

**JFK – Building 64**112(Bldg1LL02

**Lighting Vault 6**

**AMI Infrastructure & Meter Installation**

**Work plan**

**PANYNJ Project**

**August 2009**



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**Table of Contents**

[1 Executive Summary 1](#_Toc239175731)

[2 Background 1](#_Toc239175732)

[3 Cost - Benefit Analysis 2](#_Toc239175733)

[4 General Overview 2](#_Toc239175734)

[5 Required Components 3](#_Toc239175735)

[6 Prerequisites 3](#_Toc239175736)

[7 Network Topology 4](#_Toc239175737)

[8 PA Responsibilities 5](#_Toc239175738)

[9 Bldg 64 (Lighting Vault 6) Responsibilities 5](#_Toc239175739)

[10 Genergy Responsibilities 5](#_Toc239175740)

[11 Subcontractors & Responsibilities 6](#_Toc239175741)

[11.1 Electrical Subcontractor 6](#_Toc239175742)

[11.2 Scope of Work - Electrical 6](#_Toc239175743)

[12 Key Genergy Project Personnel 7](#_Toc239175744)

[13 Site Contact Information 7](#_Toc239175745)

|  |  |
| --- | --- |
| **APPENDIX A –** | **Project Budget** |
| **APPENDIX B –** | **Project Schedule** |
| **APPENDIX C –** | **Electric Meter Specs & Connection Details** |
| **APPENDIX D –** | **Custom Electric Meter Interface Cabinet Hardware Specs** |
| **APPENDIX E –** | **CAT 5E Cable Specs** |
| **APPENDIX F –** | **THHN Cable Specs** |
| **APPENDIX G –** | **Wireless Antenna Specs** |
| **APPENDIX H –** | **Coaxial Wireless Antenna Cable Specs** |
| **APPENDIX I –** | **Conduit Specs** |
| **APPENDIX J –** | **Miscellaneous Electrical Hardware & Fire Stop Specs** |
| **APPENDIX K –** | **Network Topology** |
| **APPENDIX L –** | **Insurance Certificates** |
| **APPENDIX M –** | **Project Risk Assessment** |
| **APPENDIX N –** | **MBE/WBE Participation Plan** |
| **APPENDIX O –** | **Site Access & Security Plan** |

# Executive Summary

This Work Plan presents the detailed design specifications and plans for the installation of a utility management system at John F. Kennedy International Airport (JFK) Building 64 (Lighting Vault 6) which will allow the Port Authority (PA) to remotely view, monitor, analyze and bill for electricity. This will include the installation of four (4) new electrical meters with the installation of an EMIC based advanced metering infrastructure (AMI). The end result will be a database of historical demand and usage data along with accurate and timely utility billing each month for the loads being fed from Lighting Vault 6. The data collector in this location will also serve as a receiver for signals from other surrounding buildings as part of a fault tolerant mesh network for data communication.

This document was prepared in accordance with Supplemental Agreement No. 1 to the “Contract for Utility Consumption Measurement, Billing and Related Services”, Contract # 4600006176, PO # 450044794 awarded to Genergy by the PA in February of 2006.

# Background

In February of 2006, Genergy was awarded the contract to perform reading and billing services for the PA at most of their New York facilities including JFK. After performing an exhaustive search of the existing meters and meter locations and establishing a data base of both confirmed and unconfirmed meter information, Genergy systematically phased out the existing contractor (URA) and began to provide meter reading and billing services to the PA and their tenants.

Electricity usage is measured in two ways - consumption or kilowatt-hours (kWh) and demand or kilowatts (kW).

Consumption or usage (kWh) is defined as the actual amount of electricity used in 1 hour. For example, if ten 100 watt lamps are left on for 1 hour, the usage would be 1 kilowatt-hour. Utility companies charge their customers from 10¢ to 20¢ cents or more for each kWh consumed.

The metering of consumption (kWh) is very simple and straight forward and similar to a car odometer. Each time the meter records 1 kWh of consumption, the reading on the meter increases by 1. The usage is then determined by subtracting the previous months reading from the current months reading and is billed accordingly.

Demand (kW) is defined as the rate at which electricity is used. For example, if you turned on ten 100 watt lamps they would consume electricity at the rate of 1000 watts (1 kW). Utility companies are required to provide enough electricity to meet their customer’s peak demand, and as such, they charge their customers for the highest demand during any 2 consecutive 15 minute intervals of the billing cycle at a rate of $15 to $22 per kW.

The metering of demand (kW) is similar to a car speedometer that records the highest speed driven. Demand can only increase and once the demand meter is read at the end of the billing cycle, it is reset and the process begins again. For example, if you turned on ten 100 watt lamps for at least 30 minutes (2 consecutive 15 minute intervals) the demand would be 1 kW. If you turned on eleven 100 watt lamps the next day, for at least 30 minutes, the demand would increase by 0.1 kW to 1.1 kW and you would be charged accordingly even if you turned off all the lamps for the remainder of the billing cycle.

These are examples of a single meter and a single load. In many cases, there are sub-meters involved which make it very difficult to accurately determine the demand for each individual tenant.

There will be a total of (4) new electric meters required at Bldg 64 (Lighting Vault 6). These will be connected to, and monitor via current transformers, the secondary side of the distribution transformer.

At the end of each billing period, the Genergy EMP system will compile the consumption readings and kW or demand readings for the electrical meters and then record that information for our analysts to generate invoices. For consumption, this is a straight forward process.

# Cost - Benefit Analysis

**Cost & Timeframe:**

The total cost of this work, including engineering costs, is not to exceed **$39,190** (see Appendix A) + a 15% Risk Contingency and take no more than 45 working days or 9 weeks (see Appendix B) to complete. A detailed breakdown of the required work can be found in the project schedule.

**Benefits:**

With the installation of the AMI, it will be possible to monitor the electricity usage of the loads being fed from Lighting Vault 6. The EMIC in this location will also serve as a receiver for signals from other surrounding buildings as part of a fault tolerant mesh network for data communication. In addition, once the remote system is operational, the PA will receive a discount of 50¢ per meter per month as provided in the current meter reading contract.

# General Overview

The required metering to be installed is as follows:

* Lighting Vault 6 (4) new electric meter

The new utility meters will all be connected to the gEnergyOne® EMP system so that all the utility data can be reported and managed remotely. In addition, the electric meter multiplier question will be resolved.

Once the entire system is tested and verified as functional, the PA will be notified that the installation is complete.

The project will proceed as detailed in the schedule shown in Appendix B.

# Required Components

The major hardware components required are:

Qty 2 – Itron Sentinel Smart Meters

(See Appendix C - Itron Sentinel Specs & Connection Details)

Qty 2 – Nexus Meter Smart Meters

(See Appendix C – Nexus Meter Specs & Connection Details)

Qty 1 - Custom Electric Meter Interface Cabinet (Data Collector Cabinet)

(See Appendix D - EMIC Hardware Specs)

Qty 1 - Electric Meter Ethernet Cables

(See Appendix E - Cat 5e Cable Specs)

Qty 1 – THHN Cabling (black, white, green)

(See Appendix F – THHN Cable Specs)

Qty 2 – Wireless Antenna

(See Appendix G – Wireless Antenna Specs)

Qty 2– Coaxial Wireless Antenna Cables

(See Appendix H– Coaxial Wireless Antenna Specs)

Qty 1 – Wireless Radio Cabinet

(See Appendix I – Wireless Radio Cabinet Specs)

Qty 1- RGS and EMT Conduit

(See Appendix J - Conduit Specs)

Qty 1 - Miscellaneous Electrical Hardware

(See Appendix K - electrical boxes, conduit hangers, compression fittings, wire nuts, fire stop material, J-Hooks)

All miscellaneous electrical hardware will be provided by Unity Electric.

# Prerequisites

In order for this TAA to be undertaken, the following change requests must be approved prior to the start of any work.

**PA Change Request Approval Prerequisites:**

1. Approval of Change Request **C13017-0006A** to amend the scope of the project to include the development of architectural background drawings in AutoCAD. In order to produce the aforementioned sets the following tasks were performed: coordination of access to the site and proposed work areas, investigation into the availability of existing architectural / engineering drawings, drafting of architectural plans in AutoCAD, and surveying to verify accuracy of the architectural backgrounds.
2. Approval of Change Request **C13017-0006B** to amend the scope of the project to include the development and installation of a wireless mesh network. In order to accomplish this goal the following tasks were performed: design of wireless mesh network, validation of wireless network by conducting an exhaustive wireless survey, development and specification of specialty equipment and enclosures, production of construction documents, purchasing and installation of specialty equipment and enclosures, and the performing of required additional programming, testing, and configuration.

The following is a breakdown of the other prerequisites that will need to be completed prior to the start of any work.

**Engineering Review and Drawings:**

Genergy will arrange for all drawings to be reviewed by AG Consulting Engineering, a NYS Licensed Professional Engineering Firm. The results of the review will be submitted to the PANYNJ for comments. Any alterations or additions will be incorporated into the drawing set and all drawings will be stamped and signed by AG Consulting Engineering. The engineering services provided will include:

1. Building walk through to survey the existing conditions and to verify design information (meter numbers, network connections, room details, etc.)
2. Development of a single-line diagram identifying the location of all meters and equipment.
3. Preparation of floor plan drawings showing the proposed installation details for the new meters in each location.
4. Production of sets of signed and sealed drawings plus workplan and TAA documents will be submitted to the PANYNJ for final review and approval.
5. Walk-thru to be performed to punch-list list work progress during construction.
6. Attendance by the engineer of record at the PANYNJ pre-construction & post-construction meetings.

The items above will be undertaken as shown in the schedule in Appendix B.

The PA requires that the electrical closets and ceiling areas above them be free of any asbestos containing materials (ACM). Upon an initial walk-thru of at Bldg 64 (Lighting Vault 6), there does not appear to be any asbestos insulation present in the proposed work areas. An asbestos inspection report will be provided with the work plan along with a plan for asbestos abatement (if required). All work areas are unpainted concrete block or poured concrete, so lead paint will not be an issue.

# Network Topology

A static network IP address is required for each electrical meter and EMIC in order for the AMI system to be implemented. These addresses need to be assigned and recorded as part of the installation process. In addition, there may be some firewall requirements, specific to the PANYNJ which will require the MAC address of each network adapter to be entered into an authorized communication access table. Genergy Inc. is responsible for assigning fixed IP addresses for the EMIC cabinets, via a Verizon DSL connection to be installed outside of the scope of these documents. If future needs dictate that the AMI system is required to be on the Port Authority fiber optic wide area network, then the system can be upgraded to facilitate this connectivity in the future.

A diagram of the proposed Bldg 64 (Lighting Vault 6) network topology is attached in Appendix L.

# PA Responsibilities

The PANYNJ will be responsible for the following:

1. Coordinating and executing switchgear shut-downs as required.
2. Installing and sealing new barrel locks on all new meter pans.

As agreed with Jim Gravina of the PANYNJ Electrical Maintenance Group – they will install the locks as listed above.

# Bldg 64 (Lighting Vault 6) Responsibilities

The management of Building 64 will be responsible for providing the following:

1. A secure storage area for project tools and materials within or adjacent to Building 64
2. Timely provision of escorts, if and when required, for walk-thru
3. Access to 120vAC power outlets for power tools, lighting, etc.
4. A cover letter requesting authorization for the project
5. A letter naming the Engineer of Record for the project

# Genergy Responsibilities

Genergy will be responsible for the following:

* overall project co-ordination
* arrange to hire a facility approved security guard for all night work
* scheduling and obtaining permission for utility shutdowns & overtime work
* escorts for project personnel, as required
* project tracking, reporting and invoicing
* supply of all electric meters (subject to purchase authorization from the PA) - meter signal and power cables to be pre terminated with connectors (see Appendix C)
* supply of all EMIC boxes (subject to purchase authorization from the PA)
* installation of all new electric meters
* disposal of all old electric meters
* programming of all electric meters
* programming of all EMICs
* site cleanup, as required
* a Site Access & Security Plan for the project (see Appendix S)
* an asbestos and lead paint survey report and abatement plan (if required)

Notes:

* all work to be done during regular business
* Genergy employees working in Bldg 64 (Lighting Vault 6) must have a valid JFK security ID.
* Genergy must provide a valid certificate of insurance (See Appendix M)

# Subcontractors & Responsibilities

## Electrical Subcontractor

**Unity Electric**

Steve Cuocci - Site Project Manager

65-45 Fresh Meadow Lane

Flushing, NY 11365

**C:** 917-488-0583

**F:** 718-539-8413

**E-mail:** [scuocci@unityig.com](mailto:scuocci@unityig.com)

## Scope of Work - Electrical

Unity will be responsible for the following:

* Installation of all conduit cabling.
* Installation and wiring of meter pans.
* Installation of all required pull boxes, supports, J-hooks and straps as specified by the NEC & New York City Electrical Codes.
* Installation of fire stopping materials at all fire wall penetrations as specified
* Pulling of all 120vAC wiring, low voltage signal cabling
* Installation of EMIC boxes at locations as specified
* Termination and connection of -120vAC wires, signal cables, and Ethernet cables (RJ45 M/F)
* Labeling of all cables and wires as specified in the table below
* provision of all required tools and manpower, site cleanup, as required
* Co-ordination of all power shutdowns if required for installation.
* Installation of meters for building 64.
* Provision of all required tools and manpower
* Site cleanup, as required

|  |  |
| --- | --- |
| **Cable / Wire Function** | **Label** |
|  |  |
| Electric Meter 24vDC Power Cable (Nexus 1262 only) | EM1P, EM2P, EM3P … EMnP |
| Electric Meter Ethernet Cable | EM1E, EM2E, EM2E … EMnE |
| 120vAC Line | P1L, P2L, P3L … PnL |
| 120vAC Neutral | P1N, P2N, P3N … PnG |
| 120vAC Ground | P1G, P2G, P3G … PnG |

Where: **EMn** = electric meter number

**Pn** = EMIC number

**xxx-xxx** = Room Number

# Key Genergy Project Personnel

* Mark Williams - Senior Project Manager

**C:** 845-216-7554 **e-mail:** [mark.williams@genergy.com](mailto:mark.williams@genergy.com)

##### Dave White – Field Project Manager

**C:** 914-438-1364 **e-mail:** [dave.white@genergy.com](mailto:dave.white@genergy.com)

* Jarret Stahl - Data Automation Engineer

**C:** 646-261-8034 **e-mail:** [jarret.stahl@genergy.com](mailto:jarret.stahl@genergy.com)

* Nick Zanchelli - Metering Engineer (Subcontractor Liaison)

**C:** 914-659-7750 **e-mail:** [nicholas.zanchelli@genergy.com](mailto:nicholas.zanchelli@genergy.com)

# Site Contact Information

The following is the contact information for the subcontractor and PA site personnel:

* Tony Micelli – PA Facility **C:** 718-244-4550
* Steve Cuocci - Unity Electric **C:** 718-685-3415
* David Obradovich - PA Project Mgr **C:** 646-530-3426
* Jim Steven - PA JFK Redevelopment **C:** 718-244-4502
* Enrico Socci - PA Engineering **O:** 718-244-4386

# Appendix A - Project Budget

The project schedule for this work shall not exceed **$39,190** 45 working days (9 weeks) in duration from start to finish (excluding the time for the PA approval cycle), broken down as follows:

The approved PA rate schedule is attached below for reference:

|  |  |
| --- | --- |
| **Position Description** | **Rate $/Hr** |
|  |  |
| Field Surveyor | $90 |
| Local 3 A Journeyman | $130 |
| Teams Coordination Engineer | $120 |
|  |  |
| Senior CAD Technician | $90 |
| CAD Technician | $75 |
|  |  |
| Meter Field Tech | $90 |
| Metering Engineer - Problem Resolution Specialist | $150 |
| Meter / Data Automation Engineer | $160 |
|  |  |
| IT Systems Engineer | $120 |
| IT Specialist – Administrator | $90 |
| Software Programmer | $150 |
| General Administrative Support | $70 |
|  |  |
| Senior Project Manager | $175 |
| Electrical Engineer - Project Manager | $150 |

The project work will include the following:

**Survey Site & Gather Plans**

* Take photos of electrical and water meter rooms
* Take measurements to establish meter and EMIC box placements
* Estimate length and routing of cable runs - electrical & communication
* Work with building management & the PA to get architectural drawings, if possible
* If drawings unavailable - site must be measured, photographed & drawn
* Survey for presence of asbestos and lead paint
* Determine if DSL or fiber to be used for network connection - consult with PA-TSD

**Walk-Thru with Engineer**

* Review site survey info to ensure it is complete
* Get feedback from engineer on any specific requirements
* Visit all installation locations, electrical rooms and communication rooms

**Create CAD Drawings**

* Combine field survey data with architectural site drawings
* Incorporate specific requirements identified by engineer during walk-thru
* Identify all low voltage panels and breakers to be used
* Compare finished drawings to actual site to identify any discrepancies

**Walk-Thru with Contractors**

* Identify qualified contractor(s) as bid candidate(s)
* Provide a drawing package and material list
* Solicit feedback from contractor(s) on any info missing from package
* Arrange walk-thru(s) of the site with CAD drawings
* Get bid(s) - keep 17% MBE/WBE target in mind

**Create Work plan**

* Incorporate feedback and pricing from contractor(s) in the work plan
* Update drawings with any additional information required
* Get written approval from tenant for use of any existing building infrastructure
* Get insurance certificates from selected subcontractors
* Updated Genergy insurance with rider to include current project

**Work plan Revisions & Stamp Drawings**

* Make any work plan revisions requested by the PA and/or tenant
* Review final drawings with engineer and have them signed and sealed
* Get TAA application form (3 copies) signed by building management
* Get TAA application letter signed & submitted by building management
* Get asbestos & lead paint letters from building management, if required

# Appendix B - Project Schedule

**Submit Work plan for PA Approval** (estimated to be 10 working days for PA approval)

* Request a TAA number be assigned by PA Engineering
* Submit a signed TAA application form from the building management
* Submit 14 copies of the TAA work plan and stamped construction drawings
* Submit 14 copies of signed & sealed project drawings
* Submit completed insurance questionnaire
* Submit insurance certificates for all subcontractors
* Submit an MBE/WBE plan for all subcontractors involved
* Submit a site security and access plan
* Make changes and/or updates, as required
* Get Alteration Permit from the PA Resident Engineers Office
* Schedule a pre-construction meeting with all involved parties

**Install Communication Lines**

* Work with PA-TSD to identify PAWANET connection points, if required
* Request fixed IP addresses for EMICs from PA-TSD
* Install and test internet connections at each meter location
* Note fixed IP address information for later system configuration

**Install EMIC Boxes**

* Mount EMIC boxes in predetermined locations for connection to meters
* Ensure all internal components are installed, wired and labelled correctly

**Install Conduit and Pull Cables**

* Install rigid conduit per NYC and NEC electrical codes
* Follow routing specified in installation drawings
* Pull power, communication cables and fibber as required
* Connect to specified breakers in low voltage panels
* Connect to specified communication room DSL/fibber line
* Notify building management in advance if any power shutdown is required

**Connect Power & Communications - Test**

* Connect the 120vAC wiring to the EMIC and test power
* Connect optical fibber cable to EMIC and test communication
* Verify communications both up and down to the EMP

**Install Electric Meters - Program & Test**

* Switch existing inline meter pan to bypass
* Remove and dispose of old electric meters
* Install new in line plug type meter pans
* Pull Ethernet, meter signal and meter power cables from meter pans to EMIC box
* Connect 3 cables to meters (all connectors are different)
* Plug in new meter
* Program meter
* Test all meter functions with built-in meter diagnostics
* Connect 3 meter cables to EMIC terminal blocks
* Test communications and power measurement functionality back to the EMIC

**Program EMICs - Test & Label**

* Install software to enable proper data communication, storage and transmission
* Test and validate all system functionality
* Label water meters to correspond to Ether Meter inputs
* Label electric meters to correspond to EMIC inputs + feeder #
* Add door label with all IP & MAC addresses
* Verify status LED indicates no errors
* Verify proper communication of data to and from the EMP

**Update Drawings to As-Built**

* Review redline drawing mark-ups provided by contractors
* Add field information to drawings - IP addresses, meter numbers, multipliers, etc.
* Final inspection walk-thru with engineer of record
* Get final as-built drawings signed and sealed by engineer of record
* Get project inspection and approval letter from engineer of record

**Construction Completion**

* Submit stamped and sealed final inspection letter from engineer of record
* Schedule final site inspection by the PA Resident Engineers Office
* Submit stamped as-built drawings and final documentation to the PA on CD
* Get certificate of completion from the PA Resident Engineers Office

**Integrate System into the EMP**

* Setup and initialize meter accounts in Utility Manager
* Label all EMICs with meter numbers, IP & MAC addresses
* Validate end-to-end functionality of the system
* Sample & validate data received from the field

**System Testing & Commissioning**

* Validate proper system installation, programming & configuration
* Validate proper system data display for all meters
* Sample & validate data received from the field for two billing cycles
* Provide a commissioning report detailing test results

**System Delivery**

* Provide final data package (hardcopy + CD) to the PA for project completion
* Get signoff for project completion from PA Project Manager