



CITY OF HOUSTON

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October 30, 2013

SUBJECT: Letter of Clarification No. 1 On-Call Preventive Maintenance and Repair Services of Electric 138KV Substations for the Public Works and Engineering Department

REFERENCE: Invitation to Bid No. S30-L24769

TO: All Prospective Proposers:

This Letter of Clarification is issued for the following reasons:

• **To revise the above referenced solicitation as follows:**

1. Delete Pages 7, 23 and 27 of 52 and replace with pages 7, 23 and 27 of 52 marked Revised October 30, 2013.
2. Add Pages 27A – 27U of 52 marked Revised October 30, 2013.

When issued, Letter(s) of Clarification shall automatically become a part of the proposal documents and shall supersede any previous specification(s) and/or provision(s) in conflict with the Letter(s) of Clarification. All revisions, responses, and answers incorporated into the Letter(s) of Clarification are collaboratively from both the Strategic Purchasing Division and the applicable City Department(s). It is the responsibility of the proposers to ensure that it has obtained all such letter(s). By submitting a proposal on this project, proposers shall be deemed to have received all Letter(s) of Clarification and to have incorporated them into this proposal.

If you have any questions or if further clarification is needed regarding this Request for Proposal, please contact me.

Richard Morris

Richard Morris
Senior Procurement Specialist
Strategic Purchasing Division
832-393-8736

Attached Revised Pages: 7, 23, 27 and 27A-27U marked Revised October 30, 2013

END OF LETTER OF CLARIFICATION 1

Revised October 30, 2013
SECTION B
SCOPE OF WORK/SPECIFICATIONS

- 1.0 Scope of Services:
The Contractor shall furnish all supervision, labor, parts, tools, materials, transportation, equipment, supplies, and facilities necessary to provide on-call electrical preventive maintenance and inspection services as well as un-scheduled repair services for 138 KV Substations and other High/Medium Voltage electrical equipment at various Drinking Water Operations and Wastewater Operations facilities of City of Houston. Contractor will be responsible to provide interim equipment necessary to maintain operations during the repair. The nominal system voltages are as listed in IEEE Std 141-1993 (IEEE Red Book), Table 3-3.
- 1.1 The contractor shall perform Scheduling of Switching with Center Point RTO (Real Time Operator), Receive All Required Switching Instructions from RTO, Perform All Required Switching, and Make All Required Confirmation upon Switching Competition to RTO. **Upon request, the contractor will perform an Arc-Flash study on equipment listed within this contract and install signage indicating the Cal-Rating, Approach Boundaries and Required PPE for each piece of equipment, according to NFPA 70E.** The contractor will make changes to substation relays setting provided by the city as requested.
- 1.2 The contractor shall provide the following information on all service tickets: Name of the technician and technician's current skill level. Verification of technical skill level may be requested of the vendor on an as needed basis, and will be included on the service ticket. The contractor shall perform preventive maintenance work upon written request and on a schedule defined by the UDR. There shall be no verbal scheduling with the exception of emergencies and all emergency requests shall be confirmed by the vendor by the UDR via e-mail within 24-hours of the request.
- 2.0 Contractor Requirements and Responsibilities:
- 2.1 The Contractor shall be an independent, third party entity that can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems being evaluated. The Contractor shall have been regularly engaged in the testing of High, Medium, and Low voltage electrical equipment devices and systems for the last ten (10) years.
- 2.2 The meaning of some specific terms as used in this contract /specification are given in Exhibit A, Definitions. This specification defines minimum acceptable requirements for the repair of the units. This specification covers the general requirements for the maintenance and repair services for Four 138 KV Substations and Other High or Medium Voltage Equipment located at City of Houston facilities. This includes, but is not limited to, power transformers, oil circuit breakers, protective relays (mechanical and electronic types), motor control centers, batteries/battery chargers, UPS, air switches, bus ducts and enclosures, capacitor banks, air circuit breakers, power factor capacitors and lightning arrestors/capacitors. .
- 2.3 The work shall include monthly, quarterly, annual, and bi-annual scheduled electrical preventive maintenance and inspections, relay testing and calibrations, infrared inspections, load flow evaluation, protective relay evaluation and coordination, electrical grounding evaluation and correction, power quality analysis, un-scheduled corrective maintenance, and general electrical/mechanical work of the equipment at substations. Customers must be informed when contractors enter and exit the plant at all times. The Supplier will provide the City of Houston with a roster of these employees, and the roster must include the employee's full name, picture, and driver license number. Roster will be sent by electronic mail to PWE Security (Attn: Carlos Martinez) at carlos.martinez@houstontx.gov. Any changes to the roster must be forwarded to the City of Houston immediately upon change.

- 11.6 The imaging equipment shall be capable of detecting a minimum temperature difference of 1 deg C at 30 deg C.
- 11.7 Infrared inspections shall be performed during periods of maximum possible loading but not less than 40 percent of rated load of the electrical equipment being inspected. Refer to ANSI/NFPA 70B, Section 18-16 (Infrared Inspection).
- 12.0 **Protection and Coordination and Other Studies of Power Systems**
- 12.1 The Contractor shall, upon written request from UDR, perform Protection and Coordination and other studies of power system at a facility. The analysis and study shall be in accordance with the latest edition of the electrical codes applicable to the work performed. **Upon request, the contractor will perform an Arc-Flash study on equipment listed within this contract and install signage indicating the Cal-Rating, Approach Boundaries and Required PPE for each piece of equipment, according to NFPA 70E.**
- 12.2 The Contractor and/or the Sub-contractor's State licensed engineer shall perform the work and seal the final report. The engineer shall lead and may use other qualified persons to complete the work.
- 12.3 The studies may include part or all of the following:
12.3.1 Plant electrical power system survey and documentation.
12.3.2 Load flow and power factor correction.
12.3.3 Harmonic analysis, harmonic filtering, and filter design.
12.3.4 Grounding evaluation and measurements.
12.3.5 Motor starting evaluation.
12.3.6 Short circuit and device evaluation.
12.3.7 Protections from overload and short circuit.
12.3.8 Protective relay coordination.
- 12.4 The Contractor shall use Power Tools for Windows software version 3.8.10 or higher by SKM System Analysis for computer modeling of the power system for short circuit study and system coordination.
- 12.5 The Contractor shall furnish the City a written report of the work performed which shall include all relevant information about the system, phase currents as well as sequence currents, and recommendations. Also, the report shall include all settings for any metering devices that are included in the switchgear, motor, control centers, soft-starters, transformers, etc.
- 12.6 The Contractor shall furnish the City an electronic copy of the computer generated system one-line diagram clearly identifying individual equipment buses, the bus numbers, the device numbers, and the maximum available short-circuit current at each bus which shall include short-circuit current motor current contribution.
- 12.7 The Contractor shall furnish City six (6) bound copies of the completed protective device time-current coordination analysis. No more than two devices upstream or downstream of the point of interest shall be shown on a single log-log plot.
- 12.8 The Contractor shall call to the attention of the UDR any inadequacies and shall include recommendations for improvements.
- 12.9 The Contractor shall upon written request from the UDR provide and install energy monitoring (watt-hour meter) to monitor power consumption on Main Service Feeders, Switchgear or Motor Control Centers. These meters shall be calibrated to one-half percent (.5%).
- 13.0 **STANDARD RESPONSE TIMES**

schedule. In the event that the additional equipment, supplies, locations and/or services are not identical to the item(s) already under contract, the charges therefore will then be the Contractor's normal and customary charges or rates for the equipment, supplies, locations and/or services classified in the fee schedule.

22.0 ESTIMATED QUANTITIES NOT GUARANTEED:

22.1 The estimated quantities specified herein are not a guarantee of actual quantities, as the City does not guarantee any particular quantity of services during the term of this Contract. The quantities may vary depending upon the actual needs of the Department. The quantities specified herein are good faith estimates of usage during the term of this Contract. Therefore, the City shall not be liable for any contractual agreements/obligations the Contractor enters into based on the City purchasing all the quantities specified herein.

23.0 INTERLOCAL AGREEMENT:

23.1.1 Under the same terms and conditions hereunder, the Contract may be expanded to other government entities through inter-local agreements between the City of Houston and the respective government entity that encompass all or part of the products/services provided under this contract. Separate contracts will be drawn to reflect the needs of each participating entity.

24.0 WARRANTY OF SERVICES:

24.1 *Definitions:* "Acceptance" as used in this clause, means the act of an authorized representative of the City by which the City assumes for itself, approval of specific services, as partial or complete performance of the Contract.

24.2 "Correction" as used in this clause, means the elimination of a defect.

24.3 Notwithstanding inspection and acceptance by the City or any provision concerning the conclusiveness thereof, the Contractor warrants that all services performed under this Contract will, at the time of acceptance, be free from defects in workmanship and conform to the requirements of this Contract. The City shall give written notice of any defect or nonconformance to the Contractor within a one-year period from the date of acceptance by the City. This notice shall state either (1) that the Contractor shall correct or re-perform any defective or non-conforming services at no additional cost to the City, or (2) that the City does not require correction or re-performance.

24.4 If the Contractor is required to correct or re-perform, it shall be at no cost to the City, and any services corrected or re-performed by the Contractor shall be subject to this clause to the same extent as work initially performed. If the Contractor fails or refuses to correct or re-perform, the City may, by contract or otherwise correct or replace with similar services and charge to the Contractor the cost occasioned to the City thereby, or make an equitable adjustment in the Contract price.

25.0 CONTRACT COMPLIANCE

25.1 The City reserves the right to monitor this contract to ensure that the contractor is providing the goods or services required in strict accordance contract specifications as well as complying with the contract terms and conditions.

25.2 Monitoring may take the form of, but not limited to:

25.2.1 Inspection, testing, and/or sampling of goods delivered or to be delivered

25.2.2 Review of deliveries received for accuracy and timeliness

25.2.3 Review of Supplier's invoices for accuracy

25.2.4 Review of certifications and/or licenses

25.2.5 Site Visits

25.3 The Contract Compliance Section of the applicable department(s) shall be responsible for contract compliance

Revised October 30, 2013

26.0 PRE-PORMANCE MEETING

26.1 Subsequent to contract approval/execution, the contractors shall be required to attend a performance conformance. The Strategic Purchasing Division or the primary user department will host the pre-performance conference. The purpose of the pre-performance conference is for the contractor to introduced its project manager to the City staff and for City staff to introduce the contract en-users, contract compliance and accounts payable representatives.

Exhibit BB

The City's Drinking Water Operations equipment covered by this contract are listed below.

1.0 Plant 1, 2, & 3: 2500 Federal Road

1.1. Main Substation Outdoor Equipment:

All equipment and accessories are not limited to the following:

- a) 2 - 25/33/42 MVA OA/FA/FA Transformers.
- b) 4 - 138 KV Oil Circuit Breakers.
- c) 6 - 138 KV Potential Transformers.
- d) 12 - 138 KV Air Isolation Switches.
- e) 18 - 138 KV Lightning Arresters.
- f) 6 - 138 KV Reactors.
- g) 2 - 2000 amp frequency wave traps (coupling capacitors)
- h) 1 - Yard lighting system
- l) 1 - Lightning protection system
- j) 1 - grounding system
- k) 2 - 200 amp resistors grounding
- l) 1 - substation structures

1.2 Main Substation Indoor Equipment:

All equipment and accessories are not limited to the following:

- a) 49 - Cubicles & Buses
- b) 31 - Medium Voltage Circuit breakers
- c) 12 - 50/51 Protective Relays
- d) 4 - 50 G Protective Relays
- e) 2 - 86 Lock Out Relays
- f) 6 - 67 Protective Relays
- g) 2 - 67N Protective Relays
- h) 32 - SC -1 Current Relay (Gnd)
- l) 6 - CO-7 Ground Protective Relays
- j) 117 - CO-9 Protective Relays
- k) 41 - Breaker Trip Switches
- l) 4 - Voltmeter and Voltmeter Switch.
- m) 41 - Ammeter and Ammeter Switch.
- n) 16 - DS -63 Kilowatt Hour Meter
- o) 12 - 6 KV Lightning Arrester
- p) 12 - Surge Capacitor
- q) 10 - Potential Transformers 2400V-120V
- r) 179 - Current Transformers (different sizes)
- s) 1 - Substation Battery Bank
- t) 2 - Main Incoming Bus Ducts
- u) 2 - 1000 KVAC Capacitor Bank
- v) 2 - Plant 1 & 2, Feeder Termination (G & W Potheads 3-conductors) and Enclosures.
- w) 1 - Rectifier/charger

1.3 Distribution Motor Controller (P 401, P 402, P 403, P 404, P 405, P 406, & P 407)

All equipment and accessories are not limited to the following:

- 7 – 269 Plus Multilin
- 9 – 87 Differential relays
- 6 – SPM Relays
- 1- AC Voltmeter
- 1- AC Ammeter
- 7- Starter/Contactor
- 6- Basler : Manual voltage control
- 6- Basler: SCP- 250- 60
- 6- Basler: RA-70p-DV8
- lots- HOA, Stop/Start, resistors, relays, contactors, etc.

1.4 Plant 3, BSGR Transfer Pumps

All equipment and accessories at BSGR Switchgear are not limited to the following:

- 12 – Cubicles & Buses
- 2 – Fuse Disconnect Switches
- 3 – Disconnect Switches
- 6 – 269 Plus Relays Multilin
- 1 – 369 Relay Multilin
- 6-CP relays
- lots- HOA, stop/start, indicating lights, etc.

1.5 Plant 1 & 2, Intertie Switchgear, Main

All equipment and accessories are not limited to the following:

- a) 8 - Cubicles & Buses
- b) 6 - 67 Protective Relay (West CR-7)
- c) 2 - 67N Protective Relay (West CRP-7)
- d) 6 - 27/47 Protective Relay (Basler)
- e) 2 - 59 Protective Relay (West CV-8)
- f) 6 - 87 Differential Relay (West CA-16)
- g) 6 - 50/51 Protective Relay (West CO-7)
- h) 2 - 51N Protective Relay (West CO-7)
- i) 2 - Voltmeter and Voltmeter Sw
- j) 2 - Ammeter and Ammeter Sw
- k) 2 - Type D4B-2F Watt-Hour Meter
- l) 2 - Lock Out Relay 86
- m) 3 - Main Breaker Trip Sw
- n) 1 - Auto-Manual Transfer Sw
- o) 1 - Spare Breaker Trip 1200 A
- p) 4 - Potential Transformers
- q) 22 - Current Transformers (different sizes).
- r) 2-MG-6 relay
- s) 2-timing relay
- t) 3- Medium Voltage Circuit breakers
- u) 1- Battery Bank
- v) 1- Rectifier/charger

1.6 Motor Control Center No. 2

All equipment and accessories are not limited to the following:

- a) 1 - Metal Enclosed 4.16 KV unfused Switch.
- b) 1 - Metal Enclosed 4.16 KV fusible Switch.
- c) 8 - Nema Class E2, 4.16 KV Motor Controller
- d) 3 - 51 Protective Relay (West CO-7)
- e) 1 - 86 Lock Out Relay
- f) 1 - Shunt Trip
- g) 9 - 50G Protective Relay (West SC-1)
- h) 6 - Multilin 269 plus motor protection
- i) 2 - GE Multilin 369 motor protection
- j) 2 - Ammeter & Ammeter Sw
- k) 4 - Start/Stop/Emergency Sw
- l) 1 - Stop Sw
- m) 3 - Start/Stop Sw
- n) 9 - Current Transformer Gnd
- o) 33 - Current Transformers (different sizes)
- p) 7 - Control Power Transformer (CPT)
- q) 1 - Voltmeter & Voltmeter SW
- r) 3 - Potential Transformer

1.7 Motor Control Center No. 1

All equipment and accessories are not limited to the following:

- a) 1 - Metal Enclosed 4.16 KV unfused Switch.
- b) 1 - Metal Enclosed 4.16 KV fusible Switch.
- c) 6 - Nema Class E2, 4.16 KV Motor Controller
- d) 3 - 51 Protective Relay (West CO-7)
- e) 1 - 86 Lock Out Relay
- f) 1 - Shunt Trip
- g) 7 - 50G Protective Relay (West SC-1)
- h) 3 - Multilin 269 plus motor protection
- i) 2 - GE Multilin 369 Motor Protection
- j) 2 - Ammeter & Ammeter SW
- k) 3 - Start/Stop/Emergency SW
- l) 1 - Stop SW
- m) 3 - Start/Stop SW
- n) 7 - Current Transformer Gnd
- o) 27 - Current Transformers (different sizes)
- p) 6 - Control Power Transformer (CPT)
- q) 1 - Voltmeter & Voltmeter SW
- r) 3 - Potential Transformer

1.8 Plant 3, Outdoor Distribution Pump Sta. And Switchgear Bldg.

- a) 1 - 300 KVA Oil Substation Type Transformer 4160V-277/480V 3P 4W

1.9 Plant 3, Outdoor Chemical Bldg. No. 1

- a) 1 - 2000 KVA Oil Substation Type Transformer 4160V-277/480V 3P 4W

1.10 Plant 3, Outdoor Chemical Bldg. No. 2

b) 1 – 2500 KVA Oil Substation Type Transformer 4160V-277/480V 3P 4W

1.11 Plant 3, Outdoor Sludge Bldg.

b) 1 – 2000 KVA Oil Substation Type Transformer 4160V- 277/480V 3P 4W

1.12 Plant 3, Outdoor Administration Control Bldg.

b) 1 – 1000 KVA Oil Substation Type Transformer 4160V-277/480V 3P 4W

1.13 Plant 3, Chlorine Bldg.

b) 1 – 300 KVA Oil Type Transformer 4160V – 277/480V 3P 4W with Transfer Switches

1.14 Plant 1, Transfer Pumps (B-pumps)

a) 1 – 1000 KVA Oil Type Transformer 4160V – 277/480V 3P 4W (T-17)

b) 1- 1000 KVA Oil Substation Type Transformer 4160V-277/480V 3P 4W (T-111)

1.15 Plant 2, Transfer Pumps (B-pumps)

b) 1 – 1500 KVA Oil Type Transformer 4160V – 277/480V 3P 4W (T-16) with transfer switches

1.16 Plant 2, Backwash Transfer Pumps

b) 1 - 750 KVA Oil Type Transformer 4160V - 277/480V 3P 4W (T-18A) with transfer switches

1.17 Plant 2, Maintenance Bldg.

a) 1- 300 KVA Oil Type Transformer 4160V - 277/480V 3P 4W (T-18) with transfer switches.

1.18 Plant 1 & 2, Drainage Facility Bldg.

a) 1 - 300 KVA Oil Type Transformer 4160V - 277/480V 3P 4W

1.19 Plant 1 & 2, Process Wastewater and Sludge Recycle Pumps

a) 1-500 KVA Oil Type Transformer 4160V-277/480V 3P 4W (T-119)

1.20 Plant 2, Chemical Bldg. No. 2

a) 1- 750 KVA Oil Type Transformer 4160V-277/480V 3P 4W with transfer switches.

1.21 Plant 1, Chemical Bldg. No. 1

All equipment and accessories are not limited to the following:

a) 1- 1500 KVA Oil Type Transformer 4160V-277/480V 3P 4W (T-112)

b) 1- 1500 KVA Oil Type Transformer 4160V-277/480V 3P 4W (T-113)

2.0 Southeast Water Purification Plant, 3100 Genoa Red Bluff Road.

2.1 Main Substation Outdoor Equipment

All equipment and accessories are not limited to the following:

- a) 2 - 21/28/35 MVA Transformers
- b) 4 - 138KV Oil Circuit Breakers
- c) 6 - 138KV Potential Transformers
- d) 10 - 138KV Air Isolation Switches
- e) 6 - 138KV Lightning Arresters
- f) 1 - Capacitor Bank

2.2 Main Substation Indoor Equipment

All equipment and accessories are not limited to the following:

- a) 13 - Medium Voltage Circuit Breaker
- b) 8 - Medium Voltage Air Switches
- c) 14- Multilin 750 Protection Relays
- d) 2 - 112 KVA Dry Type Transformers
- e) Provide rental breakers for high or medium voltage equipment, when repairs are needed.

2.3 Distribution

All equipment and accessories are not limited to the following:

- a) 2 – Transformers 12.47 KV / 480 Volt
- b) 16 – Medium Voltage Isolation Switches

2.4 Transfer Pump

All equipment and accessories are not limited to the following:

- a) 5 - Ampgard Medium Voltage Starters/Breaker
- b) 3 - Medium Voltage Circuit Breaker
- c) 1 - Medium Voltage Isolation Switch
- e) 5 - IQ 1000 Protective Relays
- f) 12 - CO-11 Protective Relays
- g) 2 - SC Protective Relays
- h) 3 - CVQ Protective Relays
- i) 2 - JEM Kilowatt Hour Meters
- j) 5 - Meters
- k) 1 - Dry Type Transformer 4160 V / 480 V

2.5 Chemical Building

a) TM1– Cabinet Type Transformers

b) TM2

- a) 3 – 12.4KV/4.1KV 3000KVA Oil
- b) 2 – 12.4KV/480V 2000KVA Oil
- c) 11 – Medium Voltage Circuit Breakers
- d) 17 – Multilin 750 Protection Relays

2.6 Low Service

a) 2 - Cabinet Type Transformers

2.7 Return Flow B

a) 1 - Cabinet Type Transformer (Single Feed)

2.8 Sludge Lagoon

- a) 1 - Cabinet Type Transformer (Single Feed)

2.9 Interim Process Waste

- a) 2 - Cabinet Type Transformers

2.10 Service Building

All equipment and accessories are not limited to the following:

- a) 2 - Cabinet Type Transformers
- b) 1 - Loop Switch 12.47 KV Oil

2.11 High Service Pump

All equipment and accessories are not limited to the following:

- a) 2 - Cabinet Type Transformers
- b) 1 - Loop Switch 12.47 KV Oil
- c) 1 - Medium Voltage Ampgard Starter
- d) 8 - Medium Voltage Circuit Breaker
- e) 1 - IQ Data Plus Relays
- f) 1 - IQ 1000 Protective Relays
- g) 4 - CVQ Protective Relays
- h) 5 - Multilin 269 Protective Relays
- i) 10 - CA Protective Relays
- j) 16 - Meter
- k) 4 - Multilin 750 Protective Relays

3.0 Northeast Water Purification Plant, 12121 North Sam Houston PWY East

3.1 Main Substation Outdoor Equipment

All equipment and accessories are not limited to the following:

- a) 2 – Power Transformers, 138/12.47KV
- b) 4 – 138KV Circuit Breakers
- c) 2 – Sets of Line Terminal Equipment each with:
 - 3 - Arresters
 - 1 – Coupling Capacitor
 - 3 – Potential Transformers
- d) 1 – Set of Switchgear with:
 - 9 – Air Circuit Breakers
- e) 40 – Protective Relays
- f) 2 – Transformer Relay Protection Packages

3.2 Other High and Medium Voltage Electrical Equipment/Switchgear/Protective Relays/Metering and Indicating Meters & Instruments to be included but not limited to the following:

- a) Main Substation Indoor Equipment
- b) 7 4160V Starters Distribution Centers
- c) 6 Transfer Pumps
- d) 1 Chemical Buildings
- e) 7 High Service Pumps
- f) 2 Service Buildings MCC, UV1 & UVII
- g) 8 Station Service Transformers
- h) Raw Water MCC
- i) Generator and Transfer Switch for Plant Shutdown located at UV1 MCC
- j) Admin Switch Gear and MCC

4.0 Acres Homes Plant (1810 Dolly Wright –Key Map 412S NE Area)

4.1 All equipment in Main Switchgear at Generator No. 2 Building and not limited to the following.

- 8 – cubicles & busses
- 2- Panels (277/480V & 120/208 Volt)
- 2- Low voltage transformers (secondary voltage 120/208 & 277/480V).
- 4- Over-current Relay Brown Boveri (ABB)
- 4- Under-voltage & Phase sequence relay Brown Boveri (ABB)
- 3- Main Breakers
- 3- Vacuum breakers (Toshiba)
- 1- Air Switch Toshiba
- 2- Under-voltage Solid State Protective Relay, Basler
- 2- Frequency Relays Brown Boveri (ABB)
- 2- Static Voltage regulation Basler
- 2- Woodward load sharing/speed control
- Lot- Current Transformers
- Lot- Potential Transformers
- Lot – Switches (breakers, meters)
- 2- Lock Out Relays
- Lot – HOA, Start & Stop Switches
- Lot – Meters (Volt, Am, PF, Dc, FM, Demand KWH)
- Lot- Replace the bulb of all indicating lights.
- Lot- accessories, terminals, relays, and contactors

4.2 All equipment at Switchgear (Toshiba) Pump bldg. No. 1 and not limited to the following:

- 7- cubicles & buses
- 1- Disconnect Switch 1200 amp
- 7- fuse contactors
- 2- 269 plus relays Multilin
- 1- Transformer 112.5 KVA
- Lot- Pt's
- Lot- CT's
- Lot – Switches (Volt, Amp., HOA, Stop / Start)
- 2- ETM (Solid State)
- Lot- Controllers & accessories
- Lot- Replace the bulb of all indicating lights.

5.0 Jersey Villages Plant (7207 Fairview –Key Map 409N NW Area)

All equipment at the Main Switchgear and not limited to the following:

- 9 – cubicle & buses
- Lots – power factor capacitors and each enclosure on top of switchgear.
- 1 – dry type power transformer
- Lots – Static controller devices
- 1 – Resistor & Contactor
- 5 – Fuse contactors
- Lots – low voltage controller devices & relays
- Lots – Process monitors
- 4 – ETM
- Lots – Meters (amp, volt., PF, KWH, etc.)
- 1 – Incoming Circuit breaker
- 1 – capacitor tripping devices
- Lots – Over-Current, Ground Overcurrent & Voltage relays

- Lots – Switches
- Lots – Replace bulb of all indicating lights
- Lots – Current & potential transformers

5.1 All equipment at Generator Switchgear at Generator building and not limited to the following:

- 4 – cubicle & buses
- 1 – Lightning Panel
- 2 – Over-current Relays BBC
- 2 – Under-voltage & Phase sequence Relays BBC
- 2 – Breakers BBC
- Lots – controller devices & accessories
- Lots – Automatic transfer controlling devices & accessories (Russelectric, Inc.)
- Lots – Meters (KWH, Demand, etc.)
- Lots – Switches
- Lots – Replace bulb of all indicating lights

6.0 Bellaire Braes Plant located at 12423 Bellaire Blvd.

Equipment listed here

- a. 2 GE 2400V Power Vac circuit breakers
- b. 2 Circuit Shield Type 51I protective relays
- c. 2 Circuit Shield Type 47H protective relays
- d. 2 Square D Power Logic meters
- e. 5 meters (KW, DC volts, AC volts, HZ, DC amps)
- f. 2 PTs
- g. 4 sets CTs
- h. 6 2400V contactor
- i. 1 100KVAR capacitor
- j. 4 Multilin 269+
- k. 4 Switches (2300V, 1200A)
- l. 1 lightning arrestor and surge capacitor

7.0 Katy Repump Plant located at 1485 Brittmoore. '

Equipment list here

- a. 2 PTs
- b. 2 Circuit Breakers – 4160 volt
- c. 2 Circuit Shield Type 51I protective relays
- d. 1 MTM
- e. 3 200KVAR capacitors
- f. 6 Switches
- g. 2 PQMs
- h. 3 Multilin 469
- i. 3 vacuum starters (inspect and clean only)

All work at Bellaire Braes and Katy Repump will be completed utilizing one (1) outage and continues without interruption once begun.

9.0 Sims Bayou Plant (13826 Croquet – Key Map 571P SW Area)

All equipment at Main Switchgear (Siemens) bldg. and not limited to the following:

- 5 – Cubicle & buses
- 1 – 1200 amp load break switch
- 6 – fuse contactors
- Lots – Current & potential transformer

- 2 – 269 plus Multilin
- Lots – low voltage control devices & relays
- 2 – ETM
- Lots – Meters (Volt, amp, etc.)
- Lots – Switches (amp, volt, etc.)
- Lots – Replace bulb of all indicating lights

Dry Type Outdoor Transformer

- a. 3 – transformers 2300V-277/480V, 495 KVA.

10.0 Southwest Plant (4414 Westpark – Key Map 491Z SE Area)

All equipment at Main Switchgear (Power/VAC) and not limited to the following:

- 5 – cubicle & buses
- 2- GE Protector & control
- 5 – Vacuum breakers
- 4 – Voltage relay 27/59
- 4 – Lock out Relays
- 2 – PQM monitor Multilin
- 4 – 50/51 relay GE Protection
- Lot – PLC devices, power supply, modules, etc.
- Lot – Current & Potential transformers
- Lot – control devices & accessories
- Lot – switches
- Lot – Replace bulb for all indicating lights
- Set – Battery Bank (20 batteries) & Rectifier

All equipment at Generator Controller and not limited to the following:

- 5 – Cubicles & buses
- 1 – Monitor Panel Status
- 2 – Basler Overcurrent relays
- 1 – PQM Monitor Relay Multilin
- 3 – Multilin SR 489
- 3 – Generator Monitor panel
- 3 – caterpillar Relay Module Programmable
- 3 – ETM
- 1 – lock out relay
- Lots – Meters (Hertz, Sync, Amp., Volt, KW, PF, etc.)
- Lots – Switches
- Lot – replace bulb in all indicating lights
- Set – Battery Bank (60 bat.) & Alcad Rectifier/Charger

11.0 Spring Branch Plant (3202 Campbell – Key Map 450K NW Area)

All equipment at Main Switchgear/Motor Control, Toshiba and not limited to the following:

- 6 – Cubicles & buses
- 8 – Fuse contactors
- 1 – PQM Multilin monitor
- 1 – GE Feeder Protection Relay SR735
- 2 - 269 plus relay , Multilin

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Lots- controller devices, accessories, switches, etc.

Lots – Current & Potential Transformers.

Lots- Replace bulb for indicating lights.

All equipment at Transfer Switch Controller located at Generator building and not limited to the following:

- 6 – Cubicle & buses
- 3 – Disconnect switches 2400 Volt
- Lot - Transfer switches devices & accessories ASCO Delta
- 2 – Generator & Normal breakers
- 2 – Undervoltage and phase sequence relay, ABB
- 2 – Overcurrent Relays, ABB
- 1 – Reverse power relay ABB
- Lots – Meter (Volt, KW, Amp, Hertz)
- Lots – Switches
- Lots – replace bulb for all indicating lights.
- Lots – Current & Potential transformers

12.0 Acres Homes

Offsite Generators and Equipment

- 2110 Esther
- 2300 Ellington

- Lot – Cubicle & Buses
- Lot – Lighting Panel
- Lot – Over-Current & Voltage Relays
- Lot – Breakers
- Lot – Controller Devices & Accessories
- Lot – Automatic transfer controlling devices & accessories
- Lot – Meters (KWH, Demand, etc.)
- Lot – Switches
- Lot - Replace bulbs of all indicating lights

13.0 Jersey Village

Offsite Generators and Equipment

- 11905 Spencer
- 12410 Spencer

- Lot – Cubicle & Buses
- Lot – Lighting Panel
- Lot – Over-Current & Voltage Relays
- Lot – Breakers
- Lot – Controller Devices & Accessories
- Lot – Automatic transfer controlling devices & accessories
- Lot – Meters (KWH, Demand, etc.)
- Lot – Switches
- Lot - Replace bulbs of all indicating lights

14.0 Sims Bayou –

Offsite Generators and Equipment

- 13812 ½ Croquet

- 13825 Blue Ridge
- 12445 Hodges

Lot – Cubicle & Buses
Lot – Lighting Panel
Lot – Over-Current & Voltage Relays
Lot – Breakers
Lot – Controller Devices & Accessories
Lot – Automatic transfer controlling devices & accessories
Lot – Meters (KWH, Demand, etc.)
Lot – Switches
Lot - Replace bulbs of all indicating lights

15.0 Southwest –

Offsite Generator and Equipment

- 6002 Westpark

Lot – Cubicle & Buses
Lot – Lighting Panel
Lot – Over-Current & Voltage Relays
Lot – Breakers
Lot – Controller Devices & Accessories
Lot – Automatic transfer controlling devices & accessories
Lot – Meters (KWH, Demand, etc.)
Lot – Switches
Lot - Replace bulbs of all indicating lights

16.0 Spring Branch –

Offsite Generators and Equipment

- 9420 Emnora
- 9531 Kempwood

Lot – Cubicle & Buses
Lot – Lighting Panel
Lot – Over-Current & Voltage Relays
Lot – Breakers
Lot – Controller Devices & Accessories
Lot – Automatic transfer controlling devices & accessories
Lot – Meters (KWH, Demand, etc.)
Lot – Switches
Lot - Replace bulbs of all indicating lights

17.0 Bellaire Braes –

Onsite Generator and Equipment

- 12423 Bellaire Rd.

Offsite Generators and Equipment

- 11811 Corona Ln
- 12885 Carvel Ln
- 8222 S. Dairy Ashford

Lot – Cubicle & Buses
Lot – Lighting Panel
Lot – Over-Current & Voltage Relays

- Lot – Breakers
- Lot – Controller Devices & Accessories
- Lot – Automatic transfer controlling devices & accessories
- Lot – Meters (KWH, Demand, etc.)
- Lot – Switches
- Lot - Replace bulbs of all indicating lights

18.0 Katy-Addicks Surface Water Re-Pump (1456 Brittmoore)

- Lot – Cubicle & Buses
- Lot – Lighting Panel
- Lot – Over-Current & Voltage Relays
- Lot – Breakers
- Lot – Controller Devices & Accessories
- Lot – Automatic transfer controlling devices & accessories
- Lot – Meters (KWH, Demand, etc.)
- Lot – Switches
- Lot - Replace bulbs of all indicating lights

19.0 Katy –Addicks Ground Water

Onsite Generator and Equipment

- 11500 Old Katy Rd.

Offsite Generators and Equipment

- 1100 ½ Eldridge
- 12835 Clay

- Lot – Cubicle & Buses
- Lot – Lighting Panel
- Lot – Over-Current & Voltage Relays
- Lot – Breakers
- Lot – Controller Devices & Accessories
- Lot – Automatic transfer controlling devices & accessories
- Lot – Meters (KWH, Demand, etc.)
- Lot – Switches
- Lot - Replace bulbs of all indicating lights

20. District – 184 Generator and Equipment (10518 Beechnut)

- Lot – Cubicle & Buses
- Lot – Lighting Panel
- Lot – Over-Current & Voltage Relays
- Lot – Breakers
- Lot – Controller Devices & Accessories
- Lot – Automatic transfer controlling devices & accessories
- Lot – Meters (KWH, Demand, etc.)
- Lot – Switches
- Lot - Replace bulbs of all indicating lights

21. Distract - 123 (10003 South Kirkwood)

- Lot – Cubicle & Buses
- Lot – Lighting Panel

- Lot – Over-Current & Voltage Relays
- Lot – Breakers
- Lot – Controller Devices & Accessories
- Lot – Automatic transfer controlling devices & accessories
- Lot – Meters (KWH, Demand, etc.)
- Lot – Switches
- Lot - Replace bulbs of all indicating lights

22.0 Park 10 Central (1300 Langham Creek)

- Lot – Cubicle & Buses
- Lot – Lighting Panel
- Lot – Over-Current & Voltage Relays
- Lot – Breakers
- Lot – Controller Devices & Accessories
- Lot – Automatic transfer controlling devices & accessories
- Lot – Meters (KWH, Demand, etc.)
- Lot – Switches
- Lot - Replace bulbs of all indicating lights

23.0 Wastewater Operations

The Contactor shall perform the ELECTRICAL PREVENTIVE MAINTENANCE (EPM) of medium and high voltage electrical equipment and their associated equipment at the following Wastewater Treatment Plants (WWTP) of Wastewater Operations. See also the attached listing for equipment and relays at some of these facilities.

Wastewater Plant locations and Equipment

69th Street WWTP at **2525 Sgt. Macario Garcia Dr.**

Note that for the following facilities, the electrical preventive maintenance consists only of the testing and calibration of the Relays and Protective equipment: The City of Houston retains the right to use this contract for emergency repairs at the following facilities.

<u>Almeda Sims WWTP</u>	at	<u>12321 ½ Almeda</u>
<u>Sims South WWTP</u>	at	<u>3005 Galveston Road</u>
<u>Sims Bayou WWTP</u>	at	<u>9570 ½ Lawndale</u>
<u>Northbelt WWTP</u>	at	<u>14506 Smith</u>
<u>Northeast WWTP</u>	at	<u>625 Maxey Road</u>
<u>Northwest WWTP</u>	at	<u>5423 Magnum</u>
<u>Southwest WWTP</u>	at	<u>4211 Beechnut</u>
<u>Turkey Creek WWTP</u>	at	<u>1147 Enclave Parkway</u>
<u>Keegans Bayou WWTP</u>	at	<u>9401 White Chapel Lane</u>
<u>Beltway WWTP</u>	at	<u>1058 Bellaire</u>
<u>WCID # 111 WWTP</u>	at	<u>10601 Huntington Point</u>
<u>West District WWTP</u>	at	<u>255 Isolde</u>
<u>Upper Brays WWTP</u>	at	<u>13525OldWestheimer</u>

**_City of Houston,
Public Works & Engineering Department, Wastewater Operations**

69th Street Wastewater Treatment Plant

List of Electrical Equipment for EPM and Relay Calibration

The Contractor work shall include the EPM of all medium and high voltage electrical equipment and their associated equipment.

LOCATION	MANUFAC	RELAY NAME	TYPE	STYLE	I.D.	LAST INSPE
138KV Sub main bkr cap bank 1	Schweitzer	Over Current Relay	SEL-551C		50/51	
138KV Sub main bkr cap bank 1	Schneider	Circuit Monitor	PM820			
138KV Sub main xfmr 1	Schweitzer	Over Current Relay	SEL-351S		50/51	
138KV Sub main xfmr 1	Schweitzer	Current Differential	SEL-587		87T	
138KV Sub main xfmr 1	Schneider	Circuit Monitor	CM4000T			
138KV Sub, CKT-170	Schweitzer	Over Current Relay	SEL-551C		50/51	
138KV Sub, CKT-170	Schneider	Circuit Monitor	PM820			
138KV Sub, CKT-150	Schweitzer	Over Current Relay	SEL-551C		50/51	
138KV Sub, CKT-150	Schneider	Circuit Monitor	PM820			
138KV Sub,CKT-1L	Schweitzer	Over Current Relay	SEL-551C		50/51	
138KV Sub,CKT-1L	Schneider	Circuit Monitor	PM820			
138KV Sub, CKT-1J	Schweitzer	Over Current Relay	SEL-551C		50/51	
138KV Sub, CKT-1J	Schweitzer	Circuit Monitor	PM820			
138KV Sub, CKT-1I	Schweitzer	Over Current Relay	SEL-551C		50/51	
138KV Sub, CKT-1I	Schneider	Circuit Monitor	PM820			
138KV Sub, CKT-1GH	Schweitzer	Over Current Relay	SEL-551C		50/51	
138KV Sub, CKT-1GH	Schweitzer	Circuit Monitor	PM820			
138KV Sub, CKT-1EF	Schweitzer	Over Current Relay	SEL-551C		50/51	
138KV Sub, CKT-1EF	Schneider	Circuit Monitor	PM820			
138KV Sub, CKT-1CD	Schweitzer	Over Current Relay	SEL-551C		50/51	
138KV Sub, CKT-1CD	Schweitzer	Circuit Monitor	PM820			

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138KV Sub, CKT-1AB	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub, CKT-1AB	Schweitzer	Circuit Monitor	PM820		
138KV Sub, CKT-1AB	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub,CKT-2AB	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub,CKT-2AB	Schweitzer	Circuit Monitor	PM820		
138KV Sub, CKT-2CD	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub, CKT-2CD	Schneider	Circuit Monitor	PM820		
138KV Sub, CKT-2EF	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub, CKT-2EF	Schweitzer	Circuit Monitor	PM820		
138KV Sub, CKT-2GH	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub, CKT-2GH	Schweitzer	Circuit Monitor	PM820		
138KV Sub, CKT-2I	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub, CKT-2I	Schneider	Circuit Monitor	PM820		
138KV Sub, CKT-2J	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub, CKT-2J	Schweitzer	Circuit Monitor	PM820		
138KV Sub, CKT-2L	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub, CKT-2L	Schweitzer	Circuit Monitor	PM820		
138KV Sub, CKT-160	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub, CKT-160	Schneider	Circuit Monitor	PM820		
138KV Sub, CKT-180	Schweitzer	Over Current Relay	SEL-551C		50/51
138KV Sub, CKT-180	Schweitzer	Circuit Monitor	PM820		
138KV Sub, main xfmr 2	Schweitzer	Over Current Relay	SEL-351S		50/51
138KV Sub, main xfmr 2	Schweitzer	Current Differential	SEL-587		87T
138KV Sub, main xfmr 2	Schneider	Circuit Monitor	CM4000T		
138KV Sub,HL&P, 3160620	Westinghouse	Ground Fault Relay	SC-1	1876079	
138KV Sub main bkr cap bank 2	Schweitzer	Over Current Relay	SEL-551C		50/51

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138KV Sub main bkr cap bank 2	Schweitzer	Circuit Monitor	PM820			
Main Lift Station BKR. M-1 ,Vt/cpt	ABB power	Ground Fault Relay	Micro-51	446S1101	NGR-1J- 51G	
Main Lift Station BKR. M-1 ,Vt/cpt	ABB power	Reverse Phase Relay	CP	289B415A09 A		
Main Lift Station BKR. M-2, Vt/cpt	ABB power	Ground Fault Relay	Micro-51	446S1101	NGR-1J- 51G	
Main Lift Station BKR. M-2, Vt/cpt	ABB power	Reverse Phase Relay	CP	289B415A09 A		n/a

**City of Houston,
Public Works & Engineering Department, Wastewater Operations**

Almeda Sims Wastewater Treatment Plant
List of Electrical Equipment for EPM and Relay Calibration

LOCATION	MANUFACTURER	NAME	TYPE	STYLE	I.D.	LAST INSPEC.
Buss A	Westinghouse	KWH	D563			
Buss A	Westinghouse		IAC		25A	
Buss A	Westinghouse		IAC		25B	
Buss A	Westinghouse		IAC		25C	
Buss B	Westinghouse	KWH	D563			
Buss B	Westinghouse		IAC		25A	
Buss B	Westinghouse		IAC		25B	
Buss B	Westinghouse		IAC		25C	

**City of Houston,
Public Works & Engineering Department, Wastewater Operations**

Sims South Wastewater Treatment Plant
List of Electrical Equipment for EPM and Relay Calibration

LOCATION	MANUFACTURER	RELAY NAME	TYPE	STYLE	I.D.	LAST INSPEC.
Buss A,5KV Blowers 4,5, & 6	Westinghouse	Time Overcurrent	C09	264C901A0 7	50/51- A	
Buss A,5KV Blowers 4,5, & 6	Westinghouse	Time Overcurrent	C09	264C901A0 7	50/51- B	
Buss A,5KV Blowers 4,5, & 6	Westinghouse	Time Overcurrent	C09	264C901A0 7	50/51- C	
Buss A,5KV Blowers 4,5, & 6	Westinghouse	Ground Sensor	C0- 9L1101N	264C901A0 1	51G	
Buss A Feeder to MCC 1 & 3	Westinghouse	Time Overcurrent	C09	264C901A0 7	50/51- A	
Buss A Feeder to MCC 1 & 3	Westinghouse	Time Overcurrent	C09	264C901A0 7	50/51- B	

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Buss A Feeder to MCC 1 & 3	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss A Feeder to MCC 1 & 3	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss A Feeder to MCC 5	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss A Feeder to MCC 5	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss A Feeder to MCC 5	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss A Feeder to MCC 5	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
12.47KV, HL&P CKT 1	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
12.47KV, HL&P CKT 1	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
12.47KV, HL&P CKT 1	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
12.47KV, HL&P CKT 1	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B,5KV Blowers 1,2, & 3	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B,5KV Blowers 1,2, & 3	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B,5KV Blowers 1,2, & 3	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B,5KV Blowers 1,2, & 3	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B Feeder to MCC 2 & 4	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B Feeder to MCC 2 & 4	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B Feeder to MCC 2 & 4	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B Feeder to MCC 2 & 4	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B Feeder to MCC 6	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B Feeder to MCC 6	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B Feeder to MCC 6	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B Feeder to MCC 6	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B,12.47KV,HL&P,CKT 2	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B,12.47KV,HL&P,CKT 2	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B,12.47KV,HL&P,CKT 2	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B,12.47KV,HL&P,CKT 2	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Blower bldg. A Buss Blower# 1	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Blower bldg. A Buss Blower# 1	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Blower bldg. A Buss Blower# 1	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Blower bldg. A Buss Blower# 1	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Blower bldg. A Buss Blower# 1	Westinghouse	Unbalance Voltage	CM	290B960A21	46
Blower bldg. A Buss Blower# 1	Westinghouse	Differential current			87
Blower bldg. A Buss Blower# 1	Westinghouse	Instantaneous Overcurrent			50
Blower bldg. A Buss Blower# 2	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Blower bldg. A Buss Blower# 2	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Blower bldg. A Buss Blower# 2	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Blower bldg. A Buss Blower# 2	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Blower bldg. A Buss Blower# 2	Westinghouse	Unbalance Voltage	CM	290B960A21	46
Blower bldg. A Buss Blower# 2	Westinghouse	Differential current			87
Blower bldg. A Buss Blower# 2	Westinghouse	Instantaneous Overcurrent			50
Blower bldg. A Buss Blower# 3	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Blower bldg. A Buss Blower# 3	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Blower bldg. A Buss Blower# 3	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Blower bldg. A Buss Blower# 3	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Blower bldg. A Buss Blower# 3	Westinghouse	Unbalance Voltage	CM	290B960A21	46
Blower bldg. A Buss Blower# 3	Westinghouse	Differential current			87
Incoming Line MCC-A	Westinghouse	Under Voltage Trip Relay			
Blower bldg. A Buss Blower# 3	Westinghouse	Instantaneous overcurrent			50
Blower bldg. B Buss Blower# 4	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Blower bldg. B Buss Blower# 4	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B

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Blower bldg. B Buss Blower# 4	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Blower bldg. B Buss Blower# 4	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Blower bldg. B Buss Blower# 4	Westinghouse	Unbalance Voltage	CM	290B960A21	46
Blower bldg. B Buss Blower# 4	Westinghouse	Differential current			87
Blower bldg. B Buss Blower# 4	Westinghouse	Instantaneous Overcurrent			50
Blower bldg. B Buss Blower# 5	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Blower bldg. B Buss Blower# 5	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Blower bldg. B Buss Blower# 5	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Blower bldg. B Buss Blower# 5	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Blower bldg. B Buss Blower# 5	Westinghouse	Unbalance Voltage	CM	290B960A21	46
Blower bldg. B Buss Blower# 5	Westinghouse	Differential current			87
Blower bldg. B Buss Blower# 5	Westinghouse	Instantaneous overcurrent			50
Blower bldg. B Buss Blower# 6	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Blower bldg. B Buss Blower# 6	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Blower bldg. B Buss Blower# 6	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Blower bldg. B Buss Blower# 6	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Blower bldg. B Buss Blower# 6	Westinghouse	Unbalance Voltage	CM	290B960A21	46
Blower bldg. B Buss Blower# 6	Westinghouse	Differential current			87
Blower bldg. B Buss Blower# 6	Westinghouse	Instantaneous Overcurrent			50
Incoming Line MCC-B	Westinghouse	Under Voltage Trip Relay			

**City of Houston,
Public Works & Engineering Department, Wastewater Operations**

Sims Bayou Wastewater Treatment Plant

List of Electrical Equipment for EPM and Relay Calibration

LOCATION	MANUFACTURER	RELAY NAME	TYPE	STYLE	I.D.	LAST INSPE
Buss A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A	
Buss A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B	
Buss A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C	
Buss A	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G	
Buss A	Westinghouse	Reverse Phase	CP	289B415A09	27/47	
Buss A, 1A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A	
Buss A, 1A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B	
Buss A, 1A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C	
Buss A, 1A	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G	
Buss A, 2A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A	
Buss A, 2A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B	
Buss A, 2A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C	
Buss A, 2A	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G	
Buss A, 3A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A	
Buss A, 3A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B	
Buss A, 3A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C	
Buss A, 3A	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G	

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Buss A, 4A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss A, 4A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss A, 4A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss A, 4A	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss A, 5A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss A, 5A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss A, 5A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss A, 5A	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss A, 6A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss A, 6A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss A, 6A	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss A, 6A	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B	Westinghouse	Reverse Phase	CP	289415A09	27/47
Buss B, 1B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B, 1B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B, 1B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B, 1B	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B, 2B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B, 2B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B, 2B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B, 2B	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B, 3B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B, 3B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B, 3B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B, 3B	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B, 4B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B, 4B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B, 4B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B, 4B	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B, 5B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B, 5B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B, 5B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C
Buss B, 5B	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G
Buss B, 6B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-A
Buss B, 6B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-B
Buss B, 6B	Westinghouse	Time Overcurrent	C09	264C901A07	50/51-C

Revised October 30, 2013

Buss B, 6B	Westinghouse	Ground Sensor	C0-9L1101N	264C901A01	51G	
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**City of Houston,
Public Works & Engineering Department, Wastewater Operations**

Northbelt Wastewater Treatment Plant

List of Electrical Equipment for EPM and Relay Calibration

LOCATION	MANUFACTURER	RELAY NAME	TYPE	STYLE	I.D.	LAST INS
HL&P Main Service	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
HL&P Main Service	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
HL&P Main Service	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
HL&P Main Service	ASEA Brown Boveri	Ground Sensor	Micro-51	44651101	N/A	
HL&P Main Service	Westinghouse	Reverse Phase	CP	289B415A13A	27/47	
F3 20000KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F3 20000KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F3 20000KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F7 Blower. Bldg. #1	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F7 Blower. Bldg. #1	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F7 Blower. Bldg. #1	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F9 500KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F9 500KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F9 500KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F42000KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F42000KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F42000KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F8 Blower. Bldg. #1	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F8 Blower. Bldg. #1	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F8 Blower. Bldg. #1	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F10 500KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F10 500KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	
F10 500KVA	ASEA Brown Boveri	Time Overcurrent	Micro-51	44651201	N/A	

**City of Houston,
Public Works & Engineering Department, Wastewater Operations**

Northeast Wastewater Treatment Plant

List of Electrical Equipment for EPM and Relay Calibration

LOCATION	MANUFACTURER	RELAY NAME	TYPE	STYLE	I.D.	LAST INS
Main Breaker	Westinghouse	Time Overcurrent	C09	264C901A07	51A	
Main Breaker	Westinghouse	Time Overcurrent	Micro-51		51B	
Main Breaker	Westinghouse	Time Overcurrent	Micro-51		51C	
Main Breaker	Westinghouse	Reverse Phase	CP	289B415A09	27/47	
Pulse Grd. Detector	Westinghouse	Reverse Phase	CP	288B618A22A	59-G	

**City of Houston,
Public Works & Engineering Department, Wastewater Operations**

Northwest Wastewater Treatment Plant
List of Electrical Equipment for EPM and Relay Calibration

LOCATION	MANUFACTURER	RELAY NAME	TYPE	STYLE	I.D.	LAST IN
Main Incoming	Westinghouse	KWH	D4B-3F	264C71G19	64087081	
Main Incoming	Westinghouse	Time Overcurrent	CO-11	265C47A07	C011H1111N	
Main Incoming	Westinghouse	Time Overcurrent	CO-11	265C47A07	C011H1111N	
Main Incoming	Westinghouse	Reverse Phase	CO-11	265C47A07	C011H1111N	
Main Incoming	Westinghouse	Reverse Phase	CO-11	2650047A03	C011H1111N	

**City of Houston,
Public Works & Engineering Department, Wastewater Operations**

Turkey Creek Wastewater Treatment Plant
List of Electrical Equipment for EPM and Relay Calibration

LOCATION	MANUFACTURER	RELAY NAME	TYPE	STYLE	I.D.	LAST IN
Main Incoming Feeder xfmr	Westinghouse	C0-9	D4B-3F	264C71G19	C09-A	
Main Incoming Feeder xfmr	Westinghouse	C0-9	CO-11	264C901A0 7	C09-B	
Main Incoming Feeder xfmr	Westinghouse	C0-9	CO-11	264C901A0 7	C09-C	
Main Incoming Feeder xfmr	Westinghouse	C0-9	CO-11	264C901A0 7		