

**ENERGY and WATER CONSERVATION**

**ACTION PLAN**

**for**

**NATIONAL PARK SERVICE**

**GATEWAY NATIONAL RECREATION AREA**

**Volume II – Fort Tilden**

**Report**

**Draft Report**

**June 2000**

**SUD ASSOCIATES, P.A.**

**Sustain-  
ability**

# **ENERGY and WATER CONSERVATION ACTION PLAN**

**for**

## **NATIONAL PARK SERVICE**

### **GATEWAY NATIONAL RECREATION AREA**

#### **Volume II— Fort Tilden**

**Prepared For**

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**Under Req. Number NE00-1  
U.S. Department of Energy  
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## AUDIT INFORMATION

Walk-Through Building Energy Audit  
with Water Conservation Screening and Renewables Screening

May 2000

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Cost: \$28,700  
Building Type: Varied  
Age: 30-70 years  
Number of Buildings: 32  
Total Square Footage: 591,830 SF

## **PREFACE**

Landsberg Engineering, P.C., a subcontractor to Sud Associates, P.A., prepared this document for the U.S Department of Energy as a contractor under the SAVEnergy Program. The authors of this report are Brett Fero and Paul Remington. The report was reviewed for technical quality by Dennis Landsberg.

## **ACKNOWLEDGEMENTS**

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### ENERGY CONSERVATION MEASURES

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## **EXECUTIVE SUMMARY**

This is the **Energy and Water Conservation Plan** for Fort Tilden. This report documents opportunities to save money through more efficient use of electricity, other fuels and water in these facilities.

### **FACILITY DESCRIPTION**

Fort Tilden was a former military base located on Rockaway Inlet just south of Floyd Bennett Field in Brooklyn, NY. It is now owned by the National Park Service.

The survey at Fort Tilden encompassed fourteen buildings totaling approximately 69,100 square feet. The oldest building is 84 years old and the newest is 50 years old. Included in the survey is the 21,000 square foot Rockaway Station. This building is part of a Coast Guard complex that is being turned over to the Park Service. Future plans may include leasing to an outside firm.

Seven of the buildings are residences occupied by Park Service employees. At present, three are without tenants. The buildings are centrally metered for electricity and all have gas heat except the oil heated Quarters 22 and 23. The buildings are all in good condition and all but one have had new windows installed.

Building 219 and 210 are located next to Rockaway Station. Building 219 is currently an unheated maintenance headquarters. The maintenance headquarters operations will soon be moving soon to a different building. Building 210 is a small Police station. The operations are being transferred into a section of Rockaway Station. All three buildings may become part of a privately leased complex in the future.

Building 1 serves as a Visitor's Center, office building, and classroom occupying approximately 8,000 square feet and is probably the most active of the buildings surveyed. The solid masonry building was very strongly built 70 years ago as a shelter. The main need is new windows and doors. A new gas boiler has been recently installed.

Building 149, T-4 Theatre, and Building T-25 are public use buildings and used by various senior citizens and theatre groups. Two of the buildings are in very good condition but the T-4 Theatre is in need of a complete rehab. New HVAC and lighting systems are needed and the building shell needs to be insulated.

# Fort Tilden

## ECM Summary Table

| Building    | ECM #<br>Number | ECM Description                             | Savings          |               | Demand<br>kW/mo | Total<br>Electric Cost<br>Svgs (\$) | Fossil Fuel  |                    |                    | Total<br>Cost Svgs<br>\$ | Capital<br>Cost \$ | Simple<br>Payback<br>Years |
|-------------|-----------------|---------------------------------------------|------------------|---------------|-----------------|-------------------------------------|--------------|--------------------|--------------------|--------------------------|--------------------|----------------------------|
|             |                 |                                             | Energy<br>kWh/yr | Cost<br>\$/yr |                 |                                     | Fuel<br>Type | Savings<br>MTBU/yr | Cost<br>Savings \$ |                          |                    |                            |
| Bldg 1      | 102             | Insulate Ceiling                            | 0                | 0             | 0               | 6                                   | Gas          | 103.3              | 860                | 860                      | 6940               | 8.1                        |
| Bldg 1      | 110             | Replace Windows                             | 0                | 0             | 0               | 27                                  | Gas          | 234.5              | 1950               | 1950                     | 15840              | 8.1                        |
| Bldg 1      | 120             | Replace Doors                               | 0                | 0             | 0               | 0                                   | Gas          | 26.9               | 225                | 225                      | 2150               | 9.6                        |
| Bldg 1      | 233             | Install Night Setback and Outside Air Reset | 0                | 0             | 0               | 610                                 | Gas          | 342.6              | 2845               | 2845                     | 4020               | 1.4                        |
| Bldg 1      | 301             | Replace Incandescent Lighting               | 2996             | 400           | 0               | 400                                 | Gas          | -6.7               | -56                | 345                      | 845                | 2.4                        |
| Bldg 1      | 310             | Replace Incandescent Lighting Exterior      | 1632             | 217           | 0               | 214                                 | Gas          | -4.2               | -35                | 180                      | 180                | 1.0                        |
| Bldg 1      | 325             | Replace Exit Signs                          | 460              | 61            | 0               | 61                                  | Gas          | -1.1               | -9                 | 52                       | 135                | 2.6                        |
| Bldg 1      | 332             | Install Occupancy Sensors                   | 5527             | 736           | 0               | 736                                 | Gas          | -12.3              | -102               | 635                      | 1740               | 2.7                        |
| Bldg 1      | 418             | Convert DHW to Gas                          | 2131             | 100           | 4.5             | 600                                 | Gas          | -9.7               | -80                | 520                      | 750                | 1.4                        |
| Total       |                 |                                             | 12746            | 1514          | 4.5             | 2654                                |              | 673.3              | 5598               | 7612                     | 32600              | 4.3                        |
| T4 Theatre  | 102             | Insulate Ceiling                            | 0                | 0             | 0               | 0                                   | Gas          | 211                | 1750               | 1750                     | 3300               | 1.9                        |
| T4 Theatre  | 105             | Insulate Walls                              | 0                | 0             | 0               | 610                                 | Gas          | 171                | 1420               | 1420                     | 3480               | 2.5                        |
| T4 Theatre  | 120             | Replace Doors                               | 0                | 0             | 0               | 0                                   | Gas          | 66                 | 550                | 550                      | 4850               | 8.8                        |
| T4 Theatre  | 233             | Install Night Setback                       | 0                | 0             | 0               | 0                                   | Gas          | 174.5              | 1450               | 1450                     | 200                | 0.1                        |
| T4 Theatre  | 301             | Replace Incandescent                        | 3580             | 301           | 2               | 525                                 | Gas          | 0                  | 0                  | 525                      | 2110               | 4.0                        |
| T4 Theatre  | 304             | Replace Lamps/Ballasts                      | 60               | 5             | 0.3             | 10                                  | Gas          | 0                  | 0                  | 10                       | 50                 | 5.0                        |
| Total       |                 |                                             | 3640             | 306           | 2.3             | 1145                                |              | 622.5              | 5170               | 5705                     | 13990              | 2.5                        |
| Quarters 22 | 110             | Replace Windows                             | 0                | 0             | 0               | 0                                   | Oil          | 80.1               | 660                | 660                      | 6400               | 9.7                        |
| Quarters 22 | 125             | Add Door Weatherstripping                   | 0                | 0             | 0               | 0                                   | Oil          | 3.7                | 30                 | 30                       | 110                | 3.7                        |
| Quarters 22 | 141             | Install Fireplace Doors                     | 0                | 0             | 0               | 0                                   | Oil          | 9.2                | 76                 | 76                       | 200                | 2.6                        |
| Quarters 22 | 233             | Install Night Setback                       | 0                | 0             | 0               | 0                                   | Oil          | 197.1              | 1620               | 1620                     | 400                | 0.2                        |
| Quarters 22 | 301             | Replace Incandescent Lighting               | 2680             | 225           | 2               | 450                                 | Oil          | -5.9               | -48                | 400                      | 715                | 1.8                        |
| Quarters 22 | 304             | Replace Lamps/Ballasts                      | 325              | 27            | 0.2             | 50                                  | Oil          | -0.7               | -6                 | 42                       | 385                | 9.2                        |
| Quarters 22 | 310             | Replace Exterior Incandescent               | 526              | 44            | 0.1             | 60                                  | Oil          | 0                  | 0                  | 60                       | 360                | 6.0                        |
| Quarters 22 | 508             | Install Gas Dryers                          | 744              | 67            | 4.5             | 580                                 | Gas          | -3.4               | -28                | 554                      | 550                | 1.0                        |
| Total       |                 |                                             | 4275             | 363           | 6.8             | 1140                                |              | 280.1              | 2304               | 3442                     | 9120               | 2.6                        |
| Quarters 23 | 125             | Add Door Weatherstripping                   | 0                | 0             | 0               | 0                                   | Oil          | 3.7                | 30                 | 30                       | 110                | 3.7                        |
| Quarters 23 | 141             | Install Fireplace Doors                     | 0                | 0             | 0               | 0                                   | Oil          | 9.2                | 76                 | 76                       | 200                | 2.6                        |
| Quarters 23 | 233             | Install Night Setback                       | 0                | 0             | 0               | 0                                   | Oil          | 136.9              | 1125               | 1125                     | 400                | 0.4                        |
| Quarters 23 | 301             | Replace Incandescent Lighting               | 1616             | 136           | 1.1             | 257                                 | Oil          | -3.5               | -29                | 230                      | 400                | 1.7                        |
| Quarters 23 | 310             | Replace Exterior Incandescent               | 788              | 66            | 0.2             | 90                                  | Oil          | 0                  | 0                  | 90                       | 180                | 2.0                        |
| Quarters 23 | 508             | Install Gas Dryers                          | 744              | 67            | 4.5             | 580                                 | Gas          | -3.4               | -28                | 554                      | 550                | 1.0                        |
| Total       |                 |                                             | 3148             | 269           | 5.8             | 927                                 |              | 142.9              | 1174               | 2105                     | 1840               | 0.9                        |
| T25         | 125             | Add Door Weatherstripping                   | 0                | 0             | 0               | 0                                   | Gas          | 4                  | 38                 | 38                       | 60                 | 1.6                        |
| T25         | 125             | Add Night Setback                           | 0                | 0             | 0               | 0                                   | Gas          | 39.3               | 360                | 360                      | 200                | 0.6                        |
| T25         | 304             | Replace Lamps/Ballasts                      | 813              | 68            | 0.4             | 110                                 | Gas          | -1.8               | -18                | 92                       | 900                | 9.8                        |
| T25         | 325             | Replace Exit Signs                          | 230              | 19            | 0.3             | 22                                  | Gas          | -0.5               | -5                 | 17                       | 65                 | 3.8                        |
| Total       |                 |                                             | 1043             | 87            | 0.7             | 132                                 |              | 41                 | 375                | 507                      | 1225               | 2.4                        |
| Qtrs 106A&B | 141             | Install Firepalce Doors                     | 0                | 0             | 0               | 0                                   | Gas          | 9.4                | 90                 | 90                       | 400                | 4.4                        |
| Qtrs 106A&B | 301             | Replace Incandescent Lighting               | 2815             | 237           | 2.1             | 470                                 | Gas          | -6.3               | -60                | 410                      | 610                | 1.5                        |
| Qtrs 106A&B | 304             | Replace Lamps/Ballasts                      | 67               | 6             | 0.3             | 10                                  | Gas          | -0.1               | -1                 | 8                        | 50                 | 6.3                        |
| Qtrs 106A&B | 508             | Install Gas Dryers                          | 1488             | 134           | 9               | 1025                                | Gas          | -6.8               | -56                | 1108                     | 1100               | 1.0                        |
| Total       |                 |                                             | 4370             | 377           | 11.4            | 1505                                |              | -3.8               | -27                | 1616                     | 2160               | 1.3                        |

# Fort Tilden

## ECM Summary Table

| Building | ECM #<br>Number | ECM Description               | Savings          |               | Demand<br>kW/mo | Total<br>Electric Cost<br>Svgs (\$) | Fossil Fuel  |                    |                    | Total<br>Cost Svgs<br>\$ | Capital<br>Cost \$ | Simple<br>Payback<br>Years |
|----------|-----------------|-------------------------------|------------------|---------------|-----------------|-------------------------------------|--------------|--------------------|--------------------|--------------------------|--------------------|----------------------------|
|          |                 |                               | Energy<br>kWh/yr | Cost<br>\$/yr |                 |                                     | Fuel<br>Type | Savings<br>MTBU/yr | Cost<br>Savings \$ |                          |                    |                            |
| Qtrs 133 | 101             | Add Attic Insulation          | 0                | 0             | 0               | 0                                   | Gas          | 40.6               | 395                | 395                      | 1664               | 4.2                        |
| Qtrs 133 | 110             | Repair Window Frames          | 0                | 0             | 0               | 0                                   | Gas          | 9.6                | 95                 | 95                       | 900                | 9.5                        |
| Qtrs 133 | 125             | Add Door Weatherstripping     | 0                | 0             | 0               | 0                                   | Gas          | 5.8                | 56                 | 56                       | 165                | 2.9                        |
| Qtrs 133 | 141             | Add Fireplace Doors           | 0                | 0             | 0               | 0                                   | Gas          | 9.4                | 92                 | 92                       | 200                | 2.2                        |
| Qtrs 133 | 301             | Replace Incandescent Lighting | 551              | 46            | 0.4             | 90                                  | Gas          | -1.2               | -12                | 79                       | 211                | 2.7                        |
| Qtrs 133 | 304             | Replace Lamps/Ballasts        | 67               | 6             | 0.03            | 10                                  | Gas          | -0.1               | -1                 | 10                       | 50                 | 5.0                        |
| Qtrs 133 | 508             | Install Gas Dryers            | 744              | 67            | 4.5             | 580                                 | Gas          | -3.4               | -28                | 554                      | 550                | 1.0                        |
| Total    |                 |                               | 1362             | 119           | 4.93            | 680                                 |              | 60.7               | 597                | 1281                     | 3740               | 2.9                        |
| Qtrs 134 | 101             | Add Attic Insulation          | 0                | 0             | 0               | 0                                   | Gas          | 40.6               | 395                | 395                      | 1664               | 4.2                        |
| Qtrs 134 | 110             | Repair Window Frames          | 0                | 0             | 0               | 0                                   | Gas          | 9.6                | 95                 | 95                       | 900                | 9.5                        |
| Qtrs 134 | 125             | Add Door Weatherstripping     | 0                | 0             | 0               | 0                                   | Gas          | 5.8                | 56                 | 56                       | 165                | 2.9                        |
| Qtrs 134 | 141             | Add Fireplace Doors           | 0                | 0             | 0               | 0                                   | Gas          | 9.4                | 92                 | 92                       | 200                | 2.2                        |
| Qtrs 134 | 233             | Install Night Setback         | 0                | 0             | 0               | 0                                   | Gas          | 134                | 1280               | 1280                     | 200                | 0.2                        |
| Qtrs 134 | 301             | Replace Incandescent Lighting | 1047             | 88            | 0.8             | 172                                 | Gas          | -2.4               | -22                | 150                      | 300                | 2.0                        |
| Qtrs 134 | 304             | Replace Lamps/Ballasts        | 100              | 8             | 0.1             | 15                                  | Gas          | -0.2               | 2                  | 13                       | 100                | 7.7                        |
| Qtrs 134 | 508             | Install Gas Dryers            | 744              | 67            | 4.5             | 580                                 | Gas          | -3.4               | -28                | 554                      | 550                | 1.0                        |
| Total    |                 |                               | 1891             | 163           | 5.4             | 767                                 |              | 193.4              | 1870               | 2635                     | 4079               | 1.5                        |
| Qtrs 135 | 101             | Add Attic Insulation          | 0                | 0             | 0               | 0                                   | Gas          | 40.6               | 395                | 395                      | 1664               | 4.2                        |
| Qtrs 135 | 110             | Repair Window Frames          | 0                | 0             | 0               | 1220                                | Gas          | 9.6                | 95                 | 95                       | 900                | 9.5                        |
| Qtrs 135 | 125             | Add Door Weatherstripping     | 0                | 0             | 0               | 0                                   | Gas          | 11.3               | 110                | 110                      | 165                | 1.5                        |
| Qtrs 135 | 141             | Add Fireplace Doors           | 0                | 0             | 0               | 0                                   | Gas          | 9.4                | 92                 | 92                       | 200                | 2.2                        |
| Qtrs 135 | 301             | Replace Incandescent Lighting | 1817             | 153           | 1.2             | 287                                 | Gas          | -4.1               | -40                | 247                      | 435                | 1.8                        |
| Qtrs 135 | 304             | Replace Lamps/Ballasts        | 147              | 12            | 0.1             | 23                                  | Gas          | -0.3               | -3                 | 20                       | 50                 | 2.5                        |
| Qtrs 135 | 508             | Install Gas Dryers            | 744              | 67            | 4.5             | 580                                 | Gas          | -3.4               | -28                | 554                      | 550                | 1.0                        |
| Total    |                 |                               | 2708             | 232           | 5.8             | 2110                                |              | 63.1               | 621                | 1513                     | 3964               | 2.6                        |
| Qtrs 136 | 110             | Repair Window Frames          | 0                | 0             | 0               | 0                                   | Gas          | 9.6                | 95                 | 95                       | 900                | 9.5                        |
| Qtrs 136 | 125             | Add Door Weatherstripping     | 0                | 0             | 0               | 0                                   | Gas          | 5.8                | 56                 | 56                       | 165                | 2.9                        |
| Qtrs 136 | 141             | Add Fireplace Doors           | 0                | 0             | 0               | 0                                   | Gas          | 9.4                | 92                 | 92                       | 200                | 2.2                        |
| Qtrs 136 | 301             | Replace Incandescent Lighting | 1944             | 164           | 1.4             | 319                                 | Gas          | -4.4               | -43                | 275                      | 420                | 1.5                        |
| Qtrs 136 | 304             | Replace Lamps/Ballasts        | 130              | 11            | 0.1             | 22                                  | Gas          | -0.3               | -3                 | 20                       | 150                | 7.5                        |
| Qtrs 136 | 508             | Install Gas Dryers            | 744              | 67            | 4.5             | 580                                 | Gas          | -3.4               | -28                | 554                      | 550                | 1.0                        |
| Total    |                 |                               | 2818             | 242           | 6               | 921                                 |              | 16.7               | 169                | 1092                     | 2385               | 2.2                        |
| Bldg 149 | 125             | Add Door Weatherstripping     | 0                | 0             | 0               | 0                                   | Gas          | 9.3                | 80                 | 80                       | 275                | 3.4                        |
| Bldg 149 | 233             | Add Night Setback             | 0                | 0             | 0               | 0                                   | Gas          | 108.1              | 930                | 930                      | 400                | 0.4                        |
| Bldg 149 | 301             | Replace Incandescent Lamps    | 43               | 4             | 0.1             | 10                                  | Gas          | -0.1               | -1                 | 10                       | 17                 | 1.7                        |
| Bldg 149 | 304             | Replace Lamps/Ballasts        | 705              | 59            | 0.4             | 100                                 | Gas          | -1.7               | -14                | 95                       | 620                | 6.5                        |
| Bldg 149 | 310             | Replace Exterior Incandescent | 526              | 45            | 0.14            | 60                                  | Gas          | -1.4               | -12                | 50                       | 360                | 7.2                        |
| Bldg 149 | 325             | Replace Exit Signs            | 689              | 58            | 0.1             | 67                                  | Gas          | -1.7               | -15                | 52                       | 200                | 3.8                        |
| Total    |                 |                               | 1963             | 166           | 0.74            | 237                                 |              | 112.5              | 968                | 1217                     | 1872               | 1.5                        |

Fort Tilden  
ECM Summary Table

| Building         | ECM #<br>Number | ECM Description                             | Savings          |               | Demand<br>kW/mo | Total<br>Electric Cost<br>Svgs (\$) | Fossil Fuel  |                    |                    | Total<br>Cost Svgs<br>\$ | Capital<br>Cost \$ | Simple<br>Payback<br>Years |
|------------------|-----------------|---------------------------------------------|------------------|---------------|-----------------|-------------------------------------|--------------|--------------------|--------------------|--------------------------|--------------------|----------------------------|
|                  |                 |                                             | Energy<br>kWh/yr | Cost<br>\$/yr |                 |                                     | Fuel<br>Type | Savings<br>MTBU/yr | Cost<br>Savings \$ |                          |                    |                            |
| Bldg 210         | 110             | Replace Windows                             | 0                | 0             | 0               | 0                                   | Oil          | 51                 | 420                | 420                      | 2975               | 7.1                        |
| Bldg 210         | 125             | Weatherstrip Door and Install Storm         | 0                | 0             | 0               | 0                                   | Oil          | 7.2                | 60                 | 60                       | 260                | 4.3                        |
| Bldg 210         | 233             | Install Night Setback                       | 0                | 0             | 0               | 0                                   | Oil          | 53.3               | 440                | 440                      | 200                | 0.5                        |
| Bldg 210         | 301             | Replace Incandescent Lighting               | 289              | 24            | 0.4             | 67                                  | Oil          | -0.6               | -5                 | 62                       | 95                 | 1.5                        |
| Bldg 210         | 304             | Replace Lamps/Ballasts                      | 1200             | 101           | 0.5             | 152                                 | Oil          | -2.6               | -21                | 130                      | 685                | 5.3                        |
|                  |                 |                                             | 1489             |               | 0.9             | 219                                 |              | 108.3              | 894                | 1112                     | 4215               | 3.8                        |
| Bldg 219         | 125             | Weatherstrip Doors                          | 0                | 0             | 0               | 0                                   | Oil          | 18.3               | 150                | 150                      | 290                | 1.9                        |
| Bldg 219         | 233             | Install Night Setback and O.A Reset         | 0                | 0             | 0               | 0                                   | Oil          | 302.2              | 2485               | 2485                     | 4020               | 1.6                        |
| Bldg 219         | 301             | Replace Incandescent Lighting               | 1635             | 138           | 0.6             | 207                                 | Oil          | 0                  | 0                  | 207                      | 165                | 0.8                        |
| Bldg 219         | 304             | Replace Lamps/Ballasts                      | 4869             | 410           | 1.9             | 620                                 | Oil          | 0                  | 0                  | 620                      | 2795               | 4.5                        |
| Bldg 219         | 325             | Replace Exit Signs                          | 459              | 39            | 0.1             | 45                                  | Oil          | 0                  | 0                  | 45                       | 135                | 3.0                        |
| Bldg 219         | 418             | Convert DWH to Gas                          | 1425             | 67            | 4.5             | 567                                 | Gas          | -6.5               | -55                | 515                      | 750                | 1.5                        |
| Total            |                 |                                             | 11366            | 779           | 8.9             | 1877                                |              | 530.6              | 4368               | 6246                     | 16585              | 2.7                        |
| Rockaway Station | 125             | Add Door Weatherstripping                   | 0                | 0             | 0               | 0                                   | Gas          | 36.7               | 300                | 300                      | 580                | 1.9                        |
| Rockaway Station | 233             | Install Night Setback and Outside Air Reset | 0                | 0             | 0               | 0                                   | Gas          | 499                | 4030               | 4030                     | 4420               | 1.1                        |
| Rockaway Station | 301             | Replace Incandescent Lighting               | 1042             | 88            | 0.6             | 155                                 | Gas          | -2.3               | -19                | 135                      | 615                | 4.6                        |
| Rockaway Station | 304             | Replace Lamps/Ballasts                      | 9495             | 800           | 4.4             | 1285                                | Gas          | -21.2              | -171               | 1110                     | 6670               | 6.0                        |
| Rockaway Station | 325             | Replace Exit Signs                          | 2525             | 212           | 0.3             | 245                                 | Gas          | -6                 | -48                | 195                      | 245                | 1.3                        |
| Rockaway Station | 332             | Install Occupancy Sensors                   | 4715             | 397           | 0               | 397                                 | Gas          | -10.5              | -84                | 315                      | 1860               | 5.9                        |
| Total            |                 |                                             | 17777            | 1497          | 5.3             | 2082                                |              | 495.7              | 4008               | 6085                     | 14390              | 2.4                        |
| Grand Total      |                 |                                             | 70596            | 6114          | 69.47           | 16396                               |              | 3337               | 28089              | 42168                    | 112165             | 2.7                        |

## **ASSESSMENTS**

### **Assessment of recommended modifications to operating and maintenance procedures:**

Some general observations were found during the survey. Measured domestic hot water temperatures were found set at temperatures above the recommended 125 degrees F. Not only does this increase standby energy losses from the storage tank, it also required mixing the hot water with cold water to reduce the temperature so it does not burn the skin when used.

Installing low flow showerheads is an easy way to reduce water-heating costs. Quality, inexpensive, low flow showerheads are available that produce a better spray and pressure sensation than most standard showerheads. These are very easily to install.

In a few of the totally vacant residences, space temperature settings and hot water heaters were being controlled as if the residence was occupied. Space temperatures should be drastically reduced in the winter if water lines cannot be closed and drained. If the draining the lines can be easily done, turn the heat off completely as done in some other buildings.

Insulate any exposed domestic hot water or space heating piping.

### **Assessment of recommended energy conservation measures:**

Many of the recommended measures are referred to as building envelope measures. These are measures that separate the outside air conditions from the tempered air conditions inside. Improved conduction through walls and attics using insulation as well as upgrading to insulating windows were found to have favorable paybacks in many cases. Infiltration measures that reduce the flow of outdoor air into the building included installation of weatherstripping, fireplace doors, and replacement doors.

Several lighting measures were identified. These include replacement of incandescent lamps with compact fluorescent lamps, installation of T-8 fluorescent lamps with electronic ballasts, installation of occupancy sensors in selected spaces, and replacement of exit sign illumination.

Regarding heating, buildings should implement temperature setback during unoccupied periods of the winter months. Boilers should also utilize outdoor air reset, which increases the space tempering hot water supply temperature as the outside air temperature decreases.

Electric demand saving measures were also recommended. The demand charge is based on the highest electrical peak demand achieved during the month, every month. These charges add up quickly. Measures to reduce the electrical demand included converting electric domestic hot water heaters and electric clothes dryers to natural gas.

### **Assessment of Water Conservation and Renewables Screenings:**

Water consumption is included in the tax base in New York City and there are no water bills for these buildings, with the exception of Rockaway Station. The Watergy screening tool was conducted on that building. The report presents other options for reducing water consumption in the remaining buildings through use of low flow fixtures. However, implementation of these measures will not lower water consumption costs and therefore Watergy was not conducted on these buildings.

The renewables screening for these facilities included input parameters for wind and solar ventilation preheat. These are not practical for these buildings.

# HISTORICAL UTILITY SUMMARY

## FORT TILDEN MAIN METER - ELECTRIC

| LIPA EL-P Rate 281   | Main Meter |            |      |
|----------------------|------------|------------|------|
| Fort Tilden Electric | kWh        | Total Cost | kW   |
| Aug-99               | 23,200     | \$2,724    | 50.5 |
| Jul                  | 27,200     | \$3,149    | 57   |
| Jun                  | 20,800     | \$2,450    | 49   |
| May                  | 16,400     | \$1,682    | 32   |
| Apr                  | 20,080     | \$2,002    | 44   |
| Mar                  | 22,960     | \$2,216    | 44   |
| Feb                  | 20,320     | \$2,008    | 50.5 |
| Jan                  | 23,920     | \$2,327    | 51   |
| Dec                  | 26,240     | \$2,594    | 53.5 |
| Nov                  | 19,920     | \$1,964    | 47   |
| Oct-98               | 20,560     | \$2,184    | 56   |
| Sep                  | 18,720     | \$2,165    | 49.5 |
| Total                | 260,320    | \$27,465   |      |

## FORT TILDEN BLDG 219 - ELECTRIC

| LIPA EL-S Rate 281 | 201056512 |            |      |
|--------------------|-----------|------------|------|
|                    | kWh       | Total Cost | kW   |
| Sep-99             | 3,360     | \$440      | 10   |
| Aug                | 3,880     | \$495      | 9.5  |
| Jul                | 3,960     | \$504      | 10   |
| Jun                | 3,040     | \$423      | 8.5  |
| May                | 2,760     | \$345      | 11   |
| Apr                | 3,560     | \$408      | 10.5 |
| Mar                | 5,480     | \$613      | 11.5 |
| Feb                | 3,920     | \$456      | 11   |
| Jan                | 4,600     | \$533      | 12   |
| Dec                | 4,920     | \$574      | 11.5 |
| Nov-98             | 3,320     | \$428      | 11   |
|                    | 3,800     | \$498      | 12   |
| Total              | 46,600    | \$5,717    |      |

## FORT TILDEN T-25 - NATURAL GAS

| Brooklyn Union   | 201052016 |            |
|------------------|-----------|------------|
| Fort Tilden T-25 | Therms    | Total Cost |
| Jan-99           | 308       | \$268      |
| Dec              | 266       | \$233      |
| Nov              | 191       | \$178      |
| Oct              | 115       | \$110      |
| Sep              | 60        | \$63       |
| Aug              | 53        | \$55       |
| Jul              | 46        | \$49       |
| Jun              | 49        | \$52       |
| May              | 48        | \$52       |
| Apr              | 111       | \$102      |
| Mar-98           | 244       | \$209      |
|                  | 213       | \$186      |
| Total            | 1,704     | \$1,557    |

## FORT TILDEN QTR134 - NATURAL GAS

| Brooklyn Union | 201051844 |            |
|----------------|-----------|------------|
| QTR134         | Therms    | Total Cost |
| Sep-99         | 7         | \$17       |
| Aug            | 33        | \$39       |
| Jul            | 5         | \$14       |
| Jun            | 31        | \$38       |
| May            | 46        | \$54       |
| Apr            | 151       | \$136      |
| Mar            | 272       | \$240      |
| Feb            | 258       | \$246      |
| Jan            | 448       | \$424      |
| Dec            | 287       | \$274      |
| Nov            | 474       | \$435      |
| Oct-98         | 120       | \$116      |
| Total          | 2,132     | \$2,033    |

## FORT TILDEN BLDG 1 - ELECTRIC

| Electric      |            |            |      |
|---------------|------------|------------|------|
| LIPA Rate 280 | Main Meter |            |      |
| Bldg 1        | kWh        | Total Cost | kW   |
| Jan-99        | 725        | \$99       | 50.5 |
| Dec           | 784        | \$105      | 57   |
| Nov           | 614        | \$84       | 49   |
| Oct           | 734        | \$100      | 32   |
| Sep           | 1,345      | \$201      | 44   |
| Aug           | 747        | \$115      | 44   |
| Jul           | 793        | \$122      | 50.5 |
| Jun           | 712        | \$110      | 51   |
| May           | 660        | \$90       | 53.5 |
| Apr           | 712        | \$97       | 47   |
| Mar-98        | 705        | \$95       | 56   |
|               | 691        | \$93       | 49.5 |
| Total         | 9,222      | \$1,311    |      |

## FORT TILDEN BLDG 1 - NATURAL GAS

| Natural Gas    |           |            |
|----------------|-----------|------------|
| Brooklyn Union | 201070521 |            |
| Bldg 1         | Therms    | Total Cost |
| Jan-99         | 2,209     | \$1,769    |
| Dec            | 1,165     | \$1,009    |
| Nov            | 844       | \$755      |
| Oct            | 429       | \$352      |
| Sep            | 10        | \$19       |
| Aug            | 10        | \$19       |
| Jul            | 0         | \$18       |
| Jun            | 397       | \$315      |
| May            | 181       | \$160      |
| Apr            | 586       | \$457      |
| Mar-98         | 1,424     | \$1,128    |
|                | 1,135     | \$966      |
| Total          | 8,390     | \$6,967    |

# HISTORICAL UTILITY SUMMARY

## FORT TILDEN T-149 - NATURAL GAS

| Brooklyn Union | 201051919 |            |
|----------------|-----------|------------|
| T-149          | Therms    | Total Cost |
| Jan-99         | 809       | \$661      |
| Dec            | 527       | \$467      |
| Nov            | 364       | \$336      |
| Oct            | 111       | \$103      |
| Sep            | 10        | \$20       |
| Aug            | 10        | \$20       |
| Jul            | 29        | \$35       |
| Jun            | 17        | \$26       |
| May            | 22        | \$30       |
| Apr            | 305       | \$247      |
| Mar-98         | 661       | \$534      |
|                | 789       | \$675      |
| Total          | 3,654     | \$3,154    |

## FORT TILDEN QTR135 - NATURAL GAS

| Brooklyn U | 1058293 |            |
|------------|---------|------------|
|            | Therms  | Total Cost |
| Nov-99     | 92      | \$97       |
| Oct        | 87      | \$83       |
| Sep        | 10      | \$21       |
| Aug        | 17      | \$25       |
| Jul        | 12      | \$22       |
| Jun        | 17      | \$25       |
| May        | 33      | \$40       |
| Apr        | 114     | \$103      |
| Mar        | 183     | \$160      |
| Feb        | 206     | \$192      |
| Jan        | 215     | \$203      |
| Dec-98     | 228     | \$213      |
| Total      | 1,214   | \$1,184    |

## ROCKAWAY STATION UNITED STATES COAST GUARD - ELECTRIC

| Electric   |      |       |         |           |        |
|------------|------|-------|---------|-----------|--------|
| Date       | Days | kWh   | Cost    | Use Fract | Demand |
| 04/03/2000 | 31   | 2232  | 264.25  | 72        | 7.0    |
| 03/03/2000 | 31   | 2376  | 298.9   | 76.6      | 9.5    |
| 02/01/2000 | 29   | 2364  | 277.72  | 81.5      | 0.0    |
| 01/03/2000 | 33   | 3336  | 272.02  | 101       | 0.0    |
| 12/01/1999 | 30   | 2448  | 289.79  | 81.6      | 8.0    |
| 11/01/1999 | 28   | 2184  | 253.97  | 78        | 7.0    |
| 10/04/1999 | 31   | 2172  | 302.76  | 70        | 7.5    |
| 09/03/1999 | 32   | 2520  | 355.38  | 78.7      | 8.5    |
| 08/02/1999 | 31   | 2472  | 336.63  | 79.7      | 7.5    |
| 07/02/1999 | 30   | 2292  | 311.15  | 76.4      | 7.0    |
| 06/02/1999 | 30   | 2352  | 321.46  | 78.4      | 7.5    |
| 05/03/1999 | 29   | 2856  | 336.12  | 98.4      | 9.0    |
| 04/04/1999 | 30   | 2940  | 346.55  | 98        | 0.0    |
| 03/05/1999 | 30   | 2940  | 346.55  | 98        | 0.0    |
| 02/03/1999 | 30   | 2940  | 346.55  |           | 0.0    |
| 01/04/1999 | 31   | 5112  | 551.15  | 164.9     | 0.0    |
| Annualized | 365  | 29604 | 3620.15 |           |        |

## ROCKAWAY STATION UNITED STATES COAST GUARD - NATURAL GAS

| Date       | Days | CCF  | Therm Fact | Therms | Cost \$ | Use Factor |
|------------|------|------|------------|--------|---------|------------|
| 04/03/2000 | 31   | 1452 | 1.025      | 1488   | 1213    | 48.0       |
| 03/03/2000 | 31   | 3638 | 1.027      | 3736   | 2983    | 120.5      |
| 02/01/2000 | 29   | 832  | 1.026      | 854    | 714     | 29.4       |
| 01/03/2000 | 33   | 1553 | 1.026      | 1593   | 1296    | 48.2       |
| 12/01/1999 | 30   | 954  | 1.024      | 977    | 842     | 32.5       |
| 11/01/1999 | 28   | 429  | 1.023      | 439    | 361     | 15.6       |
| 10/04/1999 | 31   | 66   | 1.03       | 68     | 70      | 2.1        |
| 09/03/1999 | 32   | 62   | 1.032      | 64     | 64      | 2.0        |
| 08/02/1999 | 31   | 58   | 1.034      | 60     | 61      | 1.9        |
| 07/02/1999 | 30   | 115  | 1.035      | 119    | 108     | 3.9        |
| 06/02/1999 | 30   | 192  | 1.042      | 200    | 171     | 6.6        |
| 05/03/1999 | 32   | 2502 | 1.039      | 2600   | 1961    | 81.2       |
| 04/04/1999 | 31   | 1200 | 1.039      | 1247   | 991     | 40.2       |
| 03/01/1999 | 27   | 1349 | 1.044      | 1408   | 1142    | 52.1       |
| 02/02/1999 | 29   | 1313 | 1.044      | 1371   | 1121    | 47.2       |
| 01/04/1999 | 33   | 1423 | 1.042      | 1483   | 1212    | 44.9       |
| Annualized | 368  |      |            | 12198  | 9842    |            |

## INTRODUCTION

This is the **Energy and Water Conservation Plan** for Fort Tilden. This report documents opportunities to save money through more efficient use of electricity, other fuels and water in these facilities.

This report should give you a better understanding of how your facility operates. **Its main purpose is to identify energy conservation measures (ECM's) you can take to improve your management and control of energy usage.**

Information contained in this report was collected during a site visit made to the Gateway National Recreation Area on February 28- March 3 and March 20-24, 2000. The audit was conducted by Brett Fero and Paul Remington of Landsberg Engineering, P.C., Consulting Engineers, under subcontract to Sud Associates, P.A.

## ENERGY MANAGEMENT

Energy conservation can not be achieved by a single action. It is an ongoing activity that should become a part of the institutional culture. At the National Parks Service, many of you are actively involved in energy conservation. Some interior lighting has been switched to 34 watt lamps and several buildings have had new windows and gas boilers installed.

The decision to undertake this audit is an important milestone in your energy conservation plan. Proper follow through of the recommendations made in this report will maximize its benefits. For example, the controls and lighting ECM's outlined in this action plan can be executed very cost effectively if they are incorporated in the design of new projects.

One method of implementing these recommendations would be to officially appoint an energy coordinator and an Energy Advisory Council. The Council would be comprised of individuals from various divisions and sections of the National Parks Service and future tenants of currently vacant buildings. The coordinator should review the findings of this energy audit with the Council. The ECM's to be implemented should be finalized and a timetable should be established.

Since the recommendations of the audit are primarily of a conceptual nature, any valid concerns should be addressed during the detailed implementation phase. If appropriate, the recommendations should be modified. There should be no attempt to force acceptance of the modifications. Early in the planning stages, the Council should solicit support from top management and involve personnel from all departments. This can be done by publicizing the benefits of energy conservation and the intended action plan. The plan should be flexible enough to accommodate unforeseen factors.

## **GENERAL BUILDING BACKGROUND**

### **Visitor Center – Building 1:**

#### **GENERAL INFORMATION**

Building 1 at Fort Tilden is a Visitor's Center used for public information, classrooms and office space. Total occupied floor area is approximately 8,000 gross square feet (GSF) on two floors plus a full basement area of 3,920 square feet which is used mostly for storage and mechanical space. The building was built about 70 years ago and is still in good condition with the exception of the wood frame windows and doors, which are in need of replacement. The windows have storms but they are not in good condition.

The exterior walls are solid brick about 1 foot thick with interior plaster work. There is no insulation in the wall system. The roof is a pitched wood deck roof with slate shingles. The ventilated attic space is over a concrete deck. There is no insulation in the roof system.

About 10 people work full time in the building but occupancy can go as high as 100 as classes are held. Operation hours are Monday through Friday from 8 AM to 5 PM.

#### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in this facility include the heating system, lighting, office equipment and domestic hot water.

The building is heated by a new gas fired, cast iron sectional boiler built by Burnham. It is rated at 404,000 BTUH output. Hot water from the boiler is sent to perimeter cast iron radiators. There is only one heating zone in the building controlled by a single manual thermostat. Space temperature in the heating season is maintained at approximately 72 degrees at all times. Some areas experience overheating and to compensate, windows are opened.

Lighting consists mainly of four lamp, four foot fluorescent fixtures utilizing a mix of 34 and 40 watt tubes with magnetic ballasts. Some incandescent display track lighting exists in the lobby and hallways but is only used on occasion. Originally, the building was more open than is now. In some areas, offices have been added but the light switches remain in near the center hallway. Some incandescent lighting exists in the basement and janitor closets.

Domestic hot water is provided by a new Bradford White, 40 gallon electric heater. Hot water temperature was measured at 130 degrees F. in a bathroom. Hot water use is mainly for hand washing. Pipe insulation for the boiler and the hot water heater exists with just a few areas that are missing.

There are no central air conditioning systems. There were five window air conditioning units at the time of the survey. Electricity and natural gas are metered at the building.

## **Theater Building T4:**

### **GENERAL INFORMATION**

The T4 Theater at Fort Tilden is a one story theater used for occasional gatherings. Total floor area is approximately 3,800 gross square feet (GSF) on the main floor. There are minimal windows in the theater but new double glazed windows have been installed in the entrance vestibule.

The building was built about 50 years ago and is in need of updating. The entrance doors are very loose and need replacing. It is of wood frame construction with no known insulation in the walls or roof. The roof is pitched with a wood deck and asphalt shingles.

The building is available Monday through Friday from 8 AM to 11 PM.

### **ENERGY CONSUMING SYSTEMS**

There was no heating or cooling system in the building at the time of the survey and the water has been shut off. The original HVAC systems were abandoned and removed due to age.

Lighting consists mainly of incandescent in the theater area. There are two, 1,000 watt spot lights for the stage in the projection room plus 20 stage lights approximately 150 watts each.

Electricity is centrally metered.

## **Quarters Building 22:**

### **GENERAL INFORMATION**

Quarters 22 at Fort Tilden is a single family residence. Total floor area is approximately 5,250 gross square feet (GSF) on two floors plus a full basement area and a partial third floor. An attached one car garage exists on the west side. The building was built about 60 years ago and is still in good condition with the exception of the wood frame, double hung windows, which need replacement. The windows have exterior storms.

The exterior walls are wood frame with exterior brick veneer. The interior has plaster work. There is no known insulation in the wall system. The roof is a pitched wood deck roof with slate shingles. There is no insulation in the roof system.

This residence was unoccupied at the time of the survey.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in this residence include the heating system, lighting, and domestic hot water.

The building is heated by a Weil McLain oil fired boiler. It is rated at 236,000 BTUH input. Hot water from the boiler is sent to perimeter cast iron radiators. There are two heating zones in the building controlled by two manual thermostats. Space temperature in the heating season is maintained at approximately 72 degrees at all times.

Lighting consists mainly of incandescent 60 and 75 watt floor, ceiling and wall fixtures. Fluorescent fixtures exist in the kitchen and the porch area.

Domestic hot water is provided by two gas fired heaters fed from building T-25. The heaters are A.O. Smith high efficiency units. One is a 40 gallon unit and the other is a 75 gallon unit rated at 32,500 BTUH and 75,100 BTUH. Hot water temperature was measured at 120 degrees F. at a sink. Pipe insulation for the boiler and the hot water heater exists with just a few areas that are missing.

There are no central air conditioning systems. There were five window air conditioning units at the time of the survey.

Electricity is centrally metered. An above ground oil tank exists in the garage area.

## **Quarters Building 23:**

### **GENERAL INFORMATION**

Quarters 23 at Fort Tilden is a single family residence. Total floor area is approximately 3,600 gross square feet (GSF) on two floors plus a full basement area. An attached one car garage exists on the west side. The building was built about 60 years ago and is still in good condition. The windows are newer double hung units with insulated glazing.

The exterior walls are wood frame with exterior brick veneer. The interior has plaster work. There is no known insulation in the wall system. The roof is a pitched wood deck roof asphalt shingles. There is no insulation in the roof system.

This residence was unoccupied at the time of the survey.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in this residence include the heating system, lighting, and domestic hot water.

The building is heated by a six year old oil fired boiler. It is rated at 221,000 BTUH input. Hot water from the boiler is sent to perimeter cast iron radiators. There are two heating zones in the building controlled by two manual thermostats. Space temperature in the heating season is maintained at approximately 72 degrees at all times.

Lighting consists mainly of 60 and 75 watt incandescent floor, ceiling and wall fixtures.

Domestic hot water is provided by a gas fired heater fed from building T-25. The heater is an A.O. Smith, 40 gallon energy saver unit. Hot water temperature was measured at 130 degrees F. at a sink. Pipe insulation for the boiler and the hot water heater exists with just a few areas that are missing.

There are no central air conditioning systems. There were no window air conditioning units installed at the time of the survey.

Electricity is centrally metered. An above ground oil tank exists in the garage area.

## **Building T25:**

### **GENERAL INFORMATION**

Building T25 at Fort Tilden is a senior center used for public gatherings. Total occupied floor area is approximately 1,200 gross square feet (GSF) on one floor. The building was built about 50 years ago and is in very good condition with new double glazed windows, wall and roof insulation.

The exterior walls are of wood frame construction with exterior insulation covered with stucco. The roof is a pitched wood deck roof with asphalt shingles. A dropped ceiling exists in the main meeting hall area. The roof has fiberglass batt insulation.

The building is available for use anytime from 8 AM to 8PM. Occupancy can go as high as 60 as various events are held.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in this facility include the heating system, lighting and domestic hot water. There is a small kitchen with a gas stove and a residential type refrigerator.

The building is heated by a newer (1988) gas fired hot water boiler. The Weil McAllen boiler (P566E-W) is controlled by one manual thermostat in the meeting hall. The space temperature appears to be maintained at about 72 degrees at all times. Piping is mostly insulated although there are some miscellaneous areas that are missing insulation.

Lighting consists mainly of two lamp, U tube fluorescent fixtures utilizing 34 watt tubes with magnetic ballasts. One for tube, eight foot fixture exists in the storage/boiler room area.

Domestic hot water is provided by a high efficiency 1988 Bradford White, 30 gallon gas fired heater rated at 32,000 BTUH. Hot water temperature was measured at 120 degrees F. in a bathroom. Hot water use is mainly in the small kitchen and for hand washing.

There are no central air conditioning systems.

Natural gas is metered at the building and electricity is metered centrally. Natural gas is piped from this building to Quarters 22 and 23 nearby where it is used for heating domestic hot water.

## **Quarters Building 106 A&B:**

### **GENERAL INFORMATION**

Quarters 106A&B at Fort Tilden is a duplex residence. Total floor area is approximately 3,600 gross square feet (GSF) on the main floor, second floor a partial basement area. There is no attached garage for this residence. The house was built about 84 years ago and is still in good condition. The windows are newer double hung units with insulated glazing. No major drafts were reported from the residents from these windows.

The exterior walls are masonry covered with stucco on the exterior. Interior walls have plaster work. There is no known insulation in the wall system. The roof is pitched with a wood deck and asphalt shingles. There is no significant insulation known to exist in the roof system.

There were four residents of the duplex at the time of the survey.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in the residence include the heating systems, lighting, and domestic hot water.

Residence A is heated by a 1995 Weil McLain gas fired unit rated at 140,000 BTUH. Hot water is sent to perimeter radiators. There is one heating zone in the building controlled by a manual thermostat. Space temperature in the heating season assumed to be maintained at approximately 70 to 72 degrees at all times. Residence B has also has a Weil McLain gas boiler.

Lighting consists mainly of 18 watt and 24 watt compact fluorescents and 25 watt candelabra lamps on the A side. The B side has mainly incandescent fixtures ranging in size from 60 to 100 watts.

Domestic hot water is provided by an A.O. Smith 40 gallon gas fired heater on the A side rated at 40,000 BTUH. The B side has a Bradford White 40 gallon gas fired unit rated at 34,000 BTUH. Hot water temperature was measured at 130F at a sink for both residences. Pipe insulation for the boiler and the hot water heater exists with just a few areas that are missing.

There are no central air conditioning systems. There was one covered window air conditioning unit installed at the time of the survey.

Electricity is centrally metered and natural gas is billed to the residents on a budget plan.

## **Quarters Building 133:**

### **GENERAL INFORMATION**

Quarters 133 at Fort Tilden is a single family residence. Total floor area is approximately 2,700 gross square feet (GSF) on the main floor, walk up attic and the partial basement area. There is no attached garage for this residence. The house was built about 60 years ago and is still in good condition. The windows are newer double hung units with insulated glazing. The windows are reported to be drafty however since the frames were not packed with insulation.

The exterior walls are wood frame with exterior brick veneer. Interior walls have plaster work. There is no known insulation in the wall system. The roof is pitched with a wood deck and asphalt shingles. There is no insulation in the roof system. The floor area over the crawlspace is insulated with R-19 fiberglass.

One resident occupied the house at the time of the survey.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in the residence include the heating systems, lighting, and domestic hot water.

The house is heated by an older Weil McLain gas fired unit. There was no nameplate on the unit. Steam from the boiler is sent to perimeter radiators. There is one heating zone in the building controlled by a manual thermostat. Space temperature in the heating season is maintained at approximately 72 degrees at all times.

Lighting consists mainly of 60 and 75 watt incandescent floor, ceiling and wall fixtures although some compact fluorescent lamps have been installed.

Domestic hot water is provided by a 1992 gas fired, 40 gallon unit. Hot water temperature was measured at 142 degrees F. at a sink. Pipe insulation for the boiler and the hot water heater exists with just a few areas that are missing.

There are no central air conditioning systems. There were no window air conditioning units installed at the time of the survey.

Electricity is centrally metered.

## **Quarters Building 134:**

### **GENERAL INFORMATION**

Quarters 134 at Fort Tilden is a single family residence. Total floor area is approximately 2,700 gross square feet (GSF) on the main floor, walk up attic and the partial basement area. There is no attached garage for this residence. The house was built about 60 years ago and is still in good condition. The windows are newer double hung units with insulated glazing. The windows are reported to be drafty however since the frames were not packed with insulation.

The exterior walls are wood frame with exterior brick veneer. Interior walls have plaster work. There is no known insulation in the wall system. The roof is pitched with a wood deck and asphalt shingles. There is no insulation in the roof system. The floor area over the crawlspace is insulated with R-19 fiberglass.

This residence was unoccupied at the time of the survey.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in the residence include the heating systems, lighting, and domestic hot water.

The house is heated by a new Burnham gas fired unit rated at 210,000 BUTH input and 170,000 BTUH output. Steam from the boiler is sent to perimeter radiators. There is one heating zone in the building controlled by a manual thermostat. Space temperature in the heating season is maintained at approximately 72 degrees at all times.

Lighting consists mainly of 60 and 75 watt incandescent floor, ceiling and wall fixtures.

Domestic hot water is provided by a Bradford White, 34,000 BTUH gas fired, 40 gallon unit. Hot water temperature was measured at 120 degrees F. at a sink. Pipe insulation for the boiler and the hot water heater exists with just a few areas that are missing.

There are no central air conditioning systems. There were no window air conditioning units installed at the time of the survey.

Electricity is centrally metered.

## **Quarters Building 135:**

### **GENERAL INFORMATION**

Quarters 135 at Fort Tilden is a single family residence. Total floor area is approximately 2,700 gross square feet (GSF) on the main floor, walk up attic and the partial basement area. There is no attached garage for this residence. The house was built about 60 years ago and is still in good condition. The windows are newer double hung units with insulated glazing. The windows are reported to be drafty however since the frames were not packed with insulation.

The exterior walls are wood frame with exterior brick veneer. Interior walls have plaster work. There is no known insulation in the wall system. The roof is pitched with a wood deck and asphalt shingles. There is no insulation in the roof system. The floor area over the crawlspace is insulated with R-19 fiberglass.

Two residents occupied the house at the time of the survey.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in the residence include the heating systems, lighting, and domestic hot water.

The house is heated by an older Weil McLain gas fired unit. There was no nameplate on the unit. Hot water from the boiler is sent to perimeter radiators. There is one heating zone in the building controlled by a clock thermostat. Space temperature in the heating season assumed to be maintained at approximately 70 to 72 degrees at all times.

Lighting consists mainly of 60 and 75 watt incandescent floor, ceiling and wall fixtures although some compact fluorescent lamps have been installed.

Domestic hot water is provided by an A.O. Smith gas fired, 40 gallon unit. Hot water temperature was measured at 130 degrees F. at a sink. Pipe insulation for the boiler and the hot water heater exists with just a few areas that are missing.

There are no central air conditioning systems. There were no window air conditioning units installed at the time of the survey.

Electricity is centrally metered.

## **Quarters Building 136:**

### **GENERAL INFORMATION**

Quarters 136 at Fort Tilden is a single family residence. Total floor area is approximately 2,700 gross square feet (GSF) on the main floor, walk up attic and the partial basement area. There is no attached garage for this residence. The house was built about 60 years ago and is still in good condition. The windows are newer double hung units with insulated glazing. The windows are reported to be drafty however since the frames were not packed with insulation.

The exterior walls are wood frame with exterior brick veneer. Interior walls have plaster work. There is no known insulation in the wall system. The roof is pitched with a wood deck and asphalt shingles. There is R-19 fiberglass insulation in the roof system. The floor area over the crawlspace is insulated with R-19 fiberglass.

One resident occupied the house at the time of the survey.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in the residence include the heating systems, lighting, and domestic hot water.

The house is heated by an older Weil McLain gas fired unit. There was no nameplate on the unit. Steam from the boiler is sent to perimeter radiators. There is one heating zone in the building controlled by a manual thermostat. Space temperature in the heating season assumed to be maintained at approximately 70 to 72 degrees at all times.

Lighting consists mainly of 60 and 75 watt incandescent floor, ceiling and wall fixtures.

Domestic hot water is provided by a Bradford White gas fired, 40 gallon unit. Hot water temperature was measured at 125 degrees F. at a sink. Pipe insulation for the boiler and the hot water heater exists with just a few areas that are missing.

There are no central air conditioning systems. There were no window air conditioning units installed at the time of the survey.

Electricity is centrally metered.

## **Meeting Hall 149:**

### **GENERAL INFORMATION**

Building 149 at Fort Tilden is a community center used for public gatherings. Total occupied floor area is approximately 3,800 gross square feet (GSF) on one floor. The building was built about 57 years ago and is in good condition with new double glazed windows.

The exterior walls are of wood frame construction with no known insulation except for some thin material used under the newer exterior vinyl siding. The roof is a pitched wood deck roof with asphalt shingles. A dropped ceiling exists in the main meeting hall area. The roof is not thought to have any significant insulation installed.

The building is available for use anytime from 8 AM to midnight. Occupancy can go as high as 200 as various events are held.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in this facility include the heating system, lighting and domestic hot water.

The building is heated by two ceiling mounted Modine natural gas fired unit heaters. The heaters are rated at 150,000 BTUH input and 112,500 BTUH output each. They each have a manual thermostat located on the wall nearby. Space temperature in the heating season is maintained at approximately 72 degrees at all times.

Lighting consists mainly of four lamp, four foot fluorescent fixtures utilizing a mix of 34 and 40 watt tubes with magnetic ballasts.

Domestic hot water is provided by a Bradford White, 40 gallon gas fired heater. Hot water temperature was measured at 120 degrees F. at the kitchen sink. Hot water use is mainly in the small kitchen and for hand washing.

There are no central air conditioning systems.

Natural gas is metered at the building and electricity is metered centrally.

## **Police Station Building 210:**

### **GENERAL INFORMATION**

Building 210 at Fort Tilden is a Police Station. Total occupied floor area is approximately 1,400 gross square feet (GSF) on one floor. There is a full basement used for storage and a vented attic area used for storage. The building was built about 50 years ago and needs updating.

The exterior walls are solid masonry with no known insulation. The roof is a pitched wood deck roof with asphalt shingles. The roof system is not thought to have any significant insulation installed. The windows are single glazed with exterior storms. The main windows need replacing.

The building is available for use anytime from 8 AM to 5 PM. There are two people that use the building but they are usually in the field.

Future plans call for the police to move into an adjacent building. This building may be leased to a private firm as office space.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in this facility include the heating system, lighting and domestic hot water.

The building is heated by an old Dunkirk Radiator Corp. steam boiler fired with #2 oil. It is rated at 195,000 BTUH. Steam pipes are insulated in the basement. Space temperature in the heating season is maintained at approximately 72 degrees at all times. Heat is provided to the space by perimeter cast iron radiators controlled by a single manual thermostat.

Lighting consists mainly of four lamp, four foot fluorescent fixtures utilizing a mix of 34 and 40 watt tubes with magnetic ballasts.

Domestic hot water is heated from the main boiler. Hot water temperature was measured at 180 degrees F. at a bathroom sink. Hot water is used is mainly for hand washing.

There are no central air conditioning systems. Two window air conditioners exist.

Electricity is metered centrally.

## **Maintenance Building 219:**

### **GENERAL INFORMATION**

Building 219 at Fort Tilden is a maintenance building housing shop areas and offices. It is approximately 6,640 gross square feet (GSF) on the main floor plus a small unused second floor area. There is no full basement. The building was built about 60 years ago and is in good condition.

The exterior walls are solid masonry with no known insulation. The roof is flat and has recently been re-roofed with a rubber membrane but some leaks have occurred. The roof system is not thought to have any significant insulation installed. The windows have been replaced and are double glazed. The main entrance doors are in need of weatherstripping if the heat was turned on.

The building is available for use anytime from 7 AM to 5 PM. There are six people that use the building but they are usually in the field.

Future plans may call for the maintenance shops to be moved. This building may be leased to a private firm.

### **ENERGY CONSUMING SYSTEMS**

Lighting is the main energy consuming system since the heat has been shut off as well as domestic water.

The building was heated by an old American Standard steam boiler fired with #2 oil. It is rated at 1,570 MBH. Terminal heating was provided by unit heaters.

Lighting has been updated in most areas and consists mainly of two lamp, U tube fluorescent fixtures utilizing 34 watt tubes. Some four tube, 8 foot fluorescent fixtures exist utilizing 60 watt energy saver tubes.

Domestic hot water was heated by a 40 gallon electric water heater. Hot water was mainly used for handwashing.

There are no central air conditioning systems.

Electricity is metered centrally.

## **Rockaway Station:**

### **GENERAL INFORMATION**

Rockaway Station is across the street from Fort Tilden. Presently it is still used by the Coast Guard as a residence for several people. The National Park Service will be taking over possession of the building soon and will most likely lease it to an outside party. Total floor area is approximately 21,00 gross square feet (GSF) on the first floor, second floor and the third floor loft. The building was built about 50 years ago and is still in very good condition. The windows are newer double hung units with insulated glazing.

The exterior walls are solid masonry with interior plaster work. There is no known insulation in the wall system. The roof is pitched with a wood deck and has slate shingles. The roof has R-19 fiberglass between the sloped rafters.

The building is mostly unoccupied except for a few residents on the second floor.

### **ENERGY CONSUMING SYSTEMS**

The major energy consuming systems in the residence include the heating systems, lighting, and domestic hot water.

The station is heated by a Bryant gas fired cast iron sectional boiler rated at 975,000 BTUH input and 780,000 BTUH output. There are three heating zones in the building but the third floor has had its circulator pump removed. It appears that the third floor has not been used for some time. Space temperature in the heating season is set at 72 degrees at all times. The circulators are controlled by wall mounted thermostats. Radiator control valves exist on the second floor only.

Lighting consists mainly of fluorescent two and four lamp fixtures utilizing 34 watt tubes and magnetic ballasts located in the dropped ceiling. Most rooms are controlled with separate light switches. Low pressure sodium fixtures are located on the exterior at the entrance doors.

Domestic hot water is provided by an A.O. Smith gas fired unit. Hot water temperature was measured at 130 degrees F. at a sink. Hot water is sent to a 120 gallon storage tank in the boiler room. There is no pipe insulation for the boiler and the domestic hot water system. Several shower rooms exist since this was a residence facility.

There are no central air conditioning systems. There were no window air conditioning units installed at the time of the survey but 10 window units were in the storage room.

Electricity and gas are metered at the building but fuel billing history was not available.

## **CURRENT CONSERVATION MEASURES**

**Visitor Center – Building 1:** New gas boiler, hot water heater

**Theater Building T4:** New HVAC to be installed

**Quarters Building 22:** Unoccupied

**Quarters Building 23:** Unoccupied

**Building T25:** Building shell insulated, newer boiler, new windows

**Quarters Building 106 A&B:** New double glazed windows installed

**Quarters Building 133:** None

**Quarters Building 134:** Unoccupied

**Quarters Building 135:** None

**Quarters Building 136:** None

**Meeting Hall 149:** None

**Police Station Building 210:** Is being vacated

**Maintenance Building 219:** Not heated, and is being vacated

**Rockaway Station:** Former Coast Guard station mostly unoccupied, police moving in

## GENERAL OBSERVATIONS

Fort Tilden was a military base at one time. It is located just south of Floyd Bennett Field on Rockaway Inlet. Many of the original buildings have been torn down. Those that remain are about 60 years old but are still in useable condition. The buildings are used mainly by the Park Service for offices and residences. The three buildings located on the water may be leased to an outside firm in the future. These include Bldg 219 Maintenance, Bldg 210 Police and Rockaway Station which the Park Service has taken over from the Coast Guard.

**Theater Building T4:** This building is scheduled to have new heating and air conditioning systems installed. When these systems are installed, high efficiency units should be specified. Additionally, programmable thermostats should be installed to permit space temperature setback/setup when the building is unoccupied.

**Consider energy conservation opportunities when rehabilitating spaces or replacing energy consuming systems:** When systems are being replaced anyway, the cost of energy efficient equipment is partially offset by the cost of standard efficiency equipment.

## WATER CONSERVATION AND RENEWABLES SCREENING

**Water Conservation Screening:** Water consumption is included in the tax base in New York City and there are no water bills for these buildings, with the exception of Rockaway Station. Watergy was run on that building. For the remaining buildings, water consumption can be reduced through the use of flow restrictors in faucets, low flow showerheads and low flow toilets and urinals. However, implementation of these measures will not lower costs and therefore Watergy was not run on these buildings.

**Renewables Screening:** The renewables screening for this facility includes input parameters for infiltration and wind generation. Infiltration measures have been addressed. A colleague recently conducted a detailed wind and photovoltaic study for the New York City Area. A 7 MW wind generation system, using \$0.05 per kWh, will pay back in about 17 years. A 50 kW wind generation system will payback in about 25 years. Photovoltaic systems were found to have even longer payback periods than the wind systems.

Regarding solar ventilation pre-heating, the buildings do not have ventilating systems.

## OPERATION AND MAINTENANCE MEASURES

Low cost modifications that will reduce energy consumption were identified during the audit and are shown in the summary table.

### Visitor Center Building 1:

**O & M 401: Reduce the domestic hot water temperature** - Water heaters typically arrive from the factory with the thermostat set at 140F. Water at this temperature or higher may cause injury. By turning down the setpoint temperatures to 125F, heating energy and standby losses will be reduced. It should be noted that water that is hot enough to disinfect will cause injury. Use disinfectant soap if this is an issue. The water heater in this building was set at 130F.

For gas or oil-fired water heaters, reduce the aquastat on the water heater. For electric water heaters, open the access panel on each electric water heater and adjust the thermostat setpoint temperature to 125F. Measure delivered hot water temperature at the closest fixture to verify thermostat accuracy, and adjust thermostat if required.

**O&M 140: Remove or Cover A/C Units in Winter** - Existing A/C units that are mounted in the windows allow a considerable amount of outside air to enter the building in winter.

In winter, the A/C units should be removed or covers installed to prevent air infiltration.

**Theater Building T4:** None. This building is not conditioned.

### Quarters Building 22:

**O&M 233: Reduce space temperature when unoccupied** - The building is currently unoccupied. However, heating space temperatures are maintained as though the building were occupied.

Reduce the space temperature to 55F when unoccupied.

### Quarters Building 23:

**O&M 233: Reduce space temperature when unoccupied** - The building is currently unoccupied. However, heating space temperatures are maintained as though the building were occupied.

Reduce the space temperature to 55F when unoccupied.

**O&M 401: Reduce the domestic hot water temperature** - Water heaters typically arrive from the factory with the thermostat set at 140F. Water at this temperature or higher may cause injury. By turning down the setpoint temperatures to 125F, heating energy and standby losses will be reduced. It should be noted that water that is hot enough to disinfect will cause injury. Use disinfectant soap if this is an issue. The water heater in this building was set at 130F.

**T25 Senior Citizens Center:**

**O&M 254: Install Pipe Insulation** - Some of the piping in the boiler room is in need of insulation.

Insulate all exposed heating and/or domestic hot water piping with one-inch pipe insulation.

**Quarters 106 A&B:**

**O&M 401: Reduce the domestic hot water temperature** - Water heaters typically arrive from the factory with the thermostat set at 140F. Water at this temperature or higher may cause injury. By turning down the setpoint temperatures to 125F, heating energy and standby losses will be reduced. It should be noted that water that is hot enough to disinfect will cause injury. Use disinfectant soap if this is an issue. The water heater in this building was set at 130F.

**O&M-416 Install Low Flow Shower Heads** - Standard showerheads permit up to 5 gallons per minute maximum flow when the fixtures are in use. Installing low flow showerheads can save water, and saving hot water also saves the energy required to heat it.

Replace existing showerheads with new low flow showerheads to permit a maximum of 3 gallons per minute to flow when the showers are in use. Low flow showerheads increase water velocity and allow air to mix with the water. The net effect is the sensation of the higher flow rate with the reduced flow rate of 3 gallons per minute.

**Quarters Building 133:**

**O&M 401: Reduce the domestic hot water temperature** - Water heaters typically arrive from the factory with the thermostat set at 140F. Water at this temperature or higher may cause injury. By turning down the setpoint temperatures to 125F, heating energy and standby losses will be reduced. It should be noted that water that is hot enough to disinfect will cause injury. Use disinfectant soap if this is an issue. The water heater in this building was set at 142F.

**Quarters Building 134:**

**O&M 233: Reduce space temperature when unoccupied** - The building is currently unoccupied. However, heating space temperatures are maintained as though the building were occupied.

Reduce the space temperature to 55F when unoccupied.

**O&M 403: Turn off the domestic water heater when unoccupied** - The building is currently unoccupied, but the domestic hot water heater has been left on. This wastes energy and the water heater should be turned off until such time as the building is occupied.

**O&M 416: Install Low Flow Showerheads**-The shower has a regular shower head installed.

Install low flow showerhead rated at 1.5 gallons per minute when the building becomes occupied.

**Quarters Building 135:**

**O&M 401: Reduce the domestic hot water temperature** - Water heaters typically arrive from the factory with the thermostat set at 140F. Water at this temperature or higher may cause injury. By turning down the setpoint temperatures to 125F, heating energy and standby losses will be reduced. It should be noted that water that is hot enough to disinfect will cause injury. Use disinfectant soap if this is an issue. The water heater in this building was set at 130F.

**O&M 416: Install Low Flow Showerheads** - The shower has a regular shower head installed.

Install low flow showerhead rated at 1.5 gallons per minute.

**Quarters Building 136:**

**O&M 416: Install Low Flow Showerheads** -The shower has a regular shower head installed.

Install low flow showerhead rated at 1.5 gallons per minute.

**Meeting Hall Building 149:** None.

**Police Station Building 210:**

**O&M 401: Reduce the domestic hot water temperature** - Water heaters typically arrive from the factory with the thermostat set at 140F. Water at this temperature or higher may cause injury. By turning down the setpoint temperatures to 125F, heating energy and standby losses will be reduced. It should be noted that water that is hot enough to disinfect will cause injury. Use disinfectant soap if this is an issue. The water heater in this building was set at 180F.

**Maintenance Building 219:** None.

**Rockaway Station:**

**O&M 333: Repair photocell lighting controls** - The outside lights have been fitted with photocell controls. However, the controls are not operating properly (suspected dirty sensor) and the outside lights were on during the day. The controls should be repaired or replaced as needed.

**O&M 401: Reduce the domestic hot water temperature** - Water heaters typically arrive from the factory with the thermostat set at 140F. Water at this temperature or higher may cause injury. By turning down the setpoint temperatures to 125F, heating energy and standby losses will be reduced. It should be noted that water that is hot enough to disinfect will cause injury. Use disinfectant soap if this is an issue. The water heater in this building was set at 130F.

**O&M-416 Install Low Flow Shower Heads** - Standard showerheads permit up to 5 gallons per minute maximum flow when the fixtures are in use. Installing low flow showerheads can save water, and saving hot water also saves the energy required to heat it.

Replace existing showerheads with new low flow showerheads to permit a maximum of 3 gallons per minute to flow when the showers are in use. Low flow showerheads increase water velocity and allow air to mix with the water. The net effect is the sensation of the higher flow rate with the reduced flow rate of 3 gallons per minute.

**O&M 254: Install Pipe Insulation** - There is no pipe insulation on some of the piping in the building mechanical room and in the attic area of the third floor.

Insulate all exposed heating and/or domestic hot water piping with one-inch pipe insulation

## ENERGY CONSERVATION MEASURES

This section of the report contains descriptions of the ECM's that are listed in the Savings Summary and recommendations for further action. Any questions that you have regarding the recommendations can be addressed to Landsberg Engineering, P.C., Consulting Engineers, 315/446-6505.

ECM's were identified for each building system where potential for savings exists.

These recommendations are based on observations made during an energy conservation audit of the facility and from written and oral information provided by the facility staff. No attempts were made to verify the accuracy of this information. The recommendations are of a conceptual nature. Any details included in the description were used for estimation and are suggestions for further evaluation only. **Prior to their implementation, all recommendations should be carefully evaluated and a detailed design should be undertaken to make sure that they are appropriate for the facility.** The actual results experienced by the facility may vary from those given in this report.

Complete savings and cost calculations are included in the Appendices. The NIST Building Life Cycle Cost Program version 4.7-99 was used to calculate Life Cycle Cost. Discount factors and price escalation rates for electricity and natural gas were taken from the "Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis 1999."

### Visitor Center Building 1:

#### **ECM 102: Install Attic Insulation**

There is no insulation visible above the dropped ceiling. The lack of insulation permits heat loss in the heating season and the conduction of heat to the conditioned spaces below during the cooling season.

Increase the R-value of the ceiling by adding six inches of R-19 fiberglass batt insulation above the dropped ceiling on the second floor if feasible.

#### **ECM 110: Repair/Replace Windows**

The existing single-glazed wood-framed windows are in poor condition and allow large quantities of unconditioned air to enter the building.

Replace the existing windows with new double hung windows fitted with low-e thermopane glass.

### **ECM 120: Repair/Replace Doors**

All of the existing entrance doors are in poor condition and allow large quantities of unconditioned air to enter the building.

Replace all existing doors with new doors equipped with automatic door closers.

### **ECM: 233 Install Night Setback and Outdoor Air Reset**

The building is heated by a gas fired boiler. The temperature of the heating loop is manually set. In periods of mild weather, the boiler short cycles and loses excess heat. Additionally, the thermostat controls in the building maintain a constant temperature at all times.

Installation of an outdoor reset control will permit modulation of the heating loop temperature with both outside air temperature and building occupancy. Installation of a night setback thermostat will permit the space temperature to be lowered automatically during the heating season when the building is unoccupied.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are several incandescent lamps in use in the building.

Replace all incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM-310 Replace Incandescent Lighting – Exterior**

There is one fixture over the front entrance door that has three, 150 watt flood lights installed.

Replace the exterior incandescent fixture above the door with a 70 watt metal halide wall pack fixture.

### **ECM 325: Install LED Exit Signs**

The existing exit signs are lit with two 15-watt incandescent lights.

Replace the existing incandescent lamps with an LED rebuild kit. The LED lamps draw only 2 watts each, and last 25 years. Alternately, the exit signs can be replaced with LED exit signs.

### **ECM 332: Install Occupancy Sensors**

During the survey it was observed that several areas remain lit when unoccupied.

For spaces here the occupants are in line of site of the wall switch, install infrared sensors mounted in wall-switch boxes. Install ultrasonic ceiling-mounted sensors in areas where occupants are not in line of site of the wall switch. Set time delays for 6 minutes in offices, 30 minutes in toilet rooms and 20 minutes in corridors.

Send an administrative notice to instruct all personnel to switch lights off as they leave the room using the existing wall switches or the button on the sensor. Automatic off operation should be used only when occupants forget to turn off the lights manually.

In mechanical areas, except boiler, chiller, generator and switchgear rooms, use digital time switches. These units flash one minute before they turn off, providing occupants with time to reset them.

### **ECM 418: Replace Domestic Hot Water Heater**

The existing domestic hot water heater is electric. Natural gas is available at the building.

The cost of heating domestic water can be greatly reduced by installing a gas-fired domestic hot water heater.

### **Theater Building T4:**

#### **ECM 102: Install Attic Insulation**

The existing roof system has no insulation which permits heat loss in the heating season and the conduction of heat to the conditioned spaces below during the cooling season.

Increase the R-value of the roof by adding six inches of R-19 fiberglass batt insulation, or blown insulation as appropriate. Install access hatches if required to install the insulation.

#### **ECM 105: Insulate Walls**

The existing walls consist of wood-framed construction with no wall insulation.

Cut access holes in the existing walls and install blown insulation.

### **ECM 120: Replace Doors**

The existing wooden doors are in poor condition and allow large quantities of unconditioned air to enter the building.

Replace the existing doors with new doors equipped with automatic door closers.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are many incandescent lamps in use in the building.

Replace incandescent bulbs with warm white, instant start, compact fluorescent lamps and four foot, T8 fluorescent fixtures in the theatre ceiling. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved. Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics.

All T-12 lamps and ballasts should be replaced with T-8 lamps and electronic ballasts. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

### **Quarters Building 22:**

#### **ECM 110: Repair/Replace Windows**

The existing single-glazed wood-framed windows are in poor condition and allow large quantities of unconditioned air to enter the building.

Replace the existing windows with new windows fitted with low-e thermopane glass.

#### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

Door head and jambs: adhesive jamb weatherstripping

Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

Door head and jambs: spring bronze

Door sill: gasketed threshold

### **ECM 141 Install Fireplace Doors**

The existing fireplaces are drafty when not in use, and lose a considerable amount of heat when the fire is winding down.

Energy can be saved by installing glass doors in the existing fireplaces.

### **ECM 233 Install Night Setback Thermostats**

The residence was unoccupied at the time of the survey but the space temperature was about 70 degrees. It is recommended to install programmable thermostats to reduce the temperature to 55 or 60 degrees until the residence is re-occupied.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are many incandescent lamps in use in the building.

Replace all incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified

electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

#### **ECM-310 Replace Incandescent Lighting – Exterior**

There are two exterior 150-watt incandescent lamps in use at the building.

Replace the existing fixtures with 70-watt metal halide wall packs, equipped with quartz restrike option.

#### **ECM 508: Install Gas Clothes Dryer**

The existing clothes dryers are electric. Energy cost can be saved by using gas clothes dryers, now that natural gas is available.

Install gas clothes dryers in place of existing electric units.

#### **Quarters Building 23:**

##### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

- Door head and jambs: adhesive jamb weatherstripping
- Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

- Door head and jambs: spring bronze
- Door sill: gasketed threshold

##### **ECM 233 Install Night Setback Thermostats**

The residence was unoccupied at the time of the survey but the space temperature was about 70 degrees. It is recommended to install programmable thermostats to reduce the temperature to 55 or 60 degrees until the residence is re-occupied.

### **ECM 141 Install Fireplace Doors**

The existing fireplace is drafty when not in use, and will lose a considerable amount of heat when the fire is winding down.

Installing glass doors in the existing fireplace can save energy.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are many incandescent lamps in use in the building.

Replace all incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM-310 Replace Incandescent Lighting – Exterior**

There are three exterior 150-watt incandescent lamps in use at the building.

Replace the existing fixtures with 70-watt metal halide wall packs, equipped with quartz restrike option.

### **ECM 508: Install Gas Clothes Dryer**

The existing clothes dryers are electric. Energy cost can be saved by using gas clothes dryers, now that natural gas is available.

Install gas clothes dryers in place of existing electric units.

### **Building T25:**

### **ECM 125: Weatherstrip Doors**

The back door requires weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

Door head and jambs: adhesive jamb weatherstripping

Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

Door head and jambs: spring bronze

Door sill: gasketed threshold

#### **ECM: 233 Install Night Setback Thermostat**

The space temperature appears to be maintained at 70 degrees at all times. Installation of a night setback thermostat will permit the space temperature to be lowered automatically during the heating season when the building is unoccupied resulting in significant savings.

#### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the "flicker" associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

#### **ECM 325: Install LED Exit Signs**

The existing exit signs are lit with two 15-watt incandescent lights.

Replace the existing incandescent lamps with an LED rebuild kit. The LED lamps draw only 2 watts each, and last 25 years. Alternately, the exit signs can be replaced with LED exit signs.

#### **Quarters Building 106 A&B:**

#### **ECM 141 Install Fireplace Doors**

The existing fireplaces are drafty when not in use, and lose a considerable amount of heat when the fire is winding down.

Installing glass doors in the existing fireplaces can save energy.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are numerous incandescent lamps in use in the building.

Replace all incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

### **ECM 508: Install Gas Clothes Dryer**

The existing clothes dryers are electric. Energy cost can be saved by using gas clothes dryers, now that natural gas is available.

Install gas clothes dryers in place of existing electric units.

### **Quarters Building 133:**

#### **ECM 101: Install Attic Insulation**

The existing attic is in need of insulating. The uninsulated attic ceilings permit heat loss in the heating season and the conduction of heat to the conditioned spaces below during the cooling season.

Increase the R-value of the roof by adding at least six inches of R-19 fiberglass batt insulation, or blown insulation as appropriate. Install access hatches if required to install the insulation.

### **ECM 110: Repair Window Frames**

The windows have been replaced with new double glazed units. The residents report that they are drafty around the edges.

Remove the window casings and install insulation to stop the drafts.

### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

Door head and jambs: adhesive jamb weatherstripping

Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

Door head and jambs: spring bronze

Door sill: gasketed threshold

### **ECM 141 Install Fireplace Doors**

The existing fireplace is drafty when not in use, and will lose a considerable amount of heat when the fire is winding down.

Installing glass doors in the existing fireplace can save energy.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are numerous incandescent lamps in use in the building.

Replace all incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

### **ECM 508: Install Gas Clothes Dryer**

The existing clothes dryer is electric. Energy costs can be saved by using a gas clothes dryer since natural gas is available.

Install a gas clothes dryer in place of the existing electric unit.

### **Quarters Building 134:**

#### **ECM 101: Install Attic Insulation**

The existing attic is in need of insulating. The uninsulated attic ceilings permit heat loss in the heating season and the conduction of heat to the conditioned spaces below during the cooling season.

Increase the R-value of the roof by adding at least six inches of R-19 fiberglass batt insulation, or blown insulation as appropriate. Install access hatches if required to install the insulation.

#### **ECM 110: Repair Window Frames**

The windows have been replaced with new double glazed units. The residents report that they are drafty around the edges.

Remove the window casings and install insulation to stop the drafts.

### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

Door head and jambs: adhesive jamb weatherstripping

Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

Door head and jambs: spring bronze

Door sill: gasketed threshold

### **ECM 141 Install Fireplace Doors**

The existing fireplace is drafty when not in use, and will lose a considerable amount of heat when the fire is winding down.

Energy can be saved by installing glass doors in the existing fireplace.

### **ECM 233 Install Night Setback Thermostat**

The residence was unoccupied at the time of the survey but the space temperature was about 70 degrees. It is recommended to install programmable thermostats to reduce the temperature to 55 or 60 degrees until the residence is re-occupied.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are numerous incandescent lamps in use in the building.

Replace all incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

#### **ECM 508: Install Gas Clothes Dryer**

The existing clothes dryer is electric. Energy costs can be saved by using a gas clothes dryer since natural gas is available.

Install a gas clothes dryer in place of the existing electric unit.

#### **Quarters Building 135:**

#### **ECM 101: Install Attic Insulation**

The existing attic is in need of insulating. The uninsulated attic ceilings permit heat loss in the heating season and the conduction of heat to the conditioned spaces below during the cooling season.

Increase the R-value of the roof by adding at least six inches of R-19 fiberglass batt insulation, or blown insulation as appropriate. Install access hatches if required to install the insulation.

#### **ECM 110: Repair Window Frames**

The windows have been replaced with new double glazed units. The residents report that they are drafty around the edges.

Remove the window casings and install insulation to stop the drafts.

#### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

- Door head and jambs: adhesive jamb weatherstripping

- Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

Door head and jambs: spring bronze

Door sill: gasketed threshold

### **ECM 141 Install Fireplace Doors**

The existing fireplace is drafty when not in use, and will lose a considerable amount of heat when the fire is winding down.

Installing glass doors in the existing fireplace can save energy.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are numerous incandescent lamps in use in the building.

Replace all incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps for use with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

### **ECM 508: Install Gas Clothes Dryer**

The existing clothes dryer is electric. Energy costs can be saved by using a gas clothes dryer since natural gas is available.

Install a gas clothes dryer in place of the existing electric unit.

## **Quarters Building 136:**

### **ECM 110: Repair Window Frames**

The windows have been replaced with new double glazed units. The residents report that they are drafty around the edges.

Remove the window casings and install insulation to stop the drafts.

### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

- Door head and jambs: adhesive jamb weatherstripping
- Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

- Door head and jambs: spring bronze
- Door sill: gasketed threshold

### **ECM 141 Install Fireplace Doors**

The existing fireplace is drafty when not in use, and will lose a considerable amount of heat when the fire is winding down.

Energy can be saved by installing glass doors in the existing fireplace.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are numerous incandescent lamps in use in the building.

Replace all incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the

34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

#### **ECM 508: Install Gas Clothes Dryer**

The existing clothes dryer is electric. Energy costs can be saved by using a gas clothes dryer since natural gas is available.

Install a gas clothes dryer in place of the existing electric unit.

#### **Meeting Hall 149:**

#### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

- Door head and jambs: adhesive jamb weatherstripping
- Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

- Door head and jambs: spring bronze
- Door sill: gasketed threshold

#### **ECM: 233 Install Night Setback Thermostats**

The building is heated by a two gas fired, ceiling mounted unit heaters controlled by two manual thermostats. The space temperature appears to be kept at a constant 70 degrees.

Installation of two programmable thermostats will allow the space temperature to be reduced when the building is unoccupied resulting in significant energy savings.

### **ECM 301: Replace Incandescent Lighting – Interior**

There is one 75-watt incandescent lamp in use in the building.

Replace the incandescent bulb with a warm white, instant start, compact fluorescent lamp. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

### **ECM-310 Replace Incandescent Lighting – Exterior**

There is one 150-watt incandescent lamp in use at the exterior of the building.

Replace the existing fixture with a 70-watt metal halide wall pack fitted with quartz restrike option and photocell control.

### **ECM 325: Install LED Exit Signs**

The existing exit signs are lit with two 15-watt incandescent lights.

Replace the existing incandescent lamps with an LED rebuild kit. The LED lamps draw only 2 watts each, and last 25 years. Alternately, the exit signs can be replaced with LED exit signs.

### **Police Station Building 210:**

### **ECM 110: Replace Windows**

The existing single-glazed wood-framed windows are in poor condition and allow large quantities of unconditioned air to enter the building.

Replace the existing windows with new windows fitted with low-e thermopane glass.

### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

- Door head and jambs: adhesive jamb weatherstripping
- Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

- Door head and jambs: spring bronze
- Door sill: gasketed threshold

A storm door should also be added to the main entrance door.

### **ECM: 233 Install Night Setback Thermostat**

The space temperature appears to be kept at a constant 70 degrees. Installation of a programmable thermostat will allow the space temperature to be reduced to 55 or 60 degrees during unoccupied periods. Since the police will be moving out it is recommended to keep the temperature down at all times during the heating season until a new tenant takes over.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are several incandescent lamps in use in the building.

Replace the incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified

electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

### **Maintenance Building 219:**

#### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

- Door head and jambs: adhesive jamb weatherstripping
- Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

- Door head and jambs: spring bronze
- Door sill: gasketed threshold

#### **ECM: 233 Install Night Setback and Outdoor Air Reset**

The building is heated by an oil fired boiler which is not in use at this time. The temperature of the heating loop is manually set. In periods of mild weather, the boiler short cycles and loses excess. Additionally, the thermostat controls in the building maintain a constant temperature at all times.

When the building is re-occupied, install an outdoor reset control that will permit modulation of the heating loop temperature with both outside air temperature and building occupancy. Installation of a night setback thermostat will permit the space temperature to be lowered automatically during the heating season when the building is unoccupied.

#### **ECM 301: Replace Incandescent Lighting – Interior**

There are several incandescent lamps in use in the building.

Replace the incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

### **ECM 325: Install LED Exit Signs**

The existing exit signs are lit with two 15-watt incandescent lights.

Replace the existing incandescent lamps with an LED rebuild kit. The LED lamps draw only 2 watts each, and last 25 years. Alternately, the exit signs can be replaced with LED exit signs.

### **ECM 418: Replace Domestic Hot Water Heater**

The existing domestic hot water heater is electric. Natural gas is available near the building. If gas is run to the building for a new boiler, the hot water heater should be changed to a gas fired unit.

### **Rockaway Station:**

### **ECM 125: Weatherstrip Doors**

Exterior doors require weatherstripping to eliminate infiltration. During the energy survey, gaps were observed along door jambs and meeting rails.

For steel and aluminum doors, install new weatherstripping as follows:

- Door head and jambs: adhesive jamb weatherstripping
- Door sill: gasketed threshold

For wood doors install new weatherstripping as follows:

- Door head and jambs: spring bronze
- Door sill: gasketed threshold

### **ECM: 233 Install Night Setback and Outdoor Air Reset**

This building is being taken over from the Coast Guard and may be leased to an outside tenant in the future. The space temperature on the first and second floor is maintained at about 70 degrees. The third floor is not heated but could be with the re-installation of the circulator pump.

A gas-fired boiler heats the building. The temperature of the heating loop is manually set. In periods of mild weather, the boiler short cycles and loses excess heat. Additionally, the thermostat controls in the building maintain a constant temperature at all times.

Installation of an outdoor reset control will permit modulation of the heating loop temperature with both outside air temperature and building occupancy. Installation of a night setback thermostat will permit the space temperature to be lowered automatically during the heating season when the building is unoccupied.

### **ECM 301: Replace Incandescent Lighting – Interior**

There are several incandescent lamps in use in the building.

Replace the incandescent bulbs with warm white, instant start, compact fluorescent lamps. If the recommended lamp sizes do not fit, use a smaller size. For recessed fixtures, lamp extenders may be required.

### **ECM 304: Install T-8 Fluorescent Lamps and Ballasts**

Most manufacturers of fluorescent lamps now offer energy saving T-8 lamps that are designed to be used with T-8 electronic ballasts. T-8 fluorescent systems use about 25% less energy than the 34-watt lamps now in use. Electronic ballasts do not produce the “flicker” associated with magnetic ballasts and therefore light quality is improved.

Electronic ballasts transform the electrical characteristics of the power supply into those needed by the lamps. Ballasts consume energy whether or not lamps are connected to them. Electronic ballasts not only use less energy but also enable the lamps to use less energy because of modified electrical characteristics. All T-12 lamps and ballasts should be replaced with like T-8 units. Reflectors and lenses should be cleaned at the time of ballast and lamp replacement.

### **ECM 325: Install LED Exit Signs**

The existing exit signs are lit with two 15-watt incandescent lights.

Replace the existing incandescent lamps with an LED rebuild kit. The LED lamps draw only 2 watts each, and last 25 years. Alternately, the exit signs can be replaced with LED exit signs.

### **ECM 332: Install Occupancy Sensors**

During the survey it was observed that there are many areas that would be good candidates for automatic lighting controls once the building is re-occupied.

For areas where occupants are in line of site of the wall switch, install infrared sensors mounted in wall-switch boxes. Install ultrasonic ceiling-mounted sensors in spaces where occupants are not in line of site of the wall switch. Set time delays for 6 minutes in offices, 30 minutes in toilet rooms and 20 minutes in corridors.

Send an administrative notice to instruct all personnel to switch lights off as they leave the room using the existing wall switches or the button on the sensor. Automatic off operation should be used only when occupants forget to turn off the lights manually.

In mechanical areas, except boiler, chiller, generator and switchgear rooms, use digital time switches. These units flash one minute before they turn off, providing occupants with time to reset them.

## FUNDING RECOMMENDATIONS

### ALTERNATIVE METHODS FOR THE FEDERAL GOVERNMENT TO FINANCE AND IMPLEMENT ENERGY EFFICIENT PROJECTS<sup>1</sup>

To meet the ambitious requirements of Federal energy management legislation, the Federal government can access five sources of financing (four available nationally and one available in New York State only) to fund energy efficiency project implementation

1. Agency Capital Funds (Direct Appropriations)
2. FEMP's Federal Energy Efficiency Fund (FEEF)
3. Utility Incentives
4. Energy Saving Performance Contracts (ESPC)
5. The New York Energy Research and Development Authority (NYSERDA).

#### 1. AGENCY CAPITAL FUNDS (DIRECT APPROPRIATIONS)

Historically, Federal appropriations have provided the bulk of energy efficiency financing for government agencies. To encourage agencies to invest in energy efficiency, EPACT permits agencies to retain a portion of the savings produced by energy efficient projects. Despite the incentive, energy efficiency continues to receive a low priority in the budget process of many agencies. The lack of adequate funding is one of the main constraints to improved energy efficiency.

##### *Advantages*

Direct appropriations allow the Federal government to retain all of the savings from cost effective renovations and so not incur any interest charge. Since the government's appropriated funds are sourced through tax revenue or bonds, the "cost" to appropriate these funds is lower than the cost to borrow money from a bank or a financial institution. This approach also enables the agency to implement an energy efficiency project with minimal contractual obligations on the government's part.

##### *Disadvantages*

Larger renovations, even if they are cost-effective, require submission and approval through the Federal budget process. Some renovations for energy efficiency financed by any of the other financing mechanisms would have reached break-even point and would be in the profit mode before large renovations could be financed and constructed through the budget cycle. However,

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<sup>1</sup> Items 1-4 from Energy Savings Performance Contracting Guidance Manual, Version 1.0.

agency appropriation is highly preferable to the do-nothing choice and is life-cycle cost-effective for Federal agencies.

With the government's intent to reduce the deficit appropriations for energy and facility-related projects, which are not directly related to agency mission, may not be funded or may be delayed. Funding for specific projects may be rejected if the payback period is too long.

## **2. FEDERAL ENERGY EFFICIENCY FUND**

Section 546(b) of NECPA, as amended by EPACT, directs DOE to establish a Federal Energy Efficiency Fund (FEEF or Fund) to provide grants to agencies to assist them in meeting the mandated energy management requirements. The legislation anticipated that these funds would enhance and stimulate other funding sources, such as agency appropriations, utility demand side management incentives, and Energy Savings Performance Contracts.

The factors to be considered in determining whether to provide funding for proposals include:

1. The cost-effectiveness of the project.
2. The amount of energy and cost savings anticipated to the Federal government.
3. The amount of funding committed to the project by the agency requesting financial assistance.
4. The extent that a proposal leverages financing from other non-Federal sources.
5. Any other factor which DOE determines will result in the greatest amount of energy and cost savings to the Federal government.

The FEEF also allows agencies to apply for grant funds to support facility audits.

### ***Advantages***

FEEF is a source of capital that will be appropriated to DOE specifically for grants to agencies and it is expected to grow. It is available to agencies based on the competitiveness of the proposals submitted. All cost-effective energy and water-saving technologies can be proposed. Grant funding can cover all aspects of the projects, including all the costs related to getting an Energy Savings Performance Contract in place.

Due to the continuous competitive evaluation process, proposals may be submitted at any time of the year. Funding is provided by interagency agreement upon completion of evaluation and determination to award.

### *Disadvantages*

Only the best proposals will receive funding. Those proposals which are marginally cost-effective are not likely to receive funding.

### **3. UTILITY INCENTIVES - DEMAND SIDE MANAGEMENT (DSM) PROGRAMS**

Utility companies offer financial or other incentives to their customers to install energy efficient equipment, or construct more energy efficient buildings, since reducing demand or load growth is more cost effective than constructing a new power plant or increasing transmission and distribution systems. In addition, particularly investor-owned and regulated utilities commonly receive approval from regulatory commissions to earn incentives or profits on demand side management (DSM) investments. Utility DSM programs provide a technical resource or source of funding that can be leveraged to help implement an energy project.

Federal agencies are encouraged and authorized to participate in utility DSM programs by EPACT which stated that:

- Agencies are authorized and encouraged to participate in programs to increase energy efficiency and for water conservation or the management of electricity demand conducted by gas, water or electric utilities and generally available to customers of such utilities.
- Each agency may accept financial incentive, goods or services generally available from any such utility, to increase energy efficiency or to conserve water or manage electricity demand.
- Each agency is encouraged to enter into negotiations with electric, water, and gas utilities to design cost-effective demand management and conservation incentive programs to address the unique needs of each agency's facilities.
- If an agency satisfies the criteria, which generally apply to other customers of a utility incentive program, such agency may not be denied collection of rebates or other incentives.

Utility DSM programs can be grouped into three general categories:

1. Audits/Cost Sharing/Rebates
  2. Customized
  3. DSM Bidding
- 
1. Audits, cost sharing and rebates are made available to customers who conduct all activity to finance, design, and construct the energy project. Audits and financial incentives are usually made available to customers through an application process where the customer agrees to specific program requirements. For example, a rebate typically requires pre- and post-installation inspections by utility representatives to confirm energy efficient equipment conforms to DSM program requirements and are eligible for rebate payments. Audits may

be made available at no cost to the customer or cost-shared. Energy technology feasibility studies such as those for thermal energy storage systems, are commonly cost-shared. The common element is that these programs usually only require a written agreement to comply with program requirements and do not necessitate a modification to an existing utility contract or a new contract. Execution of energy projects is still accomplished by the utility customer (agency). For example, the agency would acquire funding, contract for, or create project design specifications, and complete project construction with a contractor.

2. Customized programs are programs where the utility offers a menu of services for its customers, which may include: facility audits, technical and price proposals, engineering analysis and project design, project financing, installation, commissioning and sometimes equipment maintenance. In this case, the customer (agency) enters into a contract directly with the utility company who provides some of the turnkey services, but typically contracts out most of the design, installation and maintenance requirements of the project. DSM financial incentives ("rebates/cost sharing") may take the form of buying down the capital cost of the project. Repayment to the utility is usually accomplished by a "service charge" on the utility bill over several years, where the utility charge is not more than the projected monthly cost savings of the energy project. Several agencies have implemented customized DSM programs, on a sole source basis, with the serving utility. Most have used Basic Ordering Agreements (BOAs), which are not contracts, but serve to establish applicability or scope (eg., all agency buildings within the utility service territory) and the terms and conditions of contracts generated from the BOA for specific projects implemented. For example, the General Services administration has signed a BOA with a California utility which can be used by all Federal agencies within the utility service territory.
3. DSM bidding programs are another mechanism a utility can use to acquire DSM load reduction benefits. In this case, the utility company issues a competitive solicitation from firms who can provide energy services to its customers. Firms, typically Energy Service Companies (ESCOs), that are awarded DSM bid contracts are required to deliver scheduled utility system load reductions (eg., deliver 5 Megawatts (MW) peak load reduction in 3 years for a sustained period of 10 years). In return the utility pays for demand reduction and energy savings at established rates of multiyear contract terms. The ESCOs awarded the DSM bid contracts are then expected to market their services to customers and enter into separate contracts with numerous customers to implement facility energy efficiency improvements to achieve scheduled delivery of energy savings and demand reductions to the utility. ESCOs or firms with DSM bid contracts are in a unique position to offer energy services where the utility payment they receive for delivered energy savings is a financial incentive they can pass on to contracted clients (ie., the utility and utility customer (agency) share in the cost of acquiring facility energy services over a multi-year contract term).

### ***Advantages***

This is a win-win situation. It is an excellent opportunity to leverage utility sector funds or technical services to implement energy projects. Utilities with DSM programs want to reduce the demand placed on their system and are willing to pay their customers to assist them in achieving long range cost avoidance to the utility of new power plant construction. Consider that DSM programs are costly to market and implement for utilities, therefore large customers, such

as Federal agencies, are attractive, as they may be able to achieve DSM program goals at less cost. As the prospects for retail wheeling of electrical power nears, it appears electric utilities are more willing to negotiate an incentive program that fits the customer's needs and offers high value services besides delivery of reliable power.

#### ***Disadvantages***

Rebate only programs will still require the agency to acquire agency capital funds to implement an energy project. Due to competitive forces in the market place, currently available DSM programs may be eliminated or reduced from their current level, and thus may not be available in the mid to long-term future.

***NOTE: In New York State the Public Service Commission has established a System Benefit charge, collected via a tariff on electric utility bills. This program covers most New York State utilities including Con Edison and Lipa. These utilities no longer operate their own DSM Programs, although they may offer to buy capacity in the form of conservation. The money is used to fund Energy Smart Programs, administered by the New York State Energy Research and Development Authority. The purpose of this approach is to establish uniform programs and delivery of services across the state. NYSEDA is discussed under item 5. The DSM discussion has been left intact in the event the PSC changes its mind in the future and DSM programs are once again established. Lipa does bid DSM load reductions.***

#### **4. ENERGY SAVINGS PERFORMANCE CONTRACTING**

In an ESPC, the ESCO (or contractor) incurs all costs of implementing energy savings measures, including:

- performing the audit
- designing the project
- acquiring and installing equipment
- training personnel
- operating and maintaining equipment

In exchange, the ESCO receives a share of any energy cost savings directly resulting from implementation of energy conservation measures during the term of the contract.

EPACT and the Executive Order strongly recommend this method of financing for energy efficiency projects. Specific provisions of EPACT provide that:

- Agencies are allowed to enter into contracts for 25 years without funding of cancellation charges.
- Congress is notified 30 days before awarding contracts in excess of \$750,000.
- Funds are available to cover ESPC payments in the first fiscal year.
- DOE is directed to establish a pre-qualified list.
- ESCOs incur costs of conservation measures for a share of the savings.

- Payments are to be made from the utility and related operation and maintenance funds.
- ESCOs guarantee savings to agencies.
- DOE is directed, by rule, to establish methods and procedures for Federal agency use of ESPC.

FEMP has developed a list of firms from which agencies may select pre-qualified ESCOs for ESPC, as directed by EPACT and implemented by rule. The rule can be found in the *Code of Federal Regulations Title 10 Part 436*.

#### ***Advantages***

ESPC allows Federal agencies to update aging buildings systems, streamline operations, and train maintenance workers to reduce operating costs. ESPC can be used when:

- Updating aging equipment with newer more efficient products.
- Helping agencies meet the energy cost reduction goals of Executive Order 12902 and EPACT.
- Conserving nonrenewable fuels and achieving environmental benefits by reducing energy consumption.
- Reducing utility costs without sacrificing service.

ESPC allows agencies to implement energy saving projects at its facilities if agency funding or other sources are not available.

#### ***Disadvantages***

The government does not immediately retain all the savings a project generates as it would if the project were funded by direct appropriations.

### **5. NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY (NYSERDA)**

The New York State Energy Research and Development Authority is currently operating an "Energy Smart" Program, funded by system benefit charges collected on electric utility bills. Programs include a New Construction Program and a Low Interest Loan Program. The New Construction Program is targeted at new construction and buildings undergoing substantial renovation. Rebates are offered for pre-qualified conservation measures. For custom measures, the program pays offset design review and energy conservation improvement analysis services, paying up to \$10,000 in fees per building and 50% of fees in excess of \$10,000. Qualifying conservation measures are eligible for rebates of up to 70% of the incremental cost differential between standard systems and the proposed systems. Rebates of 80% are available for green buildings. The loan program provides an interest buydown of about 4% for loans of up to \$100,000 and durations of five years or less. A percentage of the loan must be for energy improvements that save electricity.

### *Advantages*

The NYSERDA programs substantially reduce the incremental first cost of acquiring high efficiency building equipment.

### *Disadvantages*

The above NYSERDA programs are primarily targeted at electric energy savings. They cannot be used for gas or oil saving measures, or fuel switching. The New Construction Program has a \$250,000 agency cap for rebates; the Loan Program has a \$100,000 cap.

## **COMBINATIONS OF THE FIVE TYPES OF FINANCING**

Using a combination of the five financing methods to reduce energy costs may be the best strategy. For example, if a facility can utilize an advanced technology, such as microturbines, yet the system's economics exceed the agency's maximum payback period, a FEEF grant can be combined with agency funds to install the system. Another example may involve the replacement of an aged chiller. NYSERDA new construction program rebates for the installation of an energy efficient chiller can be combined with an ESPC and eliminate the need to use government funding. Also, an agency with limited technical and procurement staff to develop an ESPC solicitation could apply for a FEEF grant to pay for a facility audit and technical support.

## FINANCING SUMMARY

| ECM# | ECM Description               | Recommended Financing |
|------|-------------------------------|-----------------------|
| 101  | Install Attic Insulation      | In House              |
| 102  | Install Ceiling Insulation    | In House              |
| 105  | Install Wall Insulation       | ESPC/FEEF             |
| 110  | Repair/Replace Windows        | ESPC/FEEF             |
| 120  | Repair/Replace Doors          | In House              |
| 125  | Weatherstrip Doors            | In House              |
| 141  | Install Fireplace Doors       | In House              |
| 233  | Install Night Setback         | ESPC/FEEF             |
| 301  | Replace Incandescent Lighting | ESPC/NYSERDA          |
| 304  | Replace Lamps/Ballasts        | ESPC/NYSERDA          |
| 310  | Replace Exterior Incandescent | ESPC/NYSERDA          |
| 325  | Replace Exit Signs            | ESPC/NYSERDA          |
| 332  | Install Occupancy Sensors     | ESPC/NYSERDA          |
| 418  | Convert DHW                   | In House              |
| 508  | Install Gas Fired Dryers      | In House              |

## **ACTION PLAN RECOMMENDATIONS**

The recommended ECM's should be reviewed and refined in consultation with the Energy Advisory Council. Acceptable ECM's should be subject to further scrutiny before implementation. A more detailed take off should be undertaken to verify quantities and installation cost, and the savings potential should be reviewed.

Water consumption costs for the buildings are minimal. Additionally, no major leaks or inefficiencies were found during the audit. A detailed water conservation study is not recommended. Low flow aerators are inexpensive and can be used to reduce heating water costs. Additionally, low flow fixtures should be installed by attrition.

