5,250	
01-54-19 Temporary Cranes	EQUIP	5 Days	6,000	0	6,000	
Crane and Operator						
01-54-20 Man Lift	EQUIP	3 Months	5,100	0	5,100	
01-54-23 Temp. Scaffolding & Platforms	EQUIP	15 Weeks	2,250	0	2,250	
01-54-39 Small Tools and Equipment	MATERI	1 Each	3,200	0	3,200	
		01-54-00 Construction Aids Totals:	21,800	0	21,800	

01-56-26 Temporary Fencing

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-56-30 4 Foot Orange PerimeterFencing	LABMAT	1 Each	500	0	500	
Stakes and ties for approx. 400 lf						

01-56-26 Temporary Fencing Totals:			500	0	500	
01-58-13 Project Identification						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-58-13.50 Project Sign	MATERI	1 Each	750	0	750	
01-58-13 Project Identification Totals:			750	0	750	
01-74-00 Cleaning & Waste Management						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-74-13 Progress Cleaning	LABMAT	24 Weeks	2,400	0	2,400	
01-74-19 Constr. Waste Mgmt. & Disposal	LABMAT	4 Each	3,600	0	3,600	
Final Cleaninig	LABMAT	cleaning: 5000 Sq Ft	2,250	0	2,250	
01-74-00 Cleaning & Waste Management Totals:			8,250	0	8,250	
01-76-00 Protecting Installed Construction						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
Temp. protection of carpets & finishes	LABMAT	1 Each	1,000	0	1,000	
01-76-00 Protecting Installed Construction Totals:			1,000	0	1,000	
01-80-00 PERFORMANCE REQUIREMENTS						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-80-10 Construction Bonding	OTHER	1 Each	12,000	0	12,000	
Bonding Cost = 18.70/1000 for first 500k, then 11.00/1000 for balance. 700,000 job = 18.70 x 500 = 9350, plus 11.0 x 200 = 2200, total = 9350 + 2200 = 11550.00						
01-80-00 PERFORMANCE REQUIREMENTS Totals:			12,000	0	12,000	
			Cost Est	Markup	Total Est	$ / Sqr Ft
01 General Conditions Totals:			93,565	0	93,565	
02 Existing Conditions						
02-40-00 DEMOLITION AND STRUCTURE MOVING						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
02-40-20 Demolish Existing Police Structure and Dispose	LABMAT	1 Each	20,000	0	20,000	
02-40-25 Relocate Police Shed	LABMAT	1 Each	800	0	800	
02-40-00 DEMOLITION AND STRUCTURE MOVING Totals:			20,800	0	20,800	
			Cost Est	Markup	Total Est	$ / Sqr Ft
02 Existing Conditions Totals:			20,800	0	20,800	
03 - Concrete						
03-30-00 CAST-IN-PLACE CONCRETE						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
03-30-10 Footings	LABMAT	18 Cu Yds	6,300	0	6,300	
Footing size = 1'-4"x10"x430lf= 17.7 = 18cuyd						
03-30-15 Foundation Frost Wall	LABMAT	43 Cu Yds	15,050	0	15,050	
8"x4'-0"x430lf= 43cuyd						
03-30-20 Interior Building Slab	LABMAT	73 Cu Yds	25,550	0	25,550	
Area= 30x81=2430,+ 30x23=690,+ 33x73=2409,+ 33x16=528, Total 6057 x .333= 75cuyd less 2 cuyd shelf = 73 cuyd						
03-30-00 CAST-IN-PLACE CONCRETE Totals:			46,900	0	46,900	

			Cost Est	Markup	Total Est	$ / Sqr Ft
03 - Concrete Totals:			46,900	0	46,900	
05 - Metals						
05-12-00 Structural Steel Framing						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
05-12-20 Structural Steel for Building	MATERI/	1 Each	1,290	0	1,290	
30 foot I-Beam to carry truss load. Capitol Steel quote 32 foot W14-43 with 2 HSS 5"x5"x10' steel post						
05-12-23 On Site Fabrication	LABMAT	1 Each	300	0	300	
Flange welding, post plates, nuts and bolts						
05-12-25 I-Beam Installation	LABOR	8 Hours	320	0	320	
4 men / 2 hrs @ 45/hr, machinery included in overhead						
05-12-00 Structural Steel Framing Totals:			1,910	0	1,910	
			Cost Est	Markup	Total Est	$ / Sqr Ft
05 - Metals Totals:			1,910	0	1,910	
06 - Wood, Plastics, and Composites						
06-10-00 ROUGH CARPENTRY						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-10-10 Rough Shell Framing Material	MATERI/	1 Each	15,225	0	15,225	
2x8x12' Construction ext walls. Upper and lower plates, studs,jacks, corners,headers (8220)2x4x12 Interior partitions (7022)						
06-10-20 Rough Shell Framing / Build and Set Ext & IntWalls	LABOR	384 Hours	15,360	0	15,360	
06-10-25 Miscelleneous Blocking and Framing	MATERI/	1 Each	2,000	0	2,000	
Backing for cabinets and accessories 2x6,2x8 etc.						
06-10-26 Misc Framing Installation	LABOR	40 Hours	1,600	0	1,600	
06-10-35 Rake Overhang and Jett Work Material	MATERI/	1 Each	2,500	0	2,500	
06-10-40 Frame Rake Overhang and Jettwork	LABOR	64 Hours	2,560	0	2,560	
06-10-00 ROUGH CARPENTRY Totals:			39,245	0	39,245	
06-16-00 Sheathing						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-16-10 Zip Sheathing Wall	MATERI/	206 Each	4,944	0	4,944	
Walls and Gables with 12' wall height 06						
06-16-12 Wall Sheathing Installation	LABOR	96 Hours	3,840	0	3,840	
Install sheathing and cut out windows and doors. 4 men 3 days = 60 sheets/day						
06-16-20 Roof Sheathing	MATERI/	275 Each	8,814	0	8,814	
5/8th T&G zip roof						
06-16-21 Roof Sheathing Installation Labor	LABOR	128 Hours	5,120	0	5,120	
06-16-22 Zip Tape	MATERI/	32 Rolls	960	0	960	
06-16-00 Sheathing Totals:			23,678	0	23,678	
06-17-00 Shop-Fabricated Structural Wood						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-17-15 Wood Trusses 8/12 Pitch	MATERI/	1 Each	22,500	0	22,500	
06-17-17 Truss Installation	LABOR	96 Hours	3,840	0	3,840	
4 men 3 days 96hrs						
06-17-00 Shop-Fabricated Structural Wood Totals:			26,340	0	26,340	

06-41-00 Architectural Wood Casework						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-41-10 Window Extension Jambs and Sills	MATERI	1 Each	765	0	765	
1x6 Sill 135lf @ 1.81 = 245, 1x4 extension jamb 460lf @ 1.13 = 520						
06-41-12 Office Door Sidelite Frames and Roll-Up Door	MATERI	356 Linear Ft	644	0	644	
1x6 jamb stock						
06-41-14 Door and Sidelite Casing	MATERI	1092 Linear Ft	1,234	0	1,234	
12 Doors with sidelites,552lf 15 doors without sidelites, 540lf						
06-41-20 1x4 Window Trim	MATERI	590 Linear Ft	667	0	667	
22lf x 27 window units						
06-41-22 Misc Wood Trim	MATERI	275 Linear Ft	311	0	311	
06-41-23 Misc Woodwork Install	LABOR	20 Hours	800	0	800	
Allow 20hrs						
06-41-50 Install Interior Trim	LABOR	160 Hours	6,400	0	6,400	
2 men 10 days						
06-41-00 Architectural Wood Casework Totals:			10,821	0	10,821	

06-47-00 Exterior Wood Trim						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-47-11 Hardi-Panel Soffit	MATERI	1167 Linear Ft	1,937	0	1,937	
06-47-12 Labor to Install Hardi Soffit	LABOR	64 Hours	2,560	0	2,560	
2m/4days						
06-47-13 5/4x4 Fascia Shadow	MATERI	50 Each	2,100	0	2,100	
06-47-14 Fascia, Frieze, Bottom Board	MATERI	104 Each	14,664	0	14,664	
5/4x12x20						
06-47-15 Install 5/4x12 Fascia,Frez and 5/4x12 Bottom Board	LABOR	240 Hours	9,600	0	9,600	
3 men 10 days = 240hrs						
06-47-30 Historic Sill, Corner, Door and Window Trim	MATERI	1 Each	4,117	0	4,117	
Sill 420 lf @5.05 =2121, Corner 5/4x8x20 9pcs @ 91.10 = 820, Window and Door Trim 5/4x4x20 28 @ 42=1176						
06-47-51 Install Sill, Corners, Window and Door Trim	LABOR	168 Hours	6,720	0	6,720	
06-47-85 Drainage Plain - Weather Trak 5X200	MATERI	6 Rolls	834	0	834	
06-47-00 Exterior Wood Trim Totals:			42,532	0	42,532	

	Cost Est	Markup	Total Est	$ / Sqr Ft
06 - Wood, Plastics, and Composites Totals:	142,616	0	142,616	

07 - Thermal and Moisture Protection

07-20-00 THERMAL PROTECTION						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-20-10 Rigid Foundation Insulation	MATERI	55 Each	2,255	0	2,255	
2"x4'x8' XPS Insulation Board						
07-20-15 1" Rigid Foundation Board	MATERI	9 Each	193	0	193	
07-20-20 Foundation Insulation Install	LABOR	24 Hours	960	0	960	
07-20-25 Miscellaneaous Can Foam	LABMAT	1 Each	320	0	320	
07-20-00 THERMAL PROTECTION Totals:			3,728	0	3,728	

07-21-00 Thermal Insulation						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-21-10 Thermal Envelope	LABMAT	1 Each	18,000	0	18,000	

As specified for 2x8x12 framing, Cellulose in wall with vapor barrier with 15" cellulose blown in over ceiling.						
07-21-11 Interior Sound Attenuation	LABOR	1 Each	3,000	0	3,000	
between wall sound attenuation insulation. Estimate of potential quote						
07-21-00 Thermal Insulation Totals:			21,000	0	21,000	
07-30-00 STEEP SLOPE ROOFING						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-30-10 Roofing Prep	LABOR	64 Hours	2,560	0	2,560	
Install drip edge, ice and water shield, roofing paper						
07-30-12 Grace Ice and Water	MATERI/	8 Rolls	1,160	0	1,160	
07-30-14 Tri-Flex Roof Paper	MATERI/	7 Rolls	840	0	840	
07-30-20 Asphalt Shingle Roofing	MATERI/	84 Roofing Sqr	7,140	0	7,140	
30yr Architecturals						
07-30-25 Roofing Installation	LABOR	240 Hours	9,600	0	9,600	
07-30-00 STEEP SLOPE ROOFING Totals:			21,300	0	21,300	
07-46-00 Siding						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-46-26 Hardboard Clapboard Siding	MATERI/	1926 Sq Ft	7,993	0	7,993	
07-46-30 Hardie Shingle Board Siding	MATERI/	3311 Sq Ft	12,681	0	12,681	
07-46-35 Siding Installation	LABOR	360 Each	14,400	0	14,400	
3 men 15 days						
07-46-00 Siding Totals:			35,074	0	35,074	
07-60-00 FLASHING & SHEET METAL						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-60-10 Roof Drip Edge	MATERI/	50 Each	600	0	600	
07-60-20 Exterior Window,Door and Trim Flashing	LABOR	2 Each	250	0	250	
Aluminum Coil Stock 2'x50' oll						
07-60-25 Fabricate and Install Flashing	LABOR	8 Hours	320	0	320	
1man 1 day						
07-60-00 FLASHING & SHEET METAL Totals:			1,170	0	1,170	
			Cost Est	Markup	Total Est	$ / Sqr Ft
07 - Thermal and Moisture Protection Totals:			82,272	0	82,272	
08 - Openings						
08-16-00 Composite Doors						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
08-16-10 Fiberglass Entry Doors with Transom and Sidelite	MATERI/	1 Each	3,886	0	3,886	
On double unit 6068 and two single units 3068						
08-16-11 Fiberglass Entry Unit with no Transom or Sidelite	MATERI/	1 Each	677	0	677	
1 unit 3068						
08-16-20 Exterior Door Installation	LABOR	8 Hours	320	0	320	
08-16-26 Exterior Door Hardware Installation	LABOR	8 Hours	320	0	320	
08-16-30 Interior Solid Core Masonite Doors	MATERI/	27 Each	4,725	0	4,725	
3068 2x4 wall prehung door						
08-16-31 Interior Door Hardware	MATERI/	27 Each	2,295	0	2,295	
Hand sets no closers						

08-16-32 Interior Door Hardware Installation	LABOR	16 Hours	640	0	640	
08-16-00 Composite Doors Totals:			12,863	0	12,863	
08-30-00 SPECIALTY DOORS & FRAMES						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
08-30-10 Police Garage Door	LABMAT	1 Each	2,500	0	2,500	
9090 with track and opener, insulated no glass						
08-30-00 SPECIALTY DOORS & FRAMES Totals:			2,500	0	2,500	
08-33-00 Coiling Doors & Grilles						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
08-33-10 Roll-up Aluminum Pass-thru Door	LABMAT	1 Each	2,900	0	2,900	
Unit 8040						
08-33-00 Coiling Doors & Grilles Totals:			2,900	0	2,900	
08-54-00 Composite Windows						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
08-54-20 Fiberglass Windows	MATERI	23 Each	25,300	0	25,300	
Marvin Integrity with transom as specified.						
08-54-25 Window Installation Prep	LABMAT	23 Each	1,495	0	1,495	
Flexible flashing and tape. 45.00 material 20 labor each						
08-54-30 Window Installation	LABOR	24 Hours	960	0	960	
3 men 1 day						
08-54-00 Composite Windows Totals:			27,755	0	27,755	
			Cost Est	Markup	Total Est	$ / Sqr Ft
08 - Openings Totals:			46,018	0	46,018	
09 - Finishes						
09-29-00 Gypsum Board						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-29-20 Wall Board Installation	LABMAT	19400 Sq Ft	27,160	0	27,160	
09-29-00 Gypsum Board Totals:			27,160	0	27,160	
09-31-00 Thin-Set Tiling						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-31-01 Tile Allowance - Installed	LABMAT	1166 Sq Ft	17,490	0	17,490	
464sqft wall +336 bath and toilet floor + Fire day room and corridor 366						
09-31-00 Thin-Set Tiling Totals:			17,490	0	17,490	
09-53-00 Acoustical Ceiling Suspension Assemblies						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-53-20 Suspended Ceiling Tile and Grid System	LABMAT	4215 Each	16,860	0	16,860	
09-53-00 Acoustical Ceiling Suspension Assemblies Totals:			16,860	0	16,860	
09-65-00 Resilient Flooring						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-65-19 VCT Flooring	LABMAT	530 Sq Ft	1,855	0	1,855	
09-65-00 Resilient Flooring Totals:			1,855	0	1,855	

09-68-00 Carpeting						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-68-10 Carpet Tile	LABMAT	2925 Sq Ft	11,700	0	11,700	
09-68-20 Carpet Tile Entrance Mat	LABMAT	200 Sq Ft	1,200	0	1,200	
		09-68-00 Carpeting Totals:	12,900	0	12,900	
09-91-00 Painting						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-91-30 Interior Painting	LABMAT	1 Each	21,000	0	21,000	
		09-91-00 Painting Totals:	21,000	0	21,000	
			Cost Est	Markup	Total Est	$ / Sqr Ft
		09 - Finishes Totals:	97,265	0	97,265	
10 - Specialties						
10-14-00 Signage						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
10-14-20 Room Signage	LABMAT	1 Each	1,800	0	1,800	
10-14-50 Location Identification Sign	LABMAT	1 Each	900	0	900	
		10-14-00 Signage Totals:	2,700	0	2,700	
10-28-00 Toilet, Bath & Laundry Accessories						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
10-28-13 Toilet Accessories	LABMAT	1 Each	3,685	0	3,685	
		10-28-00 Toilet, Bath & Laundry Accessories Totals:	3,685	0	3,685	
10-44-00 Fire Protection Specialties						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
10-44-10 Fire Extinguisher Cabinets	LABMAT	4 Each	1,400	0	1,400	
4						
		10-44-00 Fire Protection Specialties Totals:	1,400	0	1,400	
10-51-00 Lockers						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
10-51-10 Police Lockers	MATERI	12 Each	5,400	0	5,400	
10-51-25 Coat Racks	MATERI	2 Each	300	0	300	
10-51-30 Installation of Racks and Lockers	LABOR	16 Hours	640	0	640	
		10-51-00 Lockers Totals:	6,340	0	6,340	
			Cost Est	Markup	Total Est	$ / Sqr Ft
		10 - Specialties Totals:	14,125	0	14,125	
11 - Equipment						
11-26-00 Unit Kitchens						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
11-26-10 Appliance Allowance AL	LABOR	1 Each	4,000	0	4,000	
Range/Oven (900) , Dishwasher (450), Disposal(150), Refrigerator/Freezer (1600), Range Hood.(125)						
		11-26-00 Unit Kitchens Totals:	4,000	0	4,000	

			Cost Est	Markup	Total Est	$ / Sqr Ft
11 - Equipment Totals:			4,000	0	4,000	

12 - Furnishings

12-30-00 CASEWORK

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
12-30-20 Miscelleneaous Cabinetry and Countertops	LABMAT	1 Each	20,000	0	20,000	
12-30-00 CASEWORK Totals:			20,000	0	20,000	

	Cost Est	Markup	Total Est	$ / Sqr Ft
12 - Furnishings Totals:	20,000	0	20,000	

13 - Special Construction

13-36-00 Towers

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
13-36-00 Communication Tower AL	LABMAT	1 Each	11,000	0	11,000	
35 foot tower for communication equipment with concrete base, no wiring						
13-36-00 Towers Totals:			11,000	0	11,000	

	Cost Est	Markup	Total Est	$ / Sqr Ft
13 - Special Construction Totals:	11,000	0	11,000	

21 - Fire Suppression

21-10-00 WATER-BASED FIRE-SUPPRESSION SYSTEMS

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
21-10-10 Within the Structure Sprinkler System	LABMAT	1 Each	23,000	0	23,000	
Water Tap and Feed from Street included in Site.						
21-10-00 WATER-BASED FIRE-SUPPRESSION SYSTEMS Totals:			23,000	0	23,000	

	Cost Est	Markup	Total Est	$ / Sqr Ft
21 - Fire Suppression Totals:	23,000	0	23,000	

22 - Plumbing

22-00-00 PLUMBING

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
22-55-10 Plumbing Rough and Finish	LABMAT	1 Each	35,000	0	35,000	
22-00-00 PLUMBING Totals:			35,000	0	35,000	

	Cost Est	Markup	Total Est	$ / Sqr Ft
22 - Plumbing Totals:	35,000	0	35,000	

23 - Heating, Ventilating, and Air Conditioning

23-00-00 HEATING, VENTILATING, & AIR-CONDITIONING (HVAC)

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
23-00-01 HVAC -Hot Water Baseboard Heating	LABMAT	1 Each	39,000	0	39,000	
12 zones						
23-10-20 HVAC - AC	LABMAT	1 Each	45,000	0	45,000	
Ducted Central Air System above suspended ceiling						
23-00-00 HEATING, VENTILATING, & AIR-CONDITIONING (HVAC) Totals:			84,000	0	84,000	

			Cost Est	Markup	Total Est	$ / Sqr Ft
23 - Heating, Ventilating, and Air Conditioning Totals:			84,000	0	84,000	

26 - Electrical

26-00-00 ELECTRICAL

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
26-00-00 Electrical Subcontract	LABMAT	1 Each	43,000	0	43,000	
26-00-50 Fire Alarm System	LABMAT	1 Each	9,000	0	9,000	
26-00-90 Exterior Light Fixture Allowance	MATERI/	1 Each	8,500	0	8,500	
26-00-00 ELECTRICAL Totals:			60,500	0	60,500	

	Cost Est	Markup	Total Est	$ / Sqr Ft
26 - Electrical Totals:	60,500	0	60,500	

32 - Exterior Improvements

32-00-00 EXTERIOR IMPROVEMENTS

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
32-00-10 Landscaping and Plantings	LABOR	1 Each	3,500	0	3,500	
Tree's and Shrubberies						
32-00-00 EXTERIOR IMPROVEMENTS Totals:			3,500	0	3,500	

	Cost Est	Markup	Total Est	$ / Sqr Ft
32 - Exterior Improvements Totals:	3,500	0	3,500	

	Cost Est	Markup	Total Est	$ / Sqr Ft
Totals:	786,470	0	786,470	

UPLAND CONSTRUCTION

1655 NORWICH ESTIMATE NET ZERO OPTION

Company Job Specifications

01 General Conditions

01-21-00 Allowances

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-21-16.50 Contingency	OTHER	1 Each	10,000	0	10,000	
		01-21-00 Allowances Totals:	10,000	0	10,000	

01-30-00 ADMINISTRATIVE REQIREMENTS

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
Plans & copies	MATERI	plans & copies: 1	600	0	600	
		01-30-00 ADMINISTRATIVE REQIREMENTS Totals:	600	0	600	

01-31-00 Project Mgmt. & Coordination

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-31-13 Project Management and Coordination	LABOR	1 Each	15,000	0	15,000	
On-site Supervision						
01-31-13.200240 On Site Supervisor	LABOR	24 Weeks	21,600	0	21,600	
		01-31-00 Project Mgmt. & Coordination Totals:	36,600	0	36,600	

01-51-00 Temporary Utilities

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-51-16 Temporary Fire Protection	OTHER	Fire Protection: 1 Weeks	325	0	325	
		01-51-00 Temporary Utilities Totals:	325	0	325	

01-52-00 Construction Facilities

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-52-13 Field Offices and Sheds	OTHER	Estimate: 6 Weeks	900	0	900	
01-52-16 First Aid Facilites	OTHER	Estimate: 6 Weeks	150	0	150	
01-52-19 Sanitary Facilities	OTHER	temp.toilets: 6 Months	690	0	690	
		01-52-00 Construction Facilities Totals:	1,740	0	1,740	

01-54-00 Construction Aids

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-54-16.500100 All-terrain Forklift	EQUIP	3 Months	5,250	0	5,250	
01-54-19 Temporary Cranes	EQUIP	5 Days	6,000	0	6,000	
Crane and Operator						
01-54-20 Man Lift	EQUIP	3 Months	5,100	0	5,100	
01-54-23 Temp. Scaffolding & Platforms	EQUIP	15 Weeks	2,250	0	2,250	
01-54-39 Small Tools and Equipment	MATERI	1 Each	3,200	0	3,200	
		01-54-00 Construction Aids Totals:	21,800	0	21,800	

01-56-26 Temporary Fencing

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-56-30 4 Foot Orange PerimeterFencing	LABMAT	1 Each	500	0	500	
Stakes and ties for approx. 400 lf						

01-56-26 Temporary Fencing Totals:			500	0	500	
01-58-13 Project Identification						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-58-13.50 Project Sign	MATERI	1 Each	750	0	750	
01-58-13 Project Identification Totals:			750	0	750	
01-74-00 Cleaning & Waste Management						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-74-13 Progress Cleaning	LABMAT	24 Weeks	2,400	0	2,400	
01-74-19 Constr. Waste Mgmt. & Disposal	LABMAT	4 Each	3,600	0	3,600	
Final Cleaninig	LABMAT	cleaning: 5000 Sq Ft	2,250	0	2,250	
01-74-00 Cleaning & Waste Management Totals:			8,250	0	8,250	
01-76-00 Protecting Installed Construction						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
Temp. protection of carpets & finishes	LABMAT	1 Each	1,000	0	1,000	
01-76-00 Protecting Installed Construction Totals:			1,000	0	1,000	
01-80-00 PERFORMANCE REQUIREMENTS						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
01-80-10 Construction Bonding	OTHER	1 Each	12,000	0	12,000	
Bonding Cost = 18.70/1000 for first 500k, then 11.00/1000 for balance. 700,000 job = 18.70 x 500 = 9350, plus 11.0 x 200 = 2200, total = 9350 + 2200 = 11550.00						
01-80-00 PERFORMANCE REQUIREMENTS Totals:			12,000	0	12,000	
			Cost Est	Markup	Total Est	$ / Sqr Ft
01 General Conditions Totals:			93,565	0	93,565	
02 Existing Conditions						
02-40-00 DEMOLITION AND STRUCTURE MOVING						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
02-40-20 Demolish Existing Police Structure and Dispose	LABMAT	1 Each	20,000	0	20,000	
02-40-25 Relocate Police Shed	LABMAT	1 Each	800	0	800	
02-40-00 DEMOLITION AND STRUCTURE MOVING Totals:			20,800	0	20,800	
			Cost Est	Markup	Total Est	$ / Sqr Ft
02 Existing Conditions Totals:			20,800	0	20,800	
03 - Concrete						
03-30-00 CAST-IN-PLACE CONCRETE						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
03-30-10 Footings	LABMAT	18 Cu Yds	6,300	0	6,300	
Footing size = 1'-4"x10"x430lf= 17.7 = 18cuyd						
03-30-15 Foundation Frost Wall	LABMAT	43 Cu Yds	15,050	0	15,050	
8"x4'-0"x430lf= 43cuyd						
03-30-20 Interior Building Slab	LABMAT	73 Cu Yds	25,550	0	25,550	
Area= 30x81=2430,+ 30x23=690,+ 33x73=2409,+ 33x16=528, Total 6057 x .333= 75cuyd less 2 cuyd shelf = 73 cuyd						
03-30-00 CAST-IN-PLACE CONCRETE Totals:			46,900	0	46,900	

			Cost Est	Markup	Total Est	$ / Sqr Ft
		03 - Concrete Totals:	46,900	0	46,900	

05 - Metals

05-12-00 Structural Steel Framing

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
05-12-20 Structural Steel for Building	MATERI	1 Each	1,290	0	1,290	
30 foot I-Beam to carry truss load. Capitol Steel quote 32 foot W14-43 with 2 HSS 5"x5"x10' steel post						
05-12-23 On Site Fabrication	LABMAT	1 Each	300	0	300	
Flange welding, post plates, nuts and bolts						
05-12-25 I-Beam Installation	LABOR	8 Hours	320	0	320	
4 men / 2 hrs @ 45/hr, machinery included in overhead						
		05-12-00 Structural Steel Framing Totals:	1,910	0	1,910	

			Cost Est	Markup	Total Est	$ / Sqr Ft
		05 - Metals Totals:	1,910	0	1,910	

06 - Wood, Plastics, and Composites

06-10-00 ROUGH CARPENTRY

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-10-10 Rough Shell Framing Material	MATERI	1 Each	15,225	0	15,225	
2x8x12' Construction ext walls. Upper and lower plates, studs,jacks, corners,headers (8220)2x4x12 Interior partitions (7022)						
06-10-20 Rough Shell Framing / Build and Set Ext & IntWalls	LABOR	384 Hours	15,360	0	15,360	
06-10-25 Miscelleneous Blocking and Framing	MATERI	1 Each	2,000	0	2,000	
Backing for cabinets and accessories 2x6,2x8 etc.						
06-10-26 Misc Framing Installation	LABOR	40 Hours	1,600	0	1,600	
06-10-35 Rake Overhang and Jett Work Material	MATERI	1 Each	2,500	0	2,500	
06-10-40 Frame Rake Overhang and Jettwork	LABOR	64 Hours	2,560	0	2,560	
		06-10-00 ROUGH CARPENTRY Totals:	39,245	0	39,245	

06-16-00 Sheathing

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-16-10 Zip Sheathing Wall	MATERI	206 Each	4,944	0	4,944	
Walls and Gables with 12' wall height 06						
06-16-12 Wall Sheathing Installation	LABOR	96 Hours	3,840	0	3,840	
Install sheathing and cut out windows and doors. 4 men 3 days = 60 sheets/day						
06-16-20 Roof Sheathing	MATERI	275 Each	8,814	0	8,814	
5/8th T&G zip roof						
06-16-21 Roof Sheathing Installation Labor	LABOR	128 Hours	5,120	0	5,120	
06-16-22 Zip Tape	MATERI	32 Rolls	960	0	960	
		06-16-00 Sheathing Totals:	23,678	0	23,678	

06-17-00 Shop-Fabricated Structural Wood

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-17-15 Wood Trusses 8/12 Pitch	MATERI	1 Each	22,500	0	22,500	
06-17-17 Truss Installation	LABOR	96 Hours	3,840	0	3,840	
4 men 3 days 96hrs						
		06-17-00 Shop-Fabricated Structural Wood Totals:	26,340	0	26,340	

06-41-00 Architectural Wood Casework						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-41-10 Window Extension Jambs and Sills	MATERI	1 Each	765	0	765	
1x6 Sill 135lf @ 1.81 = 245, 1x4 extension jamb 460lf @ 1.13 = 520						
06-41-12 Office Door Sidelite Frames and Roll-Up Door	MATERI	356 Linear Ft	644	0	644	
1x6 jamb stock						
06-41-14 Door and Sidelite Casing	MATERI	1092 Linear Ft	1,234	0	1,234	
12 Doors with sidelites,552lf 15 doors without sidelites, 540lf						
06-41-20 1x4 Window Trim	MATERI	590 Linear Ft	667	0	667	
22lf x 27 window units						
06-41-22 Misc Wood Trim	MATERI	275 Linear Ft	311	0	311	
06-41-23 Misc Woodwork Install	LABOR	20 Hours	800	0	800	
Allow 20hrs						
06-41-50 Install Interior Trim	LABOR	160 Hours	6,400	0	6,400	
2 men 10 days						
06-41-00 Architectural Wood Casework Totals:			10,821	0	10,821	

06-47-00 Exterior Wood Trim						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
06-47-11 Hardi-Panel Soffit	MATERI	1167 Linear Ft	1,937	0	1,937	
06-47-12 Labor to Install Hardi Soffit	LABOR	64 Hours	2,560	0	2,560	
2m/4days						
06-47-13 5/4x4 Fascia Shadow	MATERI	50 Each	2,100	0	2,100	
06-47-14 Fascia, Frieze, Bottom Board	MATERI	104 Each	14,664	0	14,664	
5/4x12x20						
06-47-15 Install 5/4x12 Fascia,Frez and 5/4x12 Bottom Board	LABOR	240 Hours	9,600	0	9,600	
3 men 10 days = 240hrs						
06-47-30 Historic Sill, Corner, Door and Window Trim	MATERI	1 Each	4,117	0	4,117	
Sill 420 lf @5.05 =2121, Corner 5/4x8x20 9pcs @ 91.10 = 820, Window and Door Trim 5/4x4x20 28 @ 42=1176						
06-47-51 Install Sill, Corners, Window and Door Trim	LABOR	168 Hours	6,720	0	6,720	
06-47-85 Drainage Plain - Weather Trak 5X200	MATERI	6 Rolls	834	0	834	
06-47-00 Exterior Wood Trim Totals:			42,532	0	42,532	

	Cost Est	Markup	Total Est	$ / Sqr Ft
06 - Wood, Plastics, and Composites Totals:	142,616	0	142,616	

07 - Thermal and Moisture Protection

07-20-00 THERMAL PROTECTION						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-20-10 Rigid Foundation Insulation	MATERI	375 Each	15,375	0	15,375	
2"x4'x8' XPS Insulation Board						
07-20-15 1" Rigid Foundation Board	MATERI	9 Each	193	0	193	
07-20-20 Foundation Insulation Install	LABOR	48 Hours	1,920	0	1,920	
07-20-25 Miscellaneaous Can Foam	LABMAT	1 Each	320	0	320	
07-20-00 THERMAL PROTECTION Totals:			17,808	0	17,808	

07-21-00 Thermal Insulation						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-21-10 Thermal Envelope	LABMAT	1 Each	43,100	0	43,100	

As specified for 2x8x12 framing, Cellulose in wall with vapor barrier with 15" cellulose blown in over ceiling.						
07-21-11 Interior Sound Attenuation	LABOR	1 Each	3,000	0	3,000	
between wall sound attenuation insulation. Estimate of potential quote						
07-21-00 Thermal Insulation Totals:			46,100	0	46,100	
07-25-00 WEATHER BARRIERS						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-25-20 Air Sealing	LABMAT	1 Each	3,500	0	3,500	
1 man 80 hrs, perimeter sealing construction joints window and door openings. Caulk 24@7 168, Spray foam cans 12@15 180						
07-25-00 WEATHER BARRIERS Totals:			3,500	0	3,500	
07-30-00 STEEP SLOPE ROOFING						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-30-10 Roofing Prep	LABOR	64 Hours	2,560	0	2,560	
Install drip edge, ice and water shield, roofing paper						
07-30-12 Grace Ice and Water	MATERI	8 Rolls	1,160	0	1,160	
07-30-14 Tri-Flex Roof Paper	MATERI	7 Rolls	840	0	840	
07-30-20 Asphalt Shingle Roofing	MATERI	84 Roofing Sqr	7,140	0	7,140	
30yr Architecturals						
07-30-25 Roofing Installation	LABOR	240 Hours	9,600	0	9,600	
07-30-00 STEEP SLOPE ROOFING Totals:			21,300	0	21,300	
07-46-00 Siding						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-46-26 Hardboard Clapboard Siding	MATERI	1926 Sq Ft	7,993	0	7,993	
07-46-30 Hardie Shingle Board Siding	MATERI	3311 Sq Ft	12,681	0	12,681	
07-46-35 Siding Installation	LABOR	360 Each	14,400	0	14,400	
3 men 15 days						
07-46-63 Fabricated Panel Assemblies with Siding	LABMAT	2400 Sq Ft	14,400	2,400	16,800	
Kingspan Azteco Insulated Wall Panel for Apparatus Building. Not including front façade.						
07-46-65 Apparatus Building Roof Insulation Add	LABMAT	4300 Sq Ft	16,899	0	16,899	
5 inches of iso board somehow installed under roof						
07-46-00 Siding Totals:			66,373	2,400	68,773	
07-60-00 FLASHING & SHEET METAL						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
07-60-10 Roof Drip Edge	MATERI	50 Each	600	0	600	
07-60-20 Exterior Window,Door and Trim Flashing	LABOR	2 Each	250	0	250	
Aluminum Coil Stock 2'x50' oll						
07-60-25 Fabricate and Install Flashing	LABOR	8 Hours	320	0	320	
1man 1 day						
07-60-00 FLASHING & SHEET METAL Totals:			1,170	0	1,170	
			Cost Est	Markup	Total Est	$ / Sqr Ft
07 - Thermal and Moisture Protection Totals:			156,251	2,400	158,651	
08 - Openings						
08-16-00 Composite Doors						

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
08-16-10 Fiberglass Entry Doors with Transom and Sidelite	MATERI	1 Each	3,886	0	3,886	
On double unit 6068 and two single units 3068						
08-16-11 Fiberglass Entry Unit with no Transom or Sidelite	MATERI	1 Each	677	0	677	
1 unit 3068						
08-16-20 Exterior Door Installation	LABOR	8 Hours	320	0	320	
08-16-26 Exterior Door Hardware Installation	LABOR	8 Hours	320	0	320	
08-16-30 Interior Solid Core Masonite Doors	MATERI	27 Each	4,725	0	4,725	
3068 2x4 wall prehung door						
08-16-31 Interior Door Hardware	MATERI	27 Each	2,295	0	2,295	
Hand sets no closers						
08-16-32 Interior Door Hardware Installation	LABOR	16 Hours	640	0	640	
08-16-00 Composite Doors Totals:			12,863	0	12,863	
08-30-00 SPECIALTY DOORS & FRAMES						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
08-30-10 Police Garage Door	LABMAT	1 Each	2,500	0	2,500	
9090 with track and opener, insulated no glass						
08-30-15 Fire Station Garage Doors	LABMAT	3 Each	7,500	0	7,500	
3 12'x12' Insulated Doors with two tiers of glass.						
08-30-00 SPECIALTY DOORS & FRAMES Totals:			10,000	0	10,000	
08-33-00 Coiling Doors & Grilles						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
08-33-10 Roll-up Aluminum Pass-thru Door	LABMAT	1 Each	2,900	0	2,900	
Unit 8040						
08-33-00 Coiling Doors & Grilles Totals:			2,900	0	2,900	
08-54-00 Composite Windows						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
08-54-21 Marvin Clad Ultimate Windows	LABOR	23 Each	39,951	0	39,951	
Low E2 w/Argon						
08-54-25 Window Installation Prep	LABMAT	23 Each	1,495	0	1,495	
Flexible flashing and tape. 45.00 material 20 labor each						
08-54-30 Window Installation	LABOR	24 Hours	960	0	960	
3 men 1 day						
08-54-00 Composite Windows Totals:			42,406	0	42,406	
			Cost Est	Markup	Total Est	$ / Sqr Ft
08 - Openings Totals:			68,169	0	68,169	
09 - Finishes						
09-29-00 Gypsum Board						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-29-20 Wall Board Installation	LABMAT	19400 Sq Ft	27,160	0	27,160	
09-29-00 Gypsum Board Totals:			27,160	0	27,160	
09-31-00 Thin-Set Tiling						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-31-01 Tile Allowance - Installed	LABMAT	1166 Sq Ft	17,490	0	17,490	

464sqft wall +336 bath and toilet floor + Fire day room and corridor 366						
09-31-00 Thin-Set Tiling Totals:			17,490	0	17,490	
09-53-00 Acoustical Ceiling Suspension Assemblies						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-53-20 Suspended Ceiling Tile and Grid System	LABMAT	4215 Each	16,860	0	16,860	
09-53-00 Acoustical Ceiling Suspension Assemblies Totals:			16,860	0	16,860	
09-65-00 Resilient Flooring						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-65-19 VCT Flooring	LABMAT	530 Sq Ft	1,855	0	1,855	
09-65-00 Resilient Flooring Totals:			1,855	0	1,855	
09-68-00 Carpeting						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-68-10 Carpet Tile	LABMAT	2925 Sq Ft	11,700	0	11,700	
09-68-20 Carpet Tile Entrance Mat	LABMAT	200 Sq Ft	1,200	0	1,200	
09-68-00 Carpeting Totals:			12,900	0	12,900	
09-91-00 Painting						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
09-91-30 Interior Painting	LABMAT	1 Each	21,000	0	21,000	
09-91-00 Painting Totals:			21,000	0	21,000	
			Cost Est	Markup	Total Est	$ / Sqr Ft
09 - Finishes Totals:			97,265	0	97,265	
10 - Specialties						
10-14-00 Signage						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
10-14-20 Room Signage	LABMAT	1 Each	1,800	0	1,800	
10-14-50 Location Identification Sign	LABMAT	1 Each	900	0	900	
10-14-00 Signage Totals:			2,700	0	2,700	
10-28-00 Toilet, Bath & Laundry Accessories						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
10-28-13 Toilet Accessories	LABMAT	1 Each	3,685	0	3,685	
10-28-00 Toilet, Bath & Laundry Accessories Totals:			3,685	0	3,685	
10-44-00 Fire Protection Specialties						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
10-44-10 Fire Extinguisher Cabinets	LABMAT	4 Each	1,400	0	1,400	
4						
10-44-00 Fire Protection Specialties Totals:			1,400	0	1,400	
10-51-00 Lockers						
Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
10-51-10 Police Lockers	MATERI	12 Each	5,400	0	5,400	
10-51-25 Coat Racks	MATERI	2 Each	300	0	300	
10-51-30 Installation of Racks and Lockers	LABOR	16 Hours	640	0	640	

			10-51-00 Lockers Totals:	6,340	0	6,340	
				Cost Est	Markup	Total Est	$ / Sqr Ft
			10 - Specialties Totals:	14,125	0	14,125	
11 - Equipment							
11-26-00 Unit Kitchens							
Cost Item	Class	Quantity		Cost Est	Markup	Total Est	$ / Sqr Ft
11-26-10 Appliance Allowance AL	LABOR	1 Each		4,000	0	4,000	
Range/Oven (900) , Dishwasher (450), Disposal(150), Refrigerator/Freezer (1600), Range Hood.(125)							
			11-26-00 Unit Kitchens Totals:	4,000	0	4,000	
				Cost Est	Markup	Total Est	$ / Sqr Ft
			11 - Equipment Totals:	4,000	0	4,000	
12 - Furnishings							
12-30-00 CASEWORK							
Cost Item	Class	Quantity		Cost Est	Markup	Total Est	$ / Sqr Ft
12-30-20 Miscelleneaous Cabinetry and Countertops	LABMAT	1 Each		20,000	0	20,000	
			12-30-00 CASEWORK Totals:	20,000	0	20,000	
				Cost Est	Markup	Total Est	$ / Sqr Ft
			12 - Furnishings Totals:	20,000	0	20,000	
13 - Special Construction							
13-36-00 Towers							
Cost Item	Class	Quantity		Cost Est	Markup	Total Est	$ / Sqr Ft
13-36-00 Communication Tower AL	LABMAT	1 Each		11,000	0	11,000	
35 foot tower for communication equipment with concrete base, no wiring							
			13-36-00 Towers Totals:	11,000	0	11,000	
				Cost Est	Markup	Total Est	$ / Sqr Ft
			13 - Special Construction Totals:	11,000	0	11,000	
21 - Fire Suppression							
21-10-00 WATER-BASED FIRE-SUPPRESSION SYSTEMS							
Cost Item	Class	Quantity		Cost Est	Markup	Total Est	$ / Sqr Ft
21-10-10 Within the Structure Sprinkler System	LABMAT	1 Each		23,000	0	23,000	
Water Tap and Feed from Street included in Site.							
			21-10-00 WATER-BASED FIRE-SUPPRESSION SYSTEMS Totals:	23,000	0	23,000	
				Cost Est	Markup	Total Est	$ / Sqr Ft
			21 - Fire Suppression Totals:	23,000	0	23,000	
22 - Plumbing							
22-00-00 PLUMBING							
Cost Item	Class	Quantity		Cost Est	Markup	Total Est	$ / Sqr Ft
22-55-10 Plumbing Rough and Finish	LABMAT	1 Each		35,000	0	35,000	
			22-00-00 PLUMBING Totals:	35,000	0	35,000	

			Cost Est	Markup	Total Est	$ / Sqr Ft
22 - Plumbing Totals:			35,000	0	35,000	

23 - Heating, Ventilating, and Air Conditioning

23-00-00 HEATING, VENTILATING, & AIR-CONDITIONING (HVAC)

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
23-00-50 High Efficiency Heat Pump System Ducted AL	LABMAT	1 Each	150,000	0	150,000	
12 zone system with insulated duct work						
23-00-00 HEATING, VENTILATING, & AIR-CONDITIONING (HVAC) Totals:			150,000	0	150,000	

23-72-00 Air-to Air Energy Recovery Equipment

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
23-72-10 Heat Recovery Units AL	LABMAT	2 Each	13,000	0	13,000	
2 units approx. 900 cfm installed						
23-72-20 Structural Modifications to House HRU's	MATERI/	1 Each	1,200	0	1,200	
Truss modifications						
23-72-30 Added Area of Thermal Envelop Around HRU's	LABOR	1 Each	3,000	0	3,000	
Spray Foam Enclosures						
23-72-00 Air-to Air Energy Recovery Equipment Totals:			17,200	0	17,200	

	Cost Est	Markup	Total Est	$ / Sqr Ft
23 - Heating, Ventilating, and Air Conditioning Totals:	167,200	0	167,200	

26 - Electrical

26-00-00 ELECTRICAL

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
26-00-00 Electrical Subcontract	LABMAT	1 Each	46,000	0	46,000	
Add for HRU"s Heat Pump system supplemental wiring						
26-00-35 Service Upgrade to Power Mechanical Systems AL	LABMAT	1 Each	31,000	0	31,000	
Power system upgrades and panel installations as listed ESVT						
26-00-50 Fire Alarm System	LABMAT	1 Each	9,000	0	9,000	
26-00-90 Exterior Light Fixture Allowance	LABMAT	1 Each	8,500	0	8,500	
26-00-95 Generator Upgrade for Net Zero AL	LABMAT	1 Each	40,000	0	40,000	
New Generator for net zero						
26-00-00 ELECTRICAL Totals:			134,500	0	134,500	

	Cost Est	Markup	Total Est	$ / Sqr Ft
26 - Electrical Totals:	134,500	0	134,500	

32 - Exterior Improvements

32-00-00 EXTERIOR IMPROVEMENTS

Cost Item	Class	Quantity	Cost Est	Markup	Total Est	$ / Sqr Ft
32-00-10 Landscaping and Plantings	LABMAT	1 Each	3,500	0	3,500	
Tree's and Shrubberies						
32-00-00 EXTERIOR IMPROVEMENTS Totals:			3,500	0	3,500	

	Cost Est	Markup	Total Est	$ / Sqr Ft
32 - Exterior Improvements Totals:	3,500	0	3,500	

	Cost Est	Markup	Total Est	$ / Sqr Ft
Totals:	1,039,800	2,400	1,042,200	

Norwich Fire Police Facility
NET ZERO vs. Minimum Code Building Comparison

Building Construction

	NET ZERO	CODE MINIMUM
Existing Construction		
Wall R-Value	R-38	R-12 (No change)
Roof R-Value	R-39 (No Change)	R-39 (No Change)
New Construction		
Wall R-Value	R-40	R-23
Roof R-Value	R-60	R-49
Slab on Grade R-Value	R-30	R-10
Window R-Values		
Fixed Glass R-Value	R=4	R=2.78
Operable R-Value	R=4	R=2.33
Window SHGC Values		
Orinetation S,E or W	0.25	0.4
Orinetation N	0.53	0.53
Entrance Door R-Values	R=2	R=1.30
Air Sealing	0.10 CFM/SF at 50Pa	0.50 CFM/SF at 50Pa

Modelling Results

	NET ZERO	CODE MINIMUM
Energy Usage KBTU	355,880	632,000
Annual KBTU/SF	37.90	68.40
Operating Costs	$12,816	$22,311

SCHEMATIC ENGINEER'S OPINION OF PROBABLE COST (OPTION 2 WITH RESERVOIR COURSE)
FOR
TOWN OF NORWICH FIRE AND POLICE FACILITY
FIREHOUSE LANE, NORWICH, VERMONT
PREPARED BY PATHWAYS CONSULTING, LLC (Project No. 12703)
August 8, 2016

SITE WORK

Item Number	Item Description	Quantity	Unit	Unit Cost	Total Cost
1.00	**GENERAL SITE WORK**				
1.01	Saw Cut Existing Pavement (Roadway)	200	LF	$3.00	$600.00
1.02	Common Excvation Site to Subgrade (Inclusive of Removal of Pavement)	2,700	CY	$12.00	$32,400.00
1.03	Site Fine Grading	1	LS	$6,000.00	$6,000.00
1.04	Clearing and Grubbing	1	LS	$5,000.00	$5,000.00
1.05	Gravel (Assume 12" Below Walkways)	45	CY	$27.00	$1,215.00
1.06	Crushed Gravel (Assume 6" in Walkways)	23	CY	$30.00	$690.00
1.07	Bituminous Concrete Pavement Walkway (Assume 3" Thickness)	25	TN	$120.00	$3,000.00
1.08	Porous Asphalt Pavement (Assume 4" Thickness)	2,160	SY	$32.00	$69,120.00
1.09	Choker Course Porous Pavement Section 4" of 3/4" Washed Crushed Stone	250	CY	$42.00	$10,500.00
1.10	Filter Course Porous Pavement Section 12" of Gravel	760	CY	$27.00	$20,520.00
1.11	Filter Blanket Porous Pavement Section 3" of 3/8" Pea Gravel	190	CY	$60.00	$11,400.00
1.12	Reservoir Course (Option 2) Porous Pavement Section 16" of Crushed Stone AASHTO No. 3	1,010	CY	$40.00	$40,400.00
1.13	Mirafi 500X Filter Fabric Porous Pavement Section	2,300	SY	$1.50	$3,450.00
1.14	Screened Loam (Assume 4")	230	CY	$40.00	$9,200.00
1.15	Hydroseeding	2,000	SY	$3.50	$7,000.00
1.16	Parking Lot Stripping	960	LF	$1.50	$1,440.00
1.17	Handicap Parking Symbols	2	EA	$150.00	$300.00
1.18	Handicap Parking Signs	2	EA	$150.00	$300.00
GENERAL SITE WORK TOTAL					**$222,535.00**
2.00	**SITE WATER**				
2.01	6" Ductile Iron Water Main	45	LF	$80.00	$3,600.00
2.02	4" Ductile Iron Water Main	515	LF	$60.00	$30,900.00
2.03	3/4" Copper Service Pipe	60	LF	$80.00	$4,800.00
2.04	Ductile Iron MJ Fittings	400	LBS	$4.00	$1,600.00
2.05	Hydrant Assembly	1	EA	$3,500.00	$3,500.00
2.06	8"x6" Tapping Sleeve and Valve	1	EA	$3,500.00	$3,500.00
2.07	4" Ductile Iron Gate Valve	1	EA	$1,300.00	$1,300.00
2.08	3/4" Corporation	3	EA	$300.00	$900.00
2.09	3/4" Curb Stop	3	EA	$300.00	$900.00
2.10	Main Street Trench Patch (Assume 10' Wide) Gravels and Asphalt	60	SY	$35.00	$2,100.00
2.11	Main Street Traffic Control (Flaggers, Signage etc.)	1	AL	$2,000.00	$2,000.00
SITE WATER TOTAL					**$55,100.00**
3.00	**SITE SEWER**				
3.01	4" SDR35 PVC Sewer Line	25	LF	$50.00	$1,250.00
3.02	2" PVC Forcemain	140	LF	$45.00	$6,300.00
3.03	(2) 4'x46' Sewer Trench with 4" Perforated PVC Pipe and 12" of Stone	92	LF	$75.00	$6,900.00
3.04	1,250 Gallon Septic Tank	1	LS	$7,500.00	$7,500.00
3.05	1,000 Gallon Pump Station	1	LS	$9,000.00	$9,000.00
3.06	Oil Gas Grit Separator Storage Tank for Floor Drain Connection	1	LS	$5,500.00	$5,500.00
SITE SEWER TOTAL					**$36,450.00**
4.00	**SITE DRAINAGE**				
4.01	Drywells	5	EA	$5,500.00	$27,500.00
SITE DRAINAGE TOTAL					**$27,500.00**
5.00	**EROSION AND SEDIMENT CONTROLS**				
5.01	Silt Fence	500	LF	$3.50	$1,750.00
5.02	Infiltration Basin Inlet Protection	5	EA	$300.00	$1,500.00
5.03	Stabilized Construction Entrance	1	LS	$1,500.00	$1,500.00
5.04	Miscellaneous Erosion Control (Daily Dust Control, etc.)	1	AL	$2,000.00	$2,000.00
EROSION AND SEDIMENT CONTROL TOTAL					**$6,750.00**
6.00	**FIREHOUSE LANE REPAVING**				
6.01	Removal of Existing Pavement	670	SY	$3.50	$2,345.00
6.02	Hardpak Shim: Assume 3" Thickness	65	CY	$40.00	$2,600.00
6.03	Fine Grading	1	LS	$2,500.00	$2,500.00
6.04	Bituminous Concrete Pavement 3" Thickness	120	TN	$90.00	$10,800.00
FIREHOUSE LANE REPAVING TOTAL					**$18,245.00**
7.00	**MOBILIZATION/DEMOBILIZATION AND MISCELLANEOUS WORK AND CLEANUP**				
7.01	Mobilization & Demobilization (Assume 7.5% of the work)	1	LS	$26,125.13	$26,125.13
7.02	Miscellaneous Work and Cleanup (Assume 2.5% of the work)	1	LS	$8,708.38	$8,708.38
MOBILIZATION/DEMOBILIZATION AND MISCELLANEOUS WORK AND CLEANUP TOTAL					**$34,833.50**

ENGINEER'S SCHEMATIC OPINION OF PROBABLE CONSTRUCTION PROJECT COST	$401,413.50
20% CONSTRUCTION COST CONTINGENCY	$80,282.70
TOTAL ENGINEER'S SCHEMATIC OPINION OF PROBABLE COST	$481,696.20

NOTE: This Schematic Engineer's Opinion of Probable Cost (EOPC) was established from the Town of Norwich Fire and Police Facility Schematic Site Plan, dated August 2016, completed by Pathways Consulting (Pathways). In providing this EOPC, the Client understands that Pathways has no control over the cost or availability of labor, equipment, or materials, or over market conditions or the Contractor's method of pricing, and that this EOPC was developed on the basis of our experience with other projects of similarity. Pathways makes no warranty, express or implied, that the bids or the negotiated cost of the Work will not vary from this EOPC. Upon completion of the preliminary design phase of the project, Pathways will revise this EOPC to revised and/or modified design conditions and updated construction costs. (Option 2 includes the Reservoir Course in the Porous Pavement Section depicted on the drawings). This EOPC reflects site work up to 5' from buildings and does not include demolition of existing buildings or relcation of the existing AST tank.