

ITEM 1000

TRAFFIC SIGNAL INSTALLATION AND MODIFICATION

1000.1 Description. The purpose and intent of this specification is for the Contractor to furnish all labor, materials, tools, equipment, tests, adjustments and all other incidentals necessary to install and/or modify a traffic signal system.

All materials and equipment furnished for installation under this contract shall be new and unused, unless otherwise specified.

All bidders shall visit the job site prior to bidding in order to acquaint themselves with all job site conditions and problems, if any, and all other factors that may affect the bid. Any discrepancy between drawings and specifications shall be resolved prior to bidding.

The Contractor shall clean the job site of all debris, loose excess excavated materials, etc. accumulated as a result of work performed under this contract. The Contractor shall exercise care in working around the area not to infringe on or mutilate property; the Contractor shall be responsible for any such infringement or mutilation. It is the Contractor's responsibility to restore the construction area to its original condition prior to final acceptance of the contract.

All trades are to work in cooperation with one another, and all trades, when necessary and/or as standard procedure, shall construct preliminary grounds for work to be performed by succeeding trades. It is the General Contractor's responsibility to see that all work is properly coordinated and executed.

Any Contractor having any questions concerning this project should contact the Harris County Public Infrastructure Department, Traffic Signal Maintenance Section at (713) 881-3210.

1000.2 Permits, Codes, Etc. The Contractor shall be responsible for obtaining permits and inspections by regulatory bodies and shall work with Harris County in obtaining power to the system from the CenterPoint Energy and notify Harris County 48 hours prior to connecting the system to the CenterPoint Energy lines.

The meter service assembly shall be installed by the Contractor as required by CenterPoint Energy at the Contractor's expense (unless otherwise specified and/or shown).

All wiring throughout this system shall be in strict accordance with the National Electrical Code, all local applicable codes and shall also comply

with all requirements of the CenterPoint Energy, in order that service may be obtained from them. All costs for code compliance are to be included in the bid for this contract.

All traffic signal system equipment shall be furnished and installed in accordance with drawings and specifications.

All construction will be in accordance with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways", (TMUTCD), and in accordance with the specifications and drawings.

The Contractor shall contact the Lone Star Notification Center at (713)-223-4567 in Houston and 1-800-669-8344 outside of Houston and Texas One Call at 1-800-245-4545 72 hours before commencing any work to locate any utility lines in construction area. It is the Contractor's responsibility to physically locate any sewer, water or gas lines and to adjust the location of any foundations(s).

- 1000.3 Wiring Diagrams, Guarantees, Etc. This contract will not be considered complete until Harris County has been furnished with two complete sets of wiring diagrams (as built) for the controller and the system. A diagram of the phasing of the system shall be pasted inside the door of the controller cabinet to facilitate repairs and adjustments to the controller. One complete set along with brochures, warranties, etc. shall be forwarded to the Harris County Public Infrastructure Department, including one reproducible copy of wiring diagrams.

All items installed under this specification, having a manufacturer's guarantee shall be installed by or under the direction of the manufacturer or his certified agent, when required to conform with the manufacturer's guarantee, and all such manufacturer's guarantees, warranties and bonds shall be forwarded to the County Engineer.

- 1000.4 Barricades and Warning Signs. Prior to closing any section of roadway to traffic, the Contractor shall furnish and install barricades and warning signs in accordance with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways" (TMUTCD) and in accordance with Harris County Specification Items 670 and 671.

All of the above does not preclude the requirements of Item 4.04 of the "Harris County General Conditions for Roads, Bridges and Related Work".

- 1000.5 Construction Signs. Contractor shall furnish and install construction signs on all approaches to the intersection as shown on the drawings, and as required by TMUTCD and Harris County Specification Items 670 and 671.

Construction signs shall be installed at the start of the project and maintained during the entire construction, until final acceptance by Harris County.

Closing of lanes for construction shall be done in strict accordance with the TMUTCD and as shown on the drawings.

- 1000.6 Responsibility for Damage or Claims. (Also see Paragraphs 3.01 and 4.01 of "Harris County General Conditions for Roads, Bridges and Related Work".)

The Contractor shall hold harmless the County and its representatives from all suits, actions, or claims of any character filed as a result of injuries or damages sustained by any person or property due to neglect in safeguarding the work, the use of unacceptable materials in the execution of the contract, or any act of omission by the Contractor or his Sub-Contractors. The Contractor shall not be released from responsibility until the contract has been completed and all work accepted. Money due the Contractor under and by virtue of his contract may be retained by the County or his surety may be held until such claims have been settled and suitable evidence to that effect furnished to the County.

Unless otherwise set forth in these specifications, the Contractor shall receive no direct compensation for furnishing, erecting, and maintaining the necessary barricades, lights, flares, flagmen, signs, or for any other incidentals necessary for the good and proper safety, convenience, and direction of traffic during the period prior to final inspection and acceptance by the County.

- 1000.7 Field Test. All traffic signal equipment furnished and installed by the Contractor shall be field-tested. The contract shall not be considered complete until all the signal equipment has been field-tested for ten (10) consecutive days without failure and/or malfunction and to Harris County's satisfaction. Should a failure and/or malfunction occur within the 10-day test period, the test period shall be extended until the signal equipment has operated successfully for ten (10) consecutive days.

- 1000.8 Guarantee. The Contractor, by accepting this contract, guarantees all workmanship, materials and equipment performed or furnished and installed under this specification for a period of one year from date of substantial completion and shall, at his entire expense and within said term of guarantee, repair, replace or adjust all faulty, broken, or maladjusted materials and/or equipment furnished and installed under this specification including lamp replacement (180 day guarantee on lamps, traffic signal bulbs and down lights; luminaire bulbs shall be guaranteed for one year). The Contractor shall initiate emergency repair service operations on the job site a maximum of 4 hours after notification by Harris County of system failure or malfunction, and the Contractor shall

pursue repair operations with all haste in order that signal down time will be kept to absolute minimum. In the event the Contractor fails to respond within 4 hours, Harris County will pursue the repair operations and the contractor shall reimburse the County from available retainage and project receivables. Vandal damage and/or acts of nature shall not be included under Contractor's guarantee. Contractor shall sign the inspection sheet on all warranty calls.

1000.9 Substitute Materials. Set forth in these specifications are definite models, materials, etc. of particular manufacturer; however, items of equal appearance, durability, performance and design will be accepted upon approval of Harris County. The successful bidder is required to submit to the Harris County Public Infrastructure Department, Traffic Signal Maintenance Section, engineering brochures and information on all materials he desires to furnish and install which are of different manufacturer or model number than specified herein. The submittal is for approval or disapproval by the County Engineer. In the event approval is not obtained, the submitted items shall not be furnished and installed. The submittals shall be furnished no later than the initial pre-construction meeting.

1000.10 Equipment Location. Harris County or an authorized representative shall stake the location of all traffic signal supports, pull boxes, and controller. It is the Contractor's responsibility to verify these locations prior to commencing work.

1000.11 Special Equipment and Materials.

- A. Lightning Arrestor. Shall be 2 pole, 3 wire, 175v per pole for 120/240 service. Lightning arrestor shall be installed on the main disconnect box (Joslyn J9200-10, General Electric 9L15ECB001, or approved equal).
- B. Main Breaker. Shall be a minimum 30 amp breaker for base lights and luminaires and a 40 amp breaker for the signal lights.
- C. Luminaires. Shall be high pressure sodium, for 120 volt, General Electric 400 Watt "Lucalox" Model M-400-GEA-6905B, or approved equal.
- D. Photoelectric Cell. Shall be locking thermal type cell with maximum incandescent capacity of 120V at 60Hz, 1000W to 2000W, 8.3 Amps, Max ballasted capacity 8.3 Amps, ON at 1-5 footcandles, OFF at 3-15 footcandles, rated for temperatures of -0 F to 158 F. Unit shall be Grainger Part # 54793 or equal. Photoelectric cell shall be installed as indicated on drawings. The Contractor shall permanently mark, scribe or etch installation date on bottom of photoelectric cell. Photoelectric cell shall have a warranty of 2 years.

- E. Hardware. All hardware used in this construction shall be galvanized; all conduits shall be galvanized rigid steel conduits as per Item 677.

All junction boxes and/or condulets shall have a cover and gasket and shall be located approximately 24-inches above natural ground for accessibility as shown on the drawings.

- F. Pull Boxes. Pull boxes shall be installed at changes in direction of the conduit and/or as shown on the drawings.

All pull box lids shall be marked "Traffic Signal".

All pull boxes shall be installed over a 12-inch compacted gravel fill as shown on the drawings. All conduits coming to a pull box shall be sealed and grounded.

- G. Signal Cables. All traffic signal cable shall be copper insulated jacketed cable in accordance with Item 679.

The number and size of conductors shall be as directed by the manufacturer to service the required signals and according to the National Electric Code or as shown on the drawings.

All wires for luminaires shall be minimum 2 conductor #12 wire.

- H. Messenger Wire (For Catenary System Only). The catenary system shall be tied to the poles at an elevation as required to obtain a 19' clearance from the bottom of signal lights to the pavement.

The galvanized steel catenary signal suspension system shall be 5/16 inch (Siemens Martin), 7 wire strand, one per signal, and two 1/4" horizontal span, all in accordance with Item 678.

All signal cables shall be attached to the catenary system with stainless steel or aluminum "Lashed Cable Supports" two every 18-inches (Panduit Catalog No. MLT 4H-LP or approved equal).

- I. Vehicle Detector. Shall be loop sensors in saw-cut slots in the pavement as per the detail drawings.

The loops shall be pairs, twisted wires for proper tuning. The loop lead-in wires shall be continuous to the controller or pull boxes (condulet or junction box), if any, and the connection shall be waterproof (3M Scotchcast or approved equal).

The wires to the poles shall be laid in minimum 1-inch rigid galvanized steel conduit buried a minimum of 30-inches or as directed by the engineer in the field.

Where the wire leaves the pavement and enters the conduit, the junction shall be sealed with hot asphalt seal. The complete loop system shall be waterproof. In case of leakage and subsequent damage to or in operation of the loop system, the Contractor shall return to the job site and repair or replace the damaged or inoperative parts to Harris County's satisfaction.

The approximate location of the detectors is shown on the intersection drawings; however, Harris County will accurately locate them at the time of installation.

Trenching for conduit installation shall be back filled to surrounding undisturbed soil density, and any excess excavated material removed from the job site by the Contractor.

All saw cuts shall be cleaned with an air compressor to remove all debris and moisture prior to installation of loop detector wires. All loops shall be tested with a meter at the time of installation.

Wires shall not be placed in slots until the County Inspector has examined the depth, width, and condition of saw cut slot. Any loop installed prior to inspection shall be removed by the Contractor for slot inspection at the Contractor's expense.

Wires used for loop detectors and from loops to the first pull box, conduit or pole, shall be #14 X.H.H.W.

Wires used from pull box, conduit or pole to the controller shall be Belden 8720 Shielded Cable or approved equal.

J. Supports

1. Steel Strain Poles. Shall be 34 foot long hot dip galvanized steel traffic signal supports as shown on drawings.

The support shall be set on reinforced concrete foundation as shown on the drawings. The pole shall have an elevation as required to obtain the 19-foot clearance from the bottom of the signal lights to the crown of the pavement.

The traffic signal support shall be designed according to Item 680.

2. Mast Arms. Shall be installed as shown on the drawings so as to obtain 19' clearance from the bottom of the signal lights to the crown of the pavement. The mast arms shall be in accordance with Item 680.
3. Wood Poles. Shall be 35 foot, Class II treated timber poles in accordance with Item 681, unless otherwise specified in the drawings.

The poles shall be set at least 7 feet in the ground and shall be properly guyed with 3/8-inch galvanized guy wire, turnbuckle and cover shield. The anchor shall be 10 inch helix type, screw anchor with 1-1/4 inch rod 8 feet long (minimum 2 guys and anchors per pole). Sidewalk guy wire to be used where necessary due to right-of-way restriction or as directed by Harris County.

If the Contractor furnishes the poles, the Harris County Public Infrastructure Department, Traffic Signal Maintenance Section shall be supplied two (2) certified copies of documentation verifying the treatment of the poles, at no additional cost to Harris County. The Contract shall not be considered complete until such copies are received by Harris County.

4. Pedestal Pole. Shall be a 4-1/2" o.d. steel pedestal pole of the length specified in the drawings. Pedestal poles shall be in accordance with Item 683.
- K. Meter Poles. Meter address shall be installed on the meter pole by permanent type numbers and shall be clearly visible.
1. Pedestal Poles. Shall be a 4-1/2" square steel pedestal pole of the length specified in the drawings with meter loop and disconnect, including any conduits, as shown on the drawings and as required by CenterPoint Energy.
 2. Wood Poles. One of the proposed signal poles shall be used as a meter pole with new meter loop and disconnect, as required by the CenterPoint Energy and shown on the drawings.
 3. Steel Strain Pole. One of the proposed signal poles shall be used as a meter pole with new meter loop and disconnect as shown on the drawings and as required by the CenterPoint Energy.

L. Controller Unit

1. The controller shall be designed in accordance with Item 2070.

M. Cabinet

1. Pole Mounted

Cabinet shall be made of sheet aluminum or cast aluminum, all in accordance with the Harris County Specifications Item 1210.

2. Ground Mounted

Cabinet shall be made of sheet aluminum or cast aluminum, all in accordance with Harris County Specification Item 1210.

The cabinet shall be ground mounted on a reinforced concrete foundation, as shown in the drawings.

N. Detector Amplifier

Detector amplifiers shall be in accordance with Harris County Specification Item 1100.

O. Signal Heads

"Polycarbonate" signal heads shall be adjustable face for span-wire, band-on arms, or pole mounting as indicated on drawings, and shall be designed in accordance with Item 690.

"Programmable" signal heads shall be adjustable face for span-wire, band-on arms, or pole mounting as indicated on the drawings, and in accordance with Item 691.

All "T" connectors shall be made of aluminum and shall have a minimum of two (2) screws to be tied to the horizontal signal assembly. All fluorescent type down lights shall be designed according to Item 694.

All incandescent type down lights shall be designed in accordance to Item 694.

P. Pedestrian Signals. Shall be 12-inch pedestrian signals in accordance with Item 692 and installed as shown on the drawings.

Q. Signs. All required construction signs and regulatory signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways" as shown on the drawings.

Construction Signs. All required construction signs shall be installed prior to beginning of the project and shall be kept and maintained

during the entire length of construction, until final acceptance by Harris County.

- R. Pavement Markings. All pavement markings shall be installed in accordance with Items 660 and 663. All pavement markings shall be installed in accordance with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways", and Harris County Standards.
- S. Materials Furnished by Harris County. It is the responsibility of the Contractor to obtain any equipment furnished by Harris County at designated location or locations at a date to be determined by Harris County.
- T. Materials Furnished by Contractor. Contractor is required to furnish all equipment, materials, and labor necessary for the complete installation.

1000.12 Construction Phases. The Contractor will be required to construct this project in phase(s). The phases and the specific items that the Contractor will be required to complete in each are as shown by the special provision to this specification.

1000.13 Special Notes

- A. Harris County reserves the right to add to or deduct from contract any loop detectors. Unit price bid shown on the bid sheet will be used; however, Contractor shall furnish and install all loop leads from poles to pull boxes and/or poles nearest to the proposed loops.
- B. The location of all traffic signal poles shown is approximate and may be relocated as necessary. It is the Contractor's responsibility to verify exact location of the traffic poles with the Harris County Public Infrastructure Department, Traffic Signal Maintenance Section prior to installation.
- C. Location of CenterPoint Energy service outlet is subject to relocation to any corner at no additional cost to Harris County.
- D. A pre-construction meeting shall be scheduled by the County Engineer at the Harris County Public Infrastructure Department after award of contract, and prior to commencement of construction. The Contractor or his authorized representative will be required to attend.

- E. All work in this contract shall be performed between the hours of 8:30 a.m. and 4:30 p.m., Monday through Friday unless prior authorization has been obtained from the County Engineer.
- F. It is the Contractor's responsibility to visit the location prior to bidding in order to fully understand the work to be performed in accordance with these specifications. Any discrepancies shall be resolved prior to bidding.
- G. Contractor shall notify the Harris County Public Infrastructure Department, Traffic Signal Maintenance Section (713-881-3210) 24 hours prior to commencement of work so that an inspector may be assigned.
- H. The "Service Outlet Location and Data Statement" for these intersections will be supplied to the Contractor upon receipt from CenterPoint Energy.
- I. The existing signal system, if included in this contract, shall remain operational during the modifications.

Down time, if any, shall be kept to absolute minimum. The switch over from the old system to the new system shall be accomplished within six (6) hours between 9 a.m. and 3 p.m. Contractor shall furnish and install all temporary traffic control (stop signs, flagmen, etc.) during any down time, in addition to all required construction signs. Contractor shall inform the Harris County Public Infrastructure Department, Traffic Signal Maintenance Section (713-881-3210) at least 48 hours prior to turning on the new system, which shall be done during off-peak hours.

The Contractor shall be responsible for the maintenance and operation of the existing traffic control systems for 24-hours a day from commencement date of Purchase Order until final acceptance of contract by Harris County. During the construction of the proposed contract, the Contractor shall maintain the existing traffic control systems in accordance with the Texas Manual on Uniform Traffic Control Devices.

If during construction of the proposed contract, any major traffic signal equipment, such as traffic signal head, traffic signal controller assembly, and signal pole, that requires replacement due to normal wear, deterioration, or any circumstance over which the Contractor has no control (as determined by Harris County) will be furnished by Harris County at no cost to the Contractor and shall be picked up and installed by the Contractor. No extra compensation will be allowed to the Contractor for this work.

Any and all equipment/material furnished by Harris County to the Contractor which is not used in this contract is the property of Harris County and shall be returned to Harris County by the Contractor, at no cost to Harris County.

The Contractor shall furnish Harris County with a 24 hour telephone number for the purpose of forwarding malfunction calls. In the event that the Contractor cannot be reached at the above mentioned number, Harris County will take the necessary action to restore the traffic signal system to normal operation and all expenses incurred will be deducted from the final payment of the contract.

Contractor will be required to respond immediately and to initiate emergency maintenance operations on the job site a maximum of 6 hours after call is received from Harris County. In the event that operation is not returned to normal within 6 hours, the Contractor shall contact a representative from Harris County at 713-881-3210 for further assistance and/or direction.

In the event the Contractor fails to respond within 6 hours, Harris County will pursue the repair operations. If the County pursues the repair operations due to failure of the Contractor to respond within this time frame, the County will subtract all associated costs from the Contractor's retainage for the project at the time the final estimate for the project is processed. If sufficient retainage does not exist to make restitution, then the County will forward the bills to the Contractor for reimbursement and inform the appropriate bonding company."

- J. Contractor shall remove all existing traffic poles, signal heads, controller assembly, wire, conduit, etc. that are no longer used with the new traffic signal system. The Contractor shall disassemble and return salvageable equipment as per Harris County's direction.
- K. After installation and prior to connecting ends, each continuous run of insulated conductor shall have a minimum d.c. insulation resistance of fifty (50) mega-ohms when tested at 500 volts d.c.

All or part of conductor system may be tested at Harris County's option. Conductors exhibiting an insulation resistance of less than fifty (50) mega-ohms shall be replaced by the Contractor at his expense.

- L. The controller housing, signal common, service common, conduit, and metal signal supports shall be bonded with No. 8 AWG copper wire or equal to form a continuous system and effectively grounded to 5/8-inch x 10 foot copper weld ground rods.

- M. All signal heads shall be wrapped with burlap or an approved equal cover so that signal faces cannot be seen from the time of installation until placed in operation.
- N. Each loop detector cable shall be tagged inside the cabinet with loop numbers as called for on the drawings.
- O. The Contractor shall inform Harris County Public Infrastructure Department, Traffic Signal Maintenance Section (713-881-3210) at least 48 hours prior to turn-on. Turn-on shall be scheduled for Monday through Thursday, only during off-peak hours. The following conditions shall be met prior to turn-on:
 - 1. All pavement markings and signage complete;
 - 2. All poles, controllers assemblies and electrical service correctly bonded to earth;
 - 3. All appropriate signal faces clearly visible to approaching traffic for a minimum of 300 feet in advance of stop bar;
 - 4. All vehicle and pedestrian detectors complete and in place;
 - 5. All cables from signal heads connected to correct phase output terminals per plan layout and Harris County standards;
 - 6. All loop lead-in cables connected to correct detector input terminals per plan layout and Harris County standards;
 - 7. All pedestrian push button cables connected to correct pedestrian detector input terminals per plan layout and Harris County standards;
 - 8. All electrical cables and conductors clearly labeled per function;
 - 9. All screw terminals securely tightened.

The signal turn-on date shall not be set if the items listed above are incomplete or deficient in any manner without the approval of the HCPID, Traffic Signal Maintenance Section Manager.

1000.14 Measurement and Payment. The measurement and payment shall be by the lump sum bid or unit price bid as they appear on the bid sheets for the completed contract, which bids shall be for full compensation for all costs of labor, materials, tools, equipment, test, adjustments, and all other incidentals necessary to construct the complete traffic signal system, excluding all other items shown in the bid sheets in accordance with the specifications and drawings and to the satisfaction of the County Engineer.

END OF ITEM 1000