Lighting System Scope of Work & Costs

Lighting (applies to the listed buildings as dictated by scope)

The following upgrades are typical:

- Provide new lamp, ballast, sockets and reflector kits for fluorescent fixtures in the project scope.
- Fixtures are to be de-lamped going from four (4) and three (3) lamps to two (2) lamps in the 2X4 fixtures included in the project scope. Reflectors are to be used in the fixtures that are being de-lamped.
- Fixtures that are 1x4 shall be de-lamped to one (1) lamp with a reflector and 2X2 fixtures are to be de-lamped to two (2) straight lamps.
- Ballast to be typically tandem wired, except when not feasible. No dimming ballast has been specified in this project due to less-than-desirable economics.
- Wherever feasible, non-dimmable incandescent lamps will be replaced with compact Fluorescent lamps.
- Fixtures in the project scope having 8 foot Fluorescent lamps will be converted to two 4 foot lamp system.
- Replace high-bay fixtures 250-400Watt Metal Halide retrofitted to a new 4 lamp to 6 lamp fluorescent fixture. The work includes taking down the old fixture, running any new wires and installing the new high-bay fixture.

For counts in project scope and additional scope of work see tables on following pages for the buildings that in the scope of this work.

General Guidelines for Lighting Installation Production Rate

1. High Bay Fixtures 250-400Watt Metal Halide retrofitted to a new 4 lamp to 6 lamp fluorescent fixture:
    a. Typically 2 men about 1.25 to 1.75 hours to complete – average 3 man-hours
2. Any location where a new fixture is installed:
    a. About 1 to 1.5 man-hour per fixture
    b. This takes into account new wire, sensor hook up (if needed), removing old fixtures, etc.
3. De-lamping a 2x4 troffer from 4 lamps down to 2 lamps with a new ballast, new lamps and new reflector:
    a. About 1 to 1.25 man-hour per fixture

Summary of costs for the buildings in scope

Item	Sub Costs	16% Overhead	10% Profit	Total
Lighting Upgrade – DC	$219,064	$35,050	$21,906	$276,020
Lighting Upgrade – SPSC	$87,851	$14,056	$8,785	$110,692
Lighting Upgrade – ECL	$125,045	$20,007	$12,504	$157,556
Lighting Upgrade – CL	$211,023	$33,764	$21,102	$265,889
Lighting Upgrade – RPHQ	$118,818	$19,011	$11,882	$149,711
Lighting Upgrade – DB	$442,589	$70,815	$44,259	$557,663
Lighting Upgrade -- GB	$149,898	$23,984	$14,990	$188,872
Totals	**$1,354,288**	**$216,686**	**$135,429**	**$1,706,403**

Note: Totals are rounded to the nearest dollar

Summary of lighting material and labor subcontractor costs

Item	Fixtures	Controls
Lighting Upgrade – DC	1896	19
Lighting Upgrade – SPSC	710	71
Lighting Upgrade – ECL	614	85
Lighting Upgrade – CL	1462	43
Lighting Upgrade – RPHQ	820	59
Lighting Upgrade – DB	2132	275
Lighting Upgrade -- GB	1632	75
TOTAL	**9,266**	**627**

Subcontractor Costs

Total Count	Material Cost[(1)]	Estimated labor[(2)], man-hour	Labor Cost	Total Costs
9,893	**$785,487**	**12,861**	**$568,801**	**$1,354,288**
Blended material cost per fixture				**$79.40**
Blended labor cost per fixture				**$57.50**

Note: Totals are rounded to the nearest dollar; cost-per-fixture rounded to the nearest penny

[(1)]Material cost includes sales tax, disposal, storage and handling

[(2)]Labor includes installation, construction supervision, administrative and accounting functions, and subcontractor overhead and profit

Detention Center *Lighting*

Detention Center		
Type of Fixture	**Qty**	**Retrofit description**
2x4 4-Lamp Troffer	191	Delamp T8 - 2 Lamp 28w, Ballast w/reflector
1x4 2-Lamp Strip	100	Delamp T8 - 1 Lamp 28w, Ballast w/reflector
1x4 2-Lamp Wrap	637	Delamp T8 - 1 Lamp 28w, Ballast w/reflector
1x4 2-Lamp Troffer	205	Delamp T8 - 1 Lamp 28w, Ballast w/reflector
2x2 2-Lamp U-6 Troffer.	24	Retro w/T8 2 - lamp F17 w/Reflector Kit
1x8 1-Lamp Strip F96	8	Retro w/ T8 2-lamp 28W 4ft Kit Ballast no reflector
1x8 2-Lamp Strip	7	Retro w/ T8 2-lamp 28W 4ft Kit Ballast w/ reflector
1x2 2-Lamp F20 Strip	1	Retro T8 1x2 1-Lamp (Std) Ballast w/reflector.
R100W Inc. Flood Indoor	1	NEW CFL 1R3023 23W
Inc. 60w	448	NEW CFL 28915 Mini lamp 15W
R30w Inc. Flood Indoor	2	NEW CFL 1R3016 16W
250 Watt MH Fixture	6	Retro 200 Watt Pulse Start MH kit
100 Watt MH Wall Pack	14	NEW 42W CFL WALL PACK
175 Watt MH Fixture	186	NEW T5 2x4 3Lamp HO w/ Reflector & cage
400 Watt MH & HPS HID fixture	52	NEW T5 2x4 4Lamp HO w/ Reflector & cage
400 Watt HPS Wall Pack	11	Retro 320 Watt Pulse Start Metal Halide
T12 2x2 2-Lamp U-Tube	2	NEW 2' 2-Lamp Wrap
9 Watt CFL Biax Tube 2-Lamp Can	1	NEW 2' 2-Lamp Wrap
TOTAL	**1896**	

Detention Center *Lighting Controls*

Lighting controls are designed based on the space use and the surrounding environment. The attached table provides a summary of the scope of work.

Qty	Detention Center Motion Sensors
1	New Wall Switch Occupancy Sensor
4	New Dual Tech Ceiling Sensor
2	New Dual Tech Wall Switch Occ. Sensor-2P
8	New Dual Tech Wall Switch Occ. Sensor
4	Power Pack to be used w/ CM & WV
19	**TOTAL**

Item	Sub Costs	16% Overhead	10% Profit	Total
Lighting Upgrade	**$219,064**	**$35,050**	**$21,906**	**$276,020**

Scaggsville Public Safety Complex *Lighting*

Scaggsville Public Safety Complex		
Type of Fixture	**Qty**	**Proposed Scope of Work**
2x4 3-Lamp Troffer	477	Delamp T8 - 2 Lamp 28w, Ballast w/reflector
2x4 3-Lamp Wrap	26	Delamp T8 - 2 Lamp 28w, Ballast w/reflector
1x4 2-Lamp Wrap	1	Delamp T8 - 1 Lamp 28w, Ballast w/reflector
1x4 2 & 3Lamp Strip	27	Delamp T8 - 1 Lamp 28w, Ballast w/reflector
1x4 2-Lamp Troffer	12	Delamp T8 - 1 Lamp 28w, Ballast w/reflector
1x3 3-lamp Strip	8	Retro T8 2 - Lamp F25W, Ballast w/ reflector
2x2 40 Watt 2-Lamp CFL Biax & U tube	25	Retro w/T8 2 - lamp F17 w/Reflector Kit
400 Watt MH Fixture	18	Retro 320 Watt Pulse Start M.H.
250 Watt MH Fixture	44	Retro 200 Watt Pulse Start MH kit
2 Lamp 25W Inc. Exit	31	New LED Exit Fixture
2 Lamp 6w Plug in CFL kit	3	New LED Exit Fixture
Inc. 90w Par 38 Dimmable	16	New CFL 23w BR40 Dimmable Flood
Inc. 100W	1	New CFL 28923 23W
Inc. 60w	14	New CFL 1R3016 15W
T8 2x4 3-Lamp Troffer	7	Remove fixture, patch, paint and repair... room over lit
TOTAL	**710**	

Scaggsville Public Safety Complex *Lighting Controls*

Lighting controls are designed based on the space use and the surrounding environment. The attached table provides a summary of the scope of work.

Scaggsville Public Safety Complex	
Qty	**Scope of work**
15	New Dual Tech Ceiling Mount Sensor
17	New Wall Switch Occ. Sensor
18	New Dual Tech Wall Switch Occ. Sensor
3	Dual Tech Corner Mount Sensor
18	Power Pack to be used w/Ceiling and wall mount
71	TOTAL

Item	Sub Costs	16% Overhead	10% Profit	Total
Lighting Upgrade	**$87,851**	**$14,056**	**$8,785**	**$110,692**

East Columbia Library *Lighting*

East Columbia Library		
Type of Fixture	**Qty**	**Proposed Scope of Work**
2x4 4 & 2 Lamp Wrap	8	Delamp T8 - 2 Lamp 28w, Ballast w/reflector
2x4 3-Lamp Troffer Bi-level.	161	Delamp to T8 '2x4 2L Troffer 28w (STD)Bal. w/reflector
2x2 -2 40W Biax Lamps & U tubes	96	Retrofit w/ 2x2 2-F17 T8 lamps, ballast & reflector Kit
1x4 2-Lamp Wrap	50	De-Lamp to T8 1-Lamp Wrap 28w Ballast w/reflector
1x4 2-Lamp Strip	15	De-Lamp to T8 1-Lamp Wrap 28w Ballast w/reflector
T12 1x3 2-Lamp Strip	2	Retro to T8 1 Lamp F25 Ballast w/ reflector.
1x8 –8 - 4' Lamp Wrap 4up/4down	9	Delamp to T8 4 lamp 28w, Ballast. down only
1X8' tube 6 4' Lamp Bi-level	108	Delamp to T8 2 – Lamp 28 W w/reflector & Standard Ballast
250 Watt MH Fixture	11	Retro 200 Watt Pulse Start MH kit
400 Watt MH Fixture	52	Retro 320 Watt Pulse Start M.H.
Pendant mounted 2x 40 Watt 2 – Biax Lamps	32	Remove & replace with NEW T8 4-lamp 2x4 T8 w/Reflector
Inc. 100W	1	New CFL 25W SI
MR 16 -50 Watt Low Voltage Flood	14	New LED 8 Watt MR 16 replacement lamp
100W Quartz Lamp	14	Remove Fixture, patch, paint and Repair
250 Watt MH Fixture	27	Remove Fixture, patch, paint and Repair
250W Quartz flood uplight	8	Remove Fixture, patch, paint and Repair
9 Watt CFL Flood	6	Remove Fixture, patch, paint and Repair
TOTAL	**614**	

East Columbia Library *Lighting Controls*

Lighting controls are designed base on the space use and the surrounded environment. The attached table provides a summary of the scope of work.

	EAST COLUMBIA LIBRARY
Qty	**Sensor scope of work**
17	New Dual Tech Ceiling Sensor
3	New Dual Tech Ceiling Sensor W/ photo cell
6	New Ceiling mounted Photo Control Sensor w/ Dual Zone Technology
30	Power Pack to be used w/ all CM & WV
4	New Wall Switch Occupancy Sensor
12	New Wall Switch Occupancy Sensor - 2P
5	New Dual Tech Wall Switch Occ. Sensor
8	New Dual Tech Wall Switch Occ. Sensor 2 POLE
85	TOTAL

Item	**Sub Costs**	**16% Overhead**	**10% Profit**	**Total**
Lighting Upgrade	**$125,045**	**$20,007**	**$12,504**	**$157,556**

Central Library *Lighting*

Central Library		
Type of Fixture	**Qty**	**Proposed Scope of Work**
T8 2x4 3-Lamp Troffer	147	Delamp to 2 - 28 W lamps, reflector & tandem ballast.
T8 & T12 1x4 Wrap Fixtures with 2-Lamps	1221	Delamp to 2 - 28 W lamps, reflector & tandem ballast.
1x4 1-Lamp Strip	6	Re-Lamp & Re-Ballast T8 '1x4 1-Lamp Strip 28w (STD)Bal.
1x3 1-Lamp Strip	6	Retro T8 '1x3 1-Lamp F25 (STD)Bal.
2x2 3-Lamp F17 T8 Troffer w/Elec. Bal	6	Retro T8 '2x2 2lamp F17 T8 Silver Reflector Kit
400 Watt MH Fixture	3	Retro 320 Watt Pulse Start M.H.
175 Watt MH Wall Pack	30	Remove fixture, Patch and Repair
300W Quartz uplight	11	Remove fixture, Patch and Repair
150 Watt MH Wall Pack	4	Retro 100 Watt Pulse Start MH kit
250 Watt HPS Wall Pack	3	Retro 200 Watt Pulse Start MH kit
250 Watt HPS Shoe Box Pole	20	New 4 Light Bar LED fixture
150 Watt HPS Wall Pack	3	Retro 100 Watt Metal Halide
Inc. 100W	2	New CFL 28923 23W
	1462	**TOTAL**

Central Library *Lighting Controls*

Lighting controls are designed base on the space use and the surrounded environment. The attached table provides a summary of the scope of work.

	Central Library
Qty	**Proposed Scope of Work**
5	New Ceiling Mounted Photo Sensor
20	Power Pack to be used w/ all CM & WV
7	New Dual Tech Ceiling Sensor
3	New Wall Switch Occupancy Sensor
8	New Dual Tech Wall Switch Occ. Sensor
43	**TOTAL**

Item	Sub Costs	16% Overhead	10% Profit	Total
Lighting Upgrade	**$211,023**	**$33,764**	**$21,102**	**$265,889**

Recreation & Parks HQ *Lighting*

Parks and Recreation Headquarters		
Type of Fixture	**Qty**	**Proposed Scope of Work**
2x4 2-Lamp Troffer	270	Delamp T8 '2x4 2-Lamp 28w, tandem ballast w/reflector
1x8 4-Lamp Strip	89	Retro 2-32 W T8 Lamp, tandem ballast with reflector
1x4 2-Lamp Strip	106	Delamp T8 1-Lamp Strip 28w (STD)Bal. w/reflector
2x2 2-Lamp U-6 Troffer	70	Retro 2x2 2lamp F17 T8 w/ Reflector Kit
1x8 2-Lamp Industrial strip	31	Retro 4-lamp 4ft Kit with reflector
1x3 2-Lamp Strip	2	Retro to 1 lamp T8 F25 Ballast with reflector
175 Watt MH Wall Pack	6	Retro w/125 Watt Pulse Start MH kit
250 Watt MH & HPS Fixture	27	Retro w/200 Watt Pulse Start MH kit
400 Watt MH & HPS Fixture	50	Retro w/320 Watt Pulse Start M.H.
100 Watt MH Wall Pack	18	NEW 23w wall pack w/photocell
1-90W. Halogen Flood - outdoor	2	NEW Par 38 23W CFL Lamp
Inc. 100W	18	NEW 23 WATT BR40 DIMMABLE 27K
JJ Inc. 60w	4	NEW CFL 28923 15W
Inc. 60w	5	NEW 15 WATT BR30 DIMMABLE 27K
Inc. 90w indoor screw in	6	NEW 23 WATT R40 Flood 27K
2 Lamp 6w Plug in CFL kit	38	NEW LED Exit Fixture
T8 1x4 2-Lamp Vapor Tight	14	Remove fixture from operation
T8 1x8 4-Lamp Vapor Tight	12	Remove fixture from operation
100 Watt MH wall Pack	52	Remove fixture, patch, paint and repair
TOTAL	**820**	

Recreation & Parks HQ *Lighting Controls*

Lighting controls are designed based on the space use and the surrounding environment. The attached table provides a summary of the scope of work.

Recreation & Parks Headquarters	
Qty	**Scope of Work**
6	Wide Bay Sensor
19	Individual High Bay Motion Sensor
9	Ceiling Mounted Dual Technology Sensor
2	Large Wall Switch
1	New Dual Tech Wall Switch Occ. Sensor
4	New Dual Tech Wall Switch Occ. Sensor / 2 pole
18	Power Pack to be used w/ all CM & WV
59	**TOTAL**

Item	Sub Costs	16% Overhead	10% Profit	Total
Lighting Upgrade	**$118,818**	**$19,011**	**$11,882**	**$149,711**

Dorsey Building Lighting

Dorsey Building		
Type of Fixture	**Qty**	**Proposed Scope of Work**
2x4 4-Lamp Wrap	21	Delamp to 2-Lamp 28w tandem ballast w/reflector kit
2x4 4-Lamp Troffer	1540	delamp to 2-Lamp 28w, tandem ballast w/reflector kit
2x2 4-Lamp F17 T8 Troffer	108	Retro with 2lamp F17 T8 tandem ballast w/Reflector Kit
1x4 2-Lamp Wrap	77	Delamp to 1-Lamp Wrap 28w tandem ballast w/reflector
1x4 2-Lamp Strip	57	Delamp to 1-Lamp Strip 28w tandem ballast w/reflector
1x2 2-Lamp F20 Strip	6	Retro w/ 2-Lamp, tandem ballast w/reflector
1x8 2-Lamp Industrial strip	23	Retro w/2-lamp, tandem ballast w/ 4ft reflector Kit
250 Watt MH Fixture	36	New Wrap Wall Mounted T8 1x4 2-lamp 28w (STD)Bal.
250 Watt MH Fixture	14	Retro w/175 Watt Pulse Start MH kit
175 Watt MH Wall Pack	3	Retro w/ 125 Watt Pulse Start MH kit
250 Watt MH Fixture	44	New T8 2x4 32W 4Lamp pendant wrap fixture (HP) bal
400 Watt MH Fixture	45	Retro w/320 Watt Pulse Start M.H.
Inc. 100W	15	New CFL 25W SI
Inc. 50w	24	New CFL R20 FLOOD 7W
JJ Inc. 60w	7	New CFL 28923 23W
Inc. 65w Par 30	40	New CFL 15w BR30 Flood
Inc. 90w Par 38	14	New CFL 23w BR40 Flood
250 Watt MH Fixture	1	Remove Fixture
2 Lamp 6w Plug in CFL kit	8	New LED Exit Fixture
Old Style LED exit sign	34	New LED Exit Fixture
Old Style LED exit sign	15	Remove Exit Sign
TOTAL	**2132**	

Dorsey Building *Lighting Controls*

Lighting controls are designed based on the space use and the surrounding environment. The attached table provides a summary of the scope of work.

Dorsey Building	
Qty	**Sensor Type**
19	New Wall Switch Occupancy Sensor
27	New Dual Tech Wall Switch Occ. Sensor
1	New Dual Tech Wall Switch Occ. Sensor 2 POLE
3	New Large Wall Switch Occupancy Sensor
110	New DualTech Ceiling Sensor
115	Power Pack to be used w/ all CM & WV
275	**TOTAL**

Item	Sub Costs	16% Overhead	10% Profit	Total
Lighting Upgrade	**$442,589**	**$70,815**	**$44,259**	**$557,663**

Gateway Building Lighting

Gateway Building		
Type of Fixture	**Qty**	**Proposed Retrofit**
2x4 4-Lamp Troffer	958	De-Lamp to T8 '2x4 2L Troffer 28w (STD)Bal. w/reflector
1x4 2-Lamp Wrap	23	De-Lamp to T8 1x4 1-Lamp Wrap 28w (STD)Bal. w/reflector
1x4 2-Lamp Strip	176	De-Lamp to T8 1x4 1-Lamp Strip 28w (STD)Bal. w/reflector
1x4 1-Lamp Strip	9	Re-Lamp & Re-Ballast T8 '1x4 1-Lamp Strip 28w (STD)Bal.
1x3 2-Lamp Strip	81	Retro T8 '1x3 2-Lamp F25 (STD)Bal.
1x2 2-Lamp F20 Strip	25	Retro T8 '1x2 2-Lamp (STD)Bal.
1x2 1-Lamp F20 Strip	6	Retro T8 '1x2 1-Lamp (LP)Bal.
2x2 2-Lamp U-6 Trof.	227	Retro T8 '2x2 2lamp F17 T8 w/ Reflector Kit
Inc. 60w	4	New CFL 1R3016 16W
Inc. 65w Par 30	10	New CFL 15w BR30 Flood
Inc. 65w Par 30	30	New CFL 15w BR30 Flood dimming
Inc. 100W	2	New CFL 25W SI
R150W Inc.	1	New CFL 28923 27W
250 Watt MH Fixture	14	Retro 175 Watt Pulse Start MH kit
400 Watt MH Fixture	24	Retro 320 Watt Pulse Start M.H.
100 Watt MH Can	24	No Retrofit 100 Watt MH Can
Under Lit Classroom	18	Add new fixture T8 2x4 2-Lamp 28w (STD)Bal.
TOTAL	**1632**	

Gateway Building *Lighting Controls*

Lighting controls are designed based on the space use and the surrounding environment. The attached table provides a summary of the scope of work.

Gateway Building	
Qty	**Proposed Retrofit**
2	New Wall Switch Occupancy Sensor
29	New Dual Tech Wall Switch Occ. Sensor
2	New Large Wall Switch Occupancy Sensor
20	New DualTech Ceiling Sensor
22	Power Pack to be used w/ all CM & WV
75	TOTAL

Item	Sub Costs	16% Overhead	10% Profit	Total
Lighting Upgrade	**$149,898**	**$23,984**	**$14,990**	**$188,872**

Cooling System Scope of Work & Costs

The scope and costs for ECMs under Cooling System Upgrades are listed below. Detailed scope and cost breakdowns are provided later in the section.

Table 1

Item	Sub Costs	16% Overhead	10% Profit	Total Costs
Chiller repair/replace	$512,247	$81,960	$51,225	**$645,431**
Cooling Tower VSD	$45,569	$7,291	$4,557	**$57,416**
Chilled Water Valves	$22,390	$3,582	$2,239	**$28,212**
Chilled Water Pump VSD	$19,431	$3,109	$1,943	**$24,484**
TOTAL	**$599,637**	**$95,942**	**$59,964**	**$755,543**

Note: Costs are rounded to nearest dollar

SCOPE DETAILS

Chiller Retrofit – Detention Center

This scope of work includes the replacement of the two existing 100-tons Trane centrifugal chillers with two new 150-tons Trane chillers. Current chilled water piping within the plant is arranged in series through Chillers 1# and 2. The chilled water piping will be revised to permit parallel flow through the chiller plant including the installation of a chilled water header to connect the two new chillers with the existing Chiller #3. The scope of work includes the following:

- Demolition and removal of two existing Trane chillers including existing valves, pipe connections and electrical connections
- Provide and install two new 150 ton Trane chillers, water-cooled series RTHD or equal. Chillers include:
    - ASHRAE 90.1 compliant
    - Refrigerant isolation valves
    - Factory insulation
    - Standard safety devices
    - Refrigerant 134a
    - 3 pass evaporator
    - Standard grooved pipe
    - Wye-Delta Closed transition starter
    - 598 Max RLA unit mounted starter
    - 208 volt electrical
    - Mechanical disconnect
    - NEMA 1 enclosure with MRLA 598
    - Dyna-view English
    - Programmable relays
    - Chilled water reset
    - Two flow switches
    - LON communication card
    - Factory start-up
- Chiller Schedule information:

CENTRIFUGAL CHILLER SCHEDULE (@100% LOAD)							
Evaporator Section				Condenser Section			
Ent. Temp.	Lvg. Temp.	Flow (gpm)	PD Ft of H_2O	Flow @ 85/96°F	PD Ft of H_2O	Volts	Unit Power (kW)
56 °F	44 °F	298	5.9	375	8.5	208	97.5

CENTRIFUGAL CHILLER PART LOAD PERFORMANCE			
% Load	Capacity	kW	Efficiency (kW/ton)
100	150	97.5	0.650
75	112.5	64.8	0.576
50	75	39.6	0.528
25	37.5	27.7	0.739

NPLV = 0.568 kW/ton

- Existing housekeeping pads to remain and be re-used with new chillers.
- **Provide and install new automatic isolation valves on the chiller inlet piping. (One valve per chiller) – Cost included under CHW Valve ECM**
- Modify chilled water piping to permit parallel chiller operation. Provide and install 8" schedule 40 steel pipe headers (welded) with 6" branch piping to new chillers.
- Modify existing Chiller #3 connection to permit parallel operation with the new Chillers #1 and 2.
- Provide and install 1-½ inch fiberglass insulation with white all-service jacket on new piping. Black painted flow arrows and pipe ID on new pipe.
- Provide new electrical power wiring in existing conduit from switchgear to two new chillers. New circuit breakers in switchgear for chillers. Unless specified, existing electrical infrastructure will be reused.
- Provide and install manufacturer supplied refrigerant monitoring system and interlock with chillers and boilers.
- Provide and install new ventilation fans and ductwork for chiller room ventilation in conjunction with refrigerant monitor.
- Disassemble and reassemble chillers for rigging into the mechanical room. Coordinate disassembly and reassembly with manufacturer to maintain full warranty coverage.
- Existing condenser water piping and cooling towers to remain and be re-used with new chiller plant.
- Existing chilled/condenser water pumps to remain and be re-used with the new chiller plant.

- Connect new energy management temperature controls to chillers, pumps and cooling towers to permit communication with Tridium EMS frontend

Control System

- Re-program existing and new points to the proposed Tridium system
- Set up and commission the following:
    - Chiller system safeties
    - parallel operation of chillers
    - condenser relief to ensure proper sequencing of cooling-tower fans
    - refrigerant monitoring system
    - Other sequences as called for in the design document

Engineering Service (included in design fee)

- Provide detailed computer simulation to determine the cooling demand of the building
- Provide drawings and specifications for the chiller change-out
- Provide construction administration services

The following cost breakdown for the above scope of work:

Item	Sub Costs	16% Overhead	10% Profit	Total Cost
Chiller Replace/Repair	$512,247	$81,960	$51,225	$645,431

Sub Costs Split for Chiller Replace/Repair

Item	Material	Labor, h	Labor Costs	Other Subs	Controls Sub costs	Misc. costs	Total sub costs
Chiller Replace/Repair	$307,563	*1,930*	$102,143	$81,714	$17,024	$3,803	$512,247

Chilled Water Isolation Valve and Insulation Replacement - SPSC

This scope of work includes the replacement of the two pneumatic isolation valves within the chilled water distribution lines outside by the air-cooled chillers. In addition, the exterior chilled water pipe insulation will be replaced.

- Check and verify operation of the automatic isolation valves in the chilled water piping. Replace pneumatic actuator and linkage on two exterior valves.
- Remove and dispose of existing aluminum jacket and insulation on the exterior piping. Re-install 1½ inch insulation with aluminum jacket. Seal jacket edges and openings to prevent water penetration to insulation.
- This scope does not include replacement of the existing piping, valves or fittings.

Chilled Water Isolation Valve and Insulation Replacement – Detention Center

This scope of work is presented under Chiller Replace ECM presented for Detention Center.

CHW Valves (for SPSC and Detention Center Isolation Valves shown underlined in the chiller scope)

Item	Sub Costs	16% Overhead	10% Profit	Total Cost
CHW Valves	$22,390	$3,582	$2,239	$28,212

Note: Costs are rounded to nearest dollar

Variable Speed Drive Installation – Detention Center

This scope of work includes the installation of variable speed drives on specific mechanical systems to control the speed of the fan or pump to reduce electrical consumption.

The scope of work is as follows:

- Provide and install variable speed drives with drive bypass as manufactured by Honeywell or equal. Provide 208 volt Honeywell NBX series variable speed drives with cool blue drive by-pass for the following:

System ID	Drive Size
Cooling Tower Fan	10 HP
Cooling Tower Fan	5 HP

- Mount variable speed drive and by-pass on the mechanical room wall or on rack near mechanical device. Reconnect existing 208 volt electrical power wiring from existing circuit breaker to new drive.
- Provide appropriate control device (temperature sensor) piping to control variable speed drive of CT fan.
- Provide control communication wiring between variable speed drive and EMS control panel. Provide programming and control points.

Variable Speed Drive Installation – Central Library

This scope of work includes the installation of a variable speed drive on the central cooling tower fan to reduce electricity consumption. The scope of work is as follows:

- Provide and install one (1) variable speed drive with bypass as manufactured by Honeywell or equal. Provide 460 volt Honeywell NBX series variable speed drives with cool blue drive by-pass for the following:

System ID	Drive Size
Cooling Tower Fan	7 ½ HP

- Mount variable speed drive and by-pass on the mechanical room wall or on rack near the electrical distribution for the cooling tower. Reconnect existing 460 volt electrical power wiring from existing circuit breaker to new drive. Reuse existing fan disconnect located at cooling tower.
- Provide temperature sensor in condenser water piping to control variable speed drive.
- Provide control communication wiring between variable speed drive and EMS control panel. Provide programming and control points.

Variable Speed Drive Installation – Gateway Building

This scope of work includes the installation of variable speed drives on one (1) cooling tower. The scope of work is as follows:

- Provide and install variable speed drives with bypass as manufactured by Honeywell or equal. Provide 460 volt Honeywell NBX series variable speed drives with cool blue drive by-pass for the following:

System ID	Drive Size
Cooling Tower	50 HP

- Mount variable speed drives and by-pass on the mechanical room wall or on rack near the electrical distribution for the equipment. Reconnect existing 460 volt electrical power wiring from existing circuit breaker to new drive. Remove existing disconnect and replace with drive.
- Utilize condenser water temperature to control speed of cooling tower fan.
- Provide control communication wiring between variable speed drive and EMS control panel. Provide programming and control points.

Item	Sub Costs	16% Overhead	10% Profit	Total Cost
Cooling Tower VFDs (for the units listed above)	$45,568	$7,291	$4,557	$57,416

Note: All costs are rounded to nearest dollar

CHW Pump Variable Speed Drive Installation – Detention Center

This scope of work includes the installation of variable speed drives on specific mechanical systems to control the speed of the fan or pump to reduce electrical consumption.

The scope of work is as follows:

- Provide and install variable speed drives with drive bypass as manufactured by Honeywell or equal. Provide 208 volt Honeywell NBX series variable speed drives with cool blue drive by-pass for the following:

System ID	Drive Size
Chilled Water Pump 1	10 HP
Chilled Water Pump 2	10 HP

- Mount variable speed drive and by-pass on the mechanical room wall or on rack near mechanical device. Reconnect existing 208 volt electrical power wiring from existing circuit breaker to new drive.
- Provide appropriate control device (pressure differential sensor) in duct or piping to control variable speed drive.
- Provide control communication wiring between variable speed drive and EMS control panel. Provide programming and control points.

Item	Sub Costs	16% Overhead	10% Profit	Total Cost
CHW Pump VFD	$19,431	$3,109	$1,943	$24,484

Note: All costs are rounded to nearest dollar

HVAC System Upgrades Scope of Work

The HVAC System Upgrade category includes the following ECMs in multiple buildings. Cost and breakdown of the ECMs are provided later in the section. The roll-up totals are provided in the following table.

	Sub costs	16% OH	10% Profit	Installed Costs
HVAC System Upgrades	**$ 734,278**	**$ 117,485**	**$ 73,428**	**$ 925,191**
EMCS Tridium upgrade	$ 215,580	$ 34,493	$ 21,558	$ 271,630
EMS upgrades	$ 202,797	$ 32,447	$ 20,280	$ 255,524
Replace AHU, RTU and/or Condensing Unit	$ 168,613	$ 26,978	$ 16,861	$ 212,452
Demand Control Ventilation CO2	$ 15,886	$ 2,542	$ 1,589	$ 20,016
AHU, RTU VSD	$ 107,022	$ 17,123	$ 10,702	$ 134,847
ATC controls for Unit Heaters	$ 7,885	$ 1,262	$ 788	$ 9,935
Intelli-hood Controls	$ 16,498	$ 2,640	$ 1,650	$ 20,787

Note: Totals are rounded to the nearest dollar

EMCS Tridium Upgrade and EMS Upgrade

This scope of work includes the upgrade of the existing DDC system and selected pneumatic controls with new DDC control devices and programming. Please note that this scope below applies to multiple Energy Conservation Measures (ECMs) in each of the building. Due to the nature of the work, the **EMS Upgrades** and the front-end integration, **EMCS Tridium upgrade**, are presented together.

EMCS Tridium upgrade

	Sub costs	16% OH	10% Profit	Installed Costs
DC	$ 76,758	$ 12,281	$ 7,676	$ 96,715
SPSC	$ 38,380	$ 6,141	$ 3,838	$ 48,358
ECL	$ 42,786	$ 6,846	$ 4,279	$ 53,910
CL	$ 16,001	$ 2,560	$ 1,600	$ 20,161
RPHQ	$ 21,915	$ 3,506	$ 2,191	$ 27,613
Dorsey	$ 5,826	$ 932	$ 583	$ 7,341
Gateway	$ 13,914	$ 2,226	$ 1,391	$ 17,532
Total	**$ 215,580**	**$ 34,493**	**$ 21,558**	**$ 271,630**

Note: Totals are rounded to the nearest dollar

KEY: DC = Detention Center; SPSC = Scaggsville Public Safety Complex; ECL = East Columbia Library; CL = Central Library; RPHQ = Recreation & Parks Headquarters; Dorsey = Dorsey Building; Gateway = Gateway Building

EMS upgrades

	Sub costs	16% OH	10% Profit	Installed Costs
DC	$ 29,016	$ 4,643	$ 2,902	$ 36,560
SPSC	$ 42,063	$ 6,730	$ 4,206	$ 52,999
ECL	$ 28,523	$ 4,564	$ 2,852	$ 35,940
CL	$ 35,249	$ 5,640	$ 3,525	$ 44,413
RPHQ	INCLUDED IN RTU REPLACEMENT SCOPE			
Dorsey	$ 59,134	$ 9,461	$ 5,913	$ 74,509
Gateway	$ 8,812	$ 1,410	$ 881	$ 11,103
Total	**$ 202,797**	**$ 32,447**	**$ 20,280**	**$ 255,524**

Note: Totals are rounded to the nearest dollar

Energy Management System Upgrades—Detention Center

This scope of work includes the upgrade of the existing DDC system and selected pneumatic controls with new DDC control devices and programming.

- Upgrade existing Metasys DDC controls with three (3) Tridium supervisory controllers. Replace one Metasys five slot and two Metasys two slot panels for Tridium upgrade.
- Implement EMS programming: Heating water reset control, discharge air temperature reset control, VSD control, start/stop/status of equipment.
- Provide programming, commissioning, software, server communications, system engineering and system graphics.

Energy Management System Upgrades—SPSC

This scope of work includes the upgrade of the existing Metasys DDC system and selected pneumatic controls with new DDC control devices and programming. Please note that the scope presented below may apply to multiple ECMs.

- Upgrade existing Metasys DDC controls with one (1) Tridium supervisory controller. Replace one Metasys five slot panel for Tridium upgrade and communication.
- Implement EMS programming: Heating water reset control, discharge air temperature reset control, VSD control, start/stop/status of equipment.
- Provide and install CO_2 sensor in the return air duct of AHU-1 for control of ventilation air. Provide programming, graphics and communication wiring between device and panel.

Provide programming, commissioning, software, server communications, system engineering and system graphics.

Energy Management System Upgrades – ECL

This scope of work includes the upgrade of the existing Metasys DDC system to include additional EMS functions such as CO2 ventilation control (included for DCV ECM). This scope affects multiple ECMs.

- Upgrade existing Metasys DDC controls with one (1) Tridium supervisory controller. Replace one Metasys two slot panel for Tridium upgrade and communication.

- Implement EMS programming: chilled water reset, heating water reset, discharge air reset, and start/stop/status
- Provide programming, graphics and communication wiring between devices and panel.
- Provide programming, commissioning, software, server communications, system engineering and system graphics.

Energy Management System Upgrades – Central Library

This scope of work includes the upgrade of the existing Metasys DDC system to include additional EMS functions such as CO2 ventilation control (included under DCV ECM). The ECM applies to multiple EMS.

- Upgrade existing Metasys DDC controls with one (1) Tridium supervisory controller. Replace one Metasys five slot panel for Tridium upgrade and communication.
- Implement EMS programming: Condenser water loop control, start/stop/status of connected heat pump units.
- Provide programming, graphics and communication wiring between devices and panel.
- Provide programming, commissioning, software, server communications, system engineering and system graphics.

EMS Upgrades—Dorsey Building

This scope of work includes the replacement of the existing non-functioning energy management system controls with a Tridium energy management system. The scope of work is as follows:

- Demolish and remove the existing control panels.
- Provide and install three (3) control points per air handler (start/stop/status). Provide and install one zone temperature sensor per rooftop unit for night setback.
- Provide programming, commissioning, software, server communications, system engineering and system graphics.

Energy Management and Tridium Upgrade – Gateway Building

This scope of work includes the upgrade of the existing Metasys DDC system with new DDC control devices and programming.

- Upgrade existing Metasys DDC controls with one (1) Tridium supervisory controller. Replace one Metasys five slot panel for Tridium upgrade.
- Implement EMS programming: Discharge air temperature reset control, VSD control, start/stop/status of equipment.
- Provide programming, commissioning, software, server communications, system engineering and system graphics.

Average cost per point varies from $800 to $1,200

Replace AHU RTU Condensing Units – RPHQ

This scope of work includes the replacement of seven (7) rooftop units. The scope of work is as follows:

- Demolish and remove from site, seven (7) existing York rooftop units as follows:

Unit ID	Model #	Serial #	Serves	SAF HP	Cooling MBH	Heating MBH
RTU-1	D2GA030	NMBM088670	Ed Bromley Area	1/3	30	41
RTU-2	D2GA030	NMBM079027	Front 1st & 2nd Floor	1/3	30	41
RTU-3	D3CG12	NDCM031586	Left Skylight	2	105	161
RTU-4	D3CG090	NDCM034739	2nd Floor Back Loop	2	90	129
RTU-5	D4CG036	NDCM034810	1st Floor Back	2	36	41
RTU-6	D3CG102	NDCM033172	Center Sklight	3	102	129
RTU-8	D3CG120N	NDCM033732	Right Skylight	3	120	161

- Provide and install new York Predator or equal rooftop air handlers with curb adaptors as needed to fit new unit to existing roof curb. Disconnect and reconnect existing electrical power wiring. Disconnect and reconnect existing natural gas piping. Provide new units as follows:

Packaged Rooftop Unit Schedule									
SA CFM	OA CFM	ESP (in)	Fan HP	EAT clg	LAT clg	Cap MBH	Htg MBH	Qty	Model #
4,000	400	0.60	3	80	59.4	124	192	1	DM120N20P4AAA3
3,400	340	0.60	3	80	59.7	103	144	2	DM102N15P4AAA4
1,000	100	0.43	.75	80	60.1	28.4	36	1	D2NP030N03606
1,200	120	0.60	1.5	80	59.9	37.0	40	3	DJ036N04P4AAA2

Based on 95 deg F outdoor air temperature.

DDC Control of Rooftop Units and Tridium Upgrade

This scope of work includes the installation of Lonworks communicating/programmable thermostats for ten (10) rooftop units and the installation of Tridium software for central communications and control.

The scope of work is as follows:

- Replace existing programmable thermostats with Honeywell LONWORKS communication and programmable thermostat. Total of ten (10) programmable thermostats for RTU's. Existing wiring between the thermostat and the RTU's will be re-used.
- Provide and install a Tridium supervisory controller and connect the controllers for central communication.
- Provide programming, engineering, start-up and commissioning of installed equipment.

Item	Sub Costs	16% Overhead	10% Profit	Total Cost
Replace RTUs	$168,613	$26,978	$16,861	$212,452

Sub Costs Split – for RPHQ Replace RTUs

Item	Material	Labor, h	Labor Costs	Other Subs	Controls Sub costs	Total sub costs
Replace RTUs	$62,500	*760*	$50,921	$40,177	$15,015	$168,613

Note: Totals are rounded to nearest dollar

Demand Control Ventilation – ECL

This scope of work was shown previously under EMS Upgrades, but the costs were not included. The scope of the work includes:

1. upgrading of the existing Metasys DDC system to include CO2 ventilation control strategy
2. Implement EMS programming for CO_2 control of ventilation
3. Provide and install one (1) CO_2 sensor in the return air duct of AHU-1, 3 and 4 for control of ventilation air. Provide programming, graphics and communication wiring between devices and panel

Demand Control Ventilation – *Central Library*

This scope of work includes the upgrade of the existing Metasys DDC system to include EMS functions for CO2 based ventilation control.

- Implement EMS programming for CO_2 control of ventilation
- Provide and install one (1) CO_2 sensor in the return air duct of HP101, 108, 113 for control of ventilation air. Provide programming, graphics and communication wiring between devices and panel.
- Provide programming, commissioning, software, server communications, system engineering and system graphics.

Demand Control Ventilation CO2

	Sub costs	16% OH	10% Profit	Installed Costs
ECL	$ 8,465	$ 1,354	$ 846	$ 10,666
CL	$ 7,421	$ 1,187	$ 742	$ 9,350
Total	**$ 15,886**	**$ 2,542**	**$ 1,589**	**$ 20,016**

Note: Totals are rounded to the nearest dollar

Variable Speed Drive Installation –Detention Center

This scope of work includes the installation of variable speed drives on specific mechanical systems to control the speed of the fan to reduce electrical consumption.

The scope of work is as follows:

- Provide and install variable speed drives with drive bypass as manufactured by Honeywell or equal. Provide 208 volt Honeywell NBX series variable speed drives with cool blue drive by-pass for the following:

System ID	Drive Size
AHU-1 SAF	50 HP
AHU-1 RAF	7 ½ HP

- Mount variable speed drive and by-pass on the mechanical room wall or on rack near mechanical device. Reconnect existing 208 volt electrical power wiring from existing circuit breaker to new drive.
- Provide appropriate control device (pressure differential sensor) in duct to control variable speed drive.
- Provide control communication wiring between variable speed drive and EMS control panel. Provide programming and control points.
- For Air Handlers Only: Replace existing 3-way valves with 2-way control valves to vary the hydronic flow.

Variable Speed Drive Installation – ECL

This scope of work includes the installation of a variable speed drives on air handlers. The scope of work is as follows:

- Provide and install variable speed drive with bypass as manufactured by Honeywell or equal. Provide 460 volt Honeywell NBX series variable speed drives with cool blue drive by-pass for the following:

System ID	Drive Size
AHU-1	40 HP
AHU-3	10 HP
AHU-4	5 HP

- Mount variable speed drives and by-pass on the mechanical room wall or on rack near the electrical distribution for the equipment. Reconnect existing 460 volt electrical power wiring

from existing circuit breaker to new drive. Remove existing disconnect and replace with drive.

- Provide static pressure sensor in duct to control drives.
- Provide control communication wiring between variable speed drive and EMS control panel. Provide programming and control points.

Variable Speed Drive Installation – Gateway Building

This scope of work includes the installation of variable speed drives on five (5) air handlers. The scope of work is as follows:

- Provide and install variable speed drives with bypass as manufactured by Honeywell or equal. Provide 460 volt Honeywell NBX series variable speed drives with cool blue drive by-pass for the following:

System ID	Drive Size
AHU-1, 2, 3, 4	20 HP
AHU-5	25 HP

- Mount variable speed drives and by-pass on the mechanical room wall or on rack near the electrical distribution for the equipment. Reconnect existing 460 volt electrical power wiring from existing circuit breaker to new drive. Remove existing disconnect and replace with drive.
- Provide static pressure sensor in duct to control drives on AHU's.
- Provide control communication wiring between variable speed drive and EMS control panel. Provide programming and control points.

BLDG	Sub costs	16% OH	10% Profit	Installed Costs
DC	$ 26,785	$ 4,286	$ 2,678	$ 33,749
ECL	$ 35,017	$ 5,603	$ 3,502	$ 44,121
Gateway	$ 45,220	$ 7,235	$ 4,522	$ 56,977
Total	**$ 107,022**	**$ 17,123**	**$ 10,702**	**$ 134,847**

Note: Totals are rounded to nearest dollar

ATC Controls for Unit Heaters – RPHQ

- Provide and install four (4) Honeywell LONWORKS programmable thermostats for control of unit heaters within the shop bays. Remove and dispose of existing manual thermostats.
- Provide programming, engineering, start-up and commissioning of installed equipment.

ATC controls for Unit Heaters

	Sub costs	16% OH	10% Profit	Installed Costs
RPHQ	$ 7,885	$ 1,262	$ 788	$ 9,935

Note: Totals are rounded to the nearest dollar

Kitchen Hood Controls—Detention Center

Install I/O processor above the ceiling within 100 feet from any hood in the Kitchen and 50 feet from the keypad. Wire 115 Volt to a dedicated circuit.

Install VFD drives in Mechanical room with 3 phase input power from circuit breaker and output wiring to be connected to respective fan motor. Energize make-up air (MUA) controls from separate circuit.

Install Intelli-Hood sensors in each Hood according to manual and meeting applicable state and county codes.

Controls to be installed are 4 channel I/O processor, Keypad, Optic Sensor, 4 - Exhaust Temperature sensor 3 – 5HP VFD 230V 3 PH and 1 – 7.5HP VFD 230V 3 PH and associated cabling and wiring to be a turn key system

Includes start-up and one-time training.

	Sub costs	16% OH	10% Profit	Installed Costs
DC	$ 16,498	$ 2,640	$ 1,650	$ 20,787

Note: Totals are rounded to the nearest dollar

Heating System Scope of Work & Costs

The scope and costs for ECMs under Heating System Upgrades are listed below. Detailed scope and cost breakdowns are provided later in the section.

Table 1

Item	Sub Costs	16% Overhead	10% Profit	Total Costs
Boiler Replacement DC & SPSC	$603,440	$96,550	$60,344	**$760,335**
Hot Water Pump VSD	$36,151	$5,784	$3,615	**$45,550**
Hot Water Pump Retrofit	$17,350	$2,776	$1,735	**$21,861**
TOTAL	**$656,941**	**$105,111**	**$65,694**	**$827,746**

Note: Costs are rounded to nearest dollar

SCOPE DETAILS

Boiler Replacement – Detention Center

This scope of work includes the replacement of the two existing Cleaver Brooks CB100 boilers with four (4) new non-condensing boilers manufactured by RBI Boilers or equal. The scope of work is as follows:

- Demolish and remove two existing Cleaver Brooks CB 100 boilers including modified piping, electrical wiring and exhaust flues.
- Provide and install the new boilers (model #MB/MW 1750 or equal) with input of 1,750 MBH and net output of 1,523 MBH each.
- Modify hot water piping to connect the existing boiler #3 to the new boilers to provide one operating boiler plant.
- Provide and install fiberglass pipe insulation with all-service jacket on new piping. Label piping with painted black flow direction and pipe ID.
- Disconnect and reconnect existing natural gas line to new boilers.
- Provide new power wiring to serve newly installed boilers including CSD-1 wiring of boilers for safety shut-off and combustion air interlock.
- Provide and install new boiler exhaust flue sized for new boiler service.
- Existing hot water pumps to remain and be re-used with new boiler plant.
- Existing electrical infrastructure to remain and be reused for the proposed scope

Control System

- Re-program existing and new points to the proposed Tridium system
- Set up and commission the following:
    - Boiler system safeties
    - Sequencing of boilers
    - HW temperature reset with OA DBT (provide DBT sensor)
    - Other sequences as called for in the design document

Engineering Service (included in design fee)

- Provide detailed computer simulation to determine the heating demand of the building
- Provide drawings and specifications for the boiler change-out
- Provide construction administration services

Cost Breakdown

Item	Sub Costs	16% Overhead	10% Profit	Total Cost
Replace Boilers	$331,978	$53,117	$33,198	$418,293

Sub Costs Split – for DC

Item	Material	Labor, h	Labor Costs	Other Subs	Controls Sub costs	Total sub costs
Replace Boilers	$155,116	*1698*	$113,758	$50,304	$12,800	**$331,978**

Note: All costs are rounded to nearest dollar

Boiler Retrofit – Scaggsville Public Safety Complex

This scope of work includes the replacement of the two existing HB Smith 350 Mills boilers with two new higher efficiency non-condensing boilers as manufactured by RBI Boilers or equal.

- Demolish and remove two existing HB Smith 350 Mills, oil-fired boilers including existing isolation valves and electrical connections.
- Provide and install two (2) RBI Boilers model #MB/MW 2000 or equal with input of 2,000 MBH and net output of 1,739 MBH each.
- Provide and install fiberglass pipe insulation with all-service jacket on new piping. Label piping with painted black flow direction and pipe ID.
- Disconnect and remove existing fuel oil piping serving the existing boilers. Fuel oil tank is to remain. Howard County is responsible for fuel oil remaining in existing tank.
- Provide new power wiring to serve newly installed boilers.

- Existing electrical and other heating-system infrastructure will be reused, as applicable
- Provide and install new boiler exhaust flue sized for new boiler service.
- Existing hot water pumps to remain and be re-used with new boiler plant.
- Provide and install natural gas piping from newly installed BGE gas meter. Pricing is based on BGE gas meter being installed on exterior wall outside of the boiler room.
- Extend gas service to the building from the nearest gas main (**BGE scope**)

Control System

- Re-program existing and new points to the proposed Tridium system
- Set up and commission the following:
    - Boiler system safeties
    - Sequencing of boilers
    - HW temperature reset with OA DBT (provide DBT sensor)
    - Other sequences as called for in the design document

Engineering Service (included in design fee)

- Provide detailed computer simulation to determine the heating demand of the building
- Provide drawings and specifications for the boiler change-out
- Provide construction administration services

Item	Sub Costs	16% Overhead	10% Profit	Total Cost
Replace Boilers	$271,462	$43,434	$27,146	**$342,042**

Sub Costs Split – for SPSC

Item	Material	Labor, h	Labor Costs	Other Subs	Controls Sub costs	Allowance for extending gas supply	Total sub costs
Replace Boilers	$114,374	*1190*	$79,728	$20,560	$6,800	$50,000	**$271,462**

Note: All costs are rounded to nearest dollar

Hot Water Pump Retrofit – Detention Center

This scope of work includes the following:

Isolate system and disconnect piping and electrical connections.

Remove existing two (2) hot-water pumps and motors

Furnish and install two (2) new pumps and premium-efficiency motors. Pumps and motors sized to match existing

Reconnect piping, electrical and provide start-up service

The existing concrete pad and other infrastructure will be retained and reused

Item	Sub Costs	16% Overhead	10% Profit	Total Cost
HW Pump Retrofit	$17,350	$2,776	$1,735	**$21,861**

Variable Speed Drive Installation—Detention Center

This scope of work includes the installation of variable speed drives on specific mechanical systems to control the speed of the pump to reduce electrical consumption.

The scope of work is as follows:

- Provide and install variable speed drives with drive bypass as manufactured by Honeywell or equal. Provide 208 volt Honeywell NBX series variable speed drives with cool blue drive by-pass for the following:

System ID	Drive Size
Heating Water Pump 7	3 HP
Heating Water Pump 8	3 HP

- Mount variable speed drive and by-pass on the mechanical room wall or on rack near mechanical device. Reconnect existing 208 volt electrical power wiring from existing circuit breaker to new drive.
- Provide appropriate control device (pressure differential sensor) in piping to control variable speed drive.
- Provide control communication wiring between variable speed drive and EMS control panel. Provide programming and control points.

Variable Speed Drive Installation-ECL

This scope of work includes the installation of a variable speed drives on heating water pumps serving the VAV reheat coils. The scope of work is as follows:

- Provide and install variable speed drive with bypass as manufactured by Honeywell or equal. Provide 460 volt Honeywell NBX series variable speed drives with cool blue drive by-pass for the following:

System ID	Drive Size
Heating Water Pump 1	10 HP
Heating Water Pump 2	10 HP

- Mount variable speed drives and by-pass on the mechanical room wall or on rack near the electrical distribution for the equipment. Reconnect existing 460 volt electrical power wiring from existing circuit breaker to new drive. Remove existing disconnect and replace with drive.
- Provide static pressure sensor in pipe to control drives.
- Provide control communication wiring between variable speed drive and EMS control panel. Provide programming and control points.

Item	Sub Costs	16% Overhead	10% Profit	Total Cost
HW Pump Retrofit	$36,151	$5,784	$3,615	**$45,550**

Window Film Scope of Work

1. East Columbia Library: Window area of 3,652 sq ft of internal VE35 film
2. Central Library:
   a. 900 sq ft of external RK20 film for skylights, and
   b. 2,400 sq ft of internal VE35 low-e film
3. Recreation and Parks HQ:
   a. Skylights - 1406 sq ft of external RK20 film, and
   b. 1406 sq ft of internal R20 film
4. Gateway Building:
   a. 2,080 sq ft external RK20 film for skylights, and
   b. 19,054 sq ft on internal VE35 film

Total Summary for the four buildings listed above:

1. RK 20 film	4,386 sq ft
2. VE35 film	25,106 sq ft
3. R20 film	1,406 sq ft

Please note that the above areas are window areas, and the actual area (sq ft) of film will be significantly higher because of wastage.

Cost break down

Item	Subcontractor Cost	16% Overhead	10% Profit	Total Cost
Window Film	$236,927	$37,908	$23,693	$298,528

Subcontractor Costs Split

Item	Material	Labor	Total
Window Film	$88,141	$148,786	$236,927

Note: Totals are rounded to the nearest dollar