STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ADDENDUM NO. 2

FOR

PEDESTRIAN FACILITIES AND ADA COMPLIANCE

AT VARIOUS LOCATIONS ON OAHU, PHASE II

FEDERAL-AID PROJECT NO. CMAQ-0300(87)

DISTRICTS OF HONOLULU, KOOLAUPOKO, AND EWA

ISLAND OF OAHU

2003

Amend the Bid Documents as follows:

A. SPECIAL PROVISIONS

1. Replace Section 623, pages 623-1a thru 623-10a, dated r11/05/02 with the attached Section 623, pages 623-1a thru 623-20a, dated r01/29/03.

B. PLANS

1. The attached Plan Sheet No. ADD.92 S-1 shall be incorporated and made a part of the Plans.

Please acknowledge receipt of this Addendum No. 2 by recording the date of its receipt in the space provided on page P-4 of the Proposal.

for RODNEY K. HARAGA
Director of Transportation

Amend **Section 623 - Traffic Signal System** to read as follows:

"SECTION 623 - TRAFFIC SIGNAL SYSTEM

623.01 Description. This work includes furnishing labor, materials, tools, machinery, and equipment necessary to install and construct an operating traffic signal system complete in place according to the contract.

The traffic signal system includes:

(1) installing the electrical service and metering facilities and paying for the electric company's charges;

(2) trenching, structural excavating, backfilling, restoring work, and installing pullboxes;

(3) providing a complete and operating traffic signal system with controller, cabinet, auxiliary and support equipment, vehicle detectors, signal standards, traffic signals and appurtenances, signal head mounting, concrete foundations, cables, wiring, cleaning and adjusting signal heads, painting and restoration work.

(4) coordinating work and arranging for inspection of work with the Engineer and other agencies as required.

(5) turning over to the Department a complete and operating traffic signal system according to the contract.

Furnish and install the incidental parts that the contract does not show and that are necessary to complete the traffic signal system as though such parts were in the contract.

Electrical equipment shall conform to the NEMA Standards and this contract. Material and workmanship shall conform to the "National Electric Code", (the Code); General Order Nos. 6 and 10 of the Hawaii Public Utilities Commission; the standards of the ASTM; the ANSI; Local Joint Pole Agreement; local power company rules; and local ordinances that may apply.

The following definitions apply:

(1) Actuation - The operation of types of detector.

(2) Clearance Interval - The length of time of display of the signal indication following the right-of-way interval.

(3) Detector for Traffic Actuation - A device that pedestrians or vehicles can register their presence with a traffic-actuated controller.

(4) **Extendible Portion** - That part of the green interval that follows the initial portion.

(5) **Extension Limit** - The maximum time that a traffic phase may retain the right-of-way after actuation on another traffic phase, after timimg out the initial portion.

(6) **Flashing Feature** - That feature incorporated to stop normal signal operation and cause the flashing of any predetermined combination of signal lights.

(7) **Initial Portion** - That part of the green interval that is timed-out or separately controlled by a traffic-actuated controller before the extendible portion of the interval takes effect.

(8) **Interval** - Several divisions of the time cycle during which signal indications do not change.

(9) **Interval Sequence** - The order of appearance of the signal indications during successive intervals of a time cycle.

(10) **Magnetic Vehicle Detector** - A detector actuated by the movement of a vehicle passing through its magnetic field.

(11) **Major Street** - The roadway approach or approaches at an intersection normally carrying the greater volume of vehicular traffic.

(12) **Manual Operation** - The operation of a signal controller by a hand-operated switch.

(13) **Minimum Period** - In semi-traffic-actuated controllers, the shortest time for which the right-of-way will be given to the approaches not having detectors.

(14) **Minor Movement Interval** - An auxiliary phase added to a controller phase (parent phase) and modified by an auxiliary movement controller.

(15) **Minor Street** - The roadway approach or approaches at an intersection normally carrying the smaller volume of vehicular traffic.

(16) **Non-Parent Phase** - A controller phase not modified by an auxiliary control unit.

(17) **Parent Phase** - A controller phase modified by an auxiliary control unit.

(18) Passage Period - The time allowed for a vehicle to travel at a selected speed from the detector to the nearest point of conflicting traffic.

(19) Pedestrian Detector - A detector, usually of the push-button type, installed near the roadway and operated by hand.

(20) Pressure-Sensitive Vehicle Detector - A detector installed in the roadway, actuated by the pressure of a vehicle passing over its surface.

(21) Pre-Timed Controller - An automatic control device for supervising the operation of traffic control signals according to a pre-timed cycle and divisions.

(22) Recall Switch - A manually operated switch in an actuated controller to provide for the automatic return of the right-of-way to a street.

(23) Right-of-Way - The privilege of the immediate use of the highway.

(24) Signal Indication - The illumination of a traffic signal lens or equivalent device, or of a combination of several lenses or equivalent devices.

(25) Time Cycle - The number of seconds required for one complete revolution of the timing dial or complete sequence of signal indications.

(26) Traffic-Actuated Controller - A digital control device for supervising the operation of traffic control signals according to the varying demands of traffic as registered with the controller by loop detectors or pedestrian push buttons.

(27) Traffic Phase - A part of the cycle allocated to traffic movements receiving the right-of-way or to combinations of traffic movements receiving the right-of-way simultaneously during one or more intervals.

(28) Unit Extension - The minimum time, during the extendible portion, for which the right-of-way must remain on traffic phases following an actuation on that phase, subject to the extension limit.

623.02 Materials. Concrete shall conform to Section 601 - Structural Concrete.

Reinforcing steel shall conform to Section 602 - Reinforcing Steel.

Steel plate covers and anchor bolts shall conform to ASTM A 36 and A 307 respectively. The Contractor shall zinc-coat the anchor bolts if exposed.

Other materials shall conform to the following:

Dark Green Enamel Paint	708.03
Paint Thinner	708.04
Pullboxes	712.06(B)
Conduits	712.27
Conductors and Cables for Traffic Signal System	712.34(B)
Controller Equipment	712.37
Traffic Signal Standards	712.38
Traffic Signals and Appurtenances	712.39
Epoxy Sealer	712.54
Hot Applied Rubberized Sealant	712.57
Conflict Monitor Tester	712.71
Load Switch Analyzer and Tester	712.72
Loop Detector Amplifier Tester	712.73

Materials will be subject to inspection after delivery to the work site and during installation. Failure of the Engineer to note faulty material or workmanship during construction will not relieve the Contractor of the responsibility for removing or replacing materials at no cost to the State.

The Engineer may make inspection or sampling of certain materials at the factory or warehouse before delivery to the work site, when required.

Approach-Only Microwave Vehicle Detector is a vehicle detection unit for computerized signals. The detector shall detect motion of every vehicle type, including mopeds moving in only one direction utilizing a very low power microwave beam.

The detector's range shall be from 3 feet to 100 feet or greater. Base the cone of the detector on a 16^{O} field of view with a maximum width of 18-1/2 feet at 60 feet. The detector shall have two field adjustment controls, those being range control and time delay extension.

The extension timer shall be capable of extending the detector output from at least 0.5 to 7.5 seconds. Begin the extension with the termination of the detected vehicle output and continue for the duration of the selected extension time interval.

The microwave unit shall have a Federal Communication Commission (FCC) certification. The detector shall work at the frequency of 10.525 Ghz as allowed under the FCC Rules, Part 15. The detector shall be self-contained except for the power source that shall operate at both 10VAC to 24VAC and 12VDC.

The unit shall have an electro-mechanical two AMP SPDT Relay to send a signal to the controller. The unit shall employ a circuit for power failure to put relay to a close position (recall) during a power failure.

The detector shall have a monitoring circuit for the transceiver (Gunn diodes) that will failsafe the relay to a closed position (recall). Except for the range adjustment, tuning will be automatic. The Engineer will allow a five minute warm up period for diodes. There shall be no tuning controls of any kind which require an operator.

The detector shall work while installed on the side of a pole, on top of a pole, or overhead at the height of between 12 and 18 feet above the pavement. Encase each detector in a finished fabricated aluminum case with no larger than a 4-inch square, high impact plastic opening in front of the antenna.

Each detector case will be water resistant without the use of slicone gels or any other materials that will deteriorate with ultra-violet rays. Size of the detector shall be no greater than:

Height:	4.5 inches
Width:	4.5 inches
Depth:	7.5 inches

Mounting bracket supplied shall be for side, top, or overhead mounting. The detector shall be capable of continuous operation over a temperature range of -35 ^{O}F. to 165 ^{O}F.

The manufacturer shall test all microwave units to meet FCC specifications. The manufacturer shall supply a medical statement as to the safety of the unit to the general public, specifically to persons with pace-makers."

623.03 Construction Requirements.

(A) Equipment List and Drawings. The bidder shall submit the equipment list according to Subsection 106.13 - Ordering of Certain Materials.

Upon completion of the work, submit an 'As Built' or corrected plan showing in detail the construction changes.

(B) Excavation and Backfill. Excavation and backfill shall conform to Section 206 - Excavation and Backfill for Conduits and Structures.

Do the necessary excavation to modify an existing traffic signal system to prevent damage to pavements, sidewalks and other improvements. Place the material from the excavation to prevent damage and obstruction to vehicular and pedestrian traffic and interference with surface drainage.

(C) Installation.

(1) Standards. Install each traffic signal and controller standard with its shaft precisely vertical on a concrete foundation.

Locations of standards shown in the contract are approximate. The Engineer will decide the exact locations in the field.

(2) Signal Heads. Assemble the signal heads to give the signal arrangement shown in the contract. Plumb or level the members, arrange the members symmetrically, and assemble the members securely. Installation shall be such that the Contractor conceals the conductors within the standards and mounting assemblies as much as possible.

Do not install signal heads at the intersections until the other signal equipments, including the controller, are in place and ready for operation at that intersection. The Contractor may mount the signal heads when covering the faces or not directing the faces toward traffic.

Before final acceptance of the traffic signal system, adjust the direction of signal heads as specified by the Engineer.

(3) Controller and Cabinet. Mount the controller cabinet according to the contract. Assemble, wire, and house the controller and auxiliary equipment specified in the cabinet.

(4) Vehicle Detectors. Vehicle detectors shall be inductive loop detectors installed according to details shown in the contract. The saw cut groove shall be air blown to remove debris before inserting the loop cable. The loop cable shall be continuous within the roadway. Splice in the pullbox. Fill the saw cut groove with epoxy sealer or hot applied rubberized sealant. As accepted by the Engineer, the Contractor may use a sealant designed for use as a protective seal for traffic inductive loop detectors installed in asphalt concrete or concrete pavements.

(5) Traffic Signal Standard and Controller Foundations and Pullboxes. Construct the foundations and boxes required carefully at the locations designated. Pour the foundations and boxes in areas that the Contractor has carefully excavated to receive the foundations and boxes. Construct each unit as detailed in the contract and connect each unit properly with the facilities of which each unit is a component part.

Mix, place, re-grout, and cure the concrete according to Section 601 - Structural Concrete, and Section 503 - Concrete Structures. The Engineer will allow hand mixing.

Set the anchor bolts for the foundations to fit the bases of the standards to be installed.

Give the pullbox frames and covers two coats of asphaltic base paint after installation.

(6) Conduits. Conduits shall be direct burial shown in the contract. Conduits under paved areas subject to vehicular traffic shall be PVC Schedule 80.

Install the ducts to drain towards either one or both pullboxes, manholes, or signal standard foundation.

Make directional changes in the conduits, such as bends and changes to clear obstructions with curved segments using accepted deflection couplings or with short lengths of straight ducts and couplings. The deflection angle between two adjacent lengths of ducts shall not exceed 6^{O}. The bends shall not have a radius of less than 12 times the nominal size of the conduit. The Contractor may use factory-made ells.

Cut the rigid PVC conduits with a hacksaw. Square and trim the ends after cutting to remove rough edges. The connections shall be of the solvent weld type. Make the solvent weld joints according to the conduit manufacturer's recommendations and as accepted.

Use the rigid PVC conduit for drilling or jacking.

Thread the PVC fittings for connecting PVC conduit to rigid metal conduit on the metal conduit side.

Seal the ends of the duct with plugs at the end of each day of work, whenever problems interrupt the duct installation work and whenever ducts are subject to submergence in water.

Keep the conduits clean during construction.

Use only hand shovels in compacting concrete encasements. Cure the concrete for at least 72 hours before permitting vehicular traffic to run over the concrete.

Provide each conduit run with a No. 10 gage flexible, zinc-coated pull wire extending through its entire length. Double an additional two feet back into the conduit at each end of the run. Conduits and sleeves entering pullboxes shall end flush in the wall with ends ground smooth. Plug the conduits and sleeves temporarily.

Ends of conduit runs shall extend at least 24 inches past the face of curb or edge of pavement unless the ends end in the pullboxes. Locate the ends accurately by special markers, markings on curb, or as specified by the Engineer. Show these locations on the 'As Built' plans required under Subsection 623.03(A) - Equipment List and Drawings.

Give the exterior portions of the direct burial steel conduits not encased in concrete two coats of asphaltic base paint.

The entire length of a conduit run between pullboxes or standards shall be of one type of material.

The completed duct lines shall be subject to a field test. Pass a bullet-shaped test mandrel about 14 inches long with a diameter 0.5 inch less than the inside diameter of the ducts through the entire length of each duct run. The Engineer will consider scouring found on the mandrel deeper than one thirty-secondth inch an indication of burrs and/or obstructions in the duct run. Normal abrasion between the duct line and bottom of mandrel is not an indication of burrs and/or obstructions in the duct run. Remove such burrs and/or obstructions. Pass the test mandrel through again. Repeat the process until the Contractor gets a satisfactory result.

Use steel or Schedule 80 PVC conduits for all exposed construction except risers for communications cables. Use only Schedule 80 PVC conduits for risers for communication cables.

(7) Wiring. Wiring shall conform to the appropriate articles of the Code. Arrange the wiring within cabinets, signal heads, standards and pullboxes neatly. Encase the wiring installed underground in conduits. Before installing the wires and cables in conduits, pull a wire brush, swab and mandrel through each conduit for the removal of extraneous matter and verification of the absence of obstructions and debris from the conduit system.

Pull the cables directly from their cores or reels into the conduits. Do not pull off and lay the cables on the ground before installation. Make the pulls in one direction only. Lubricants used shall be as recommended by the cable manufacturer or accepted by the Engineer. Leave the wires or cables under tension nor tight against bushings or fittings.

Remove the damaged ends resulting from the use of pulling grips soon after pulling the cable. Maintain the cable end seals. Do not pull the open ended cables through the conduits. Cables shall be continuous from pulling point to pulling point. The Engineer will not permit splices. Make the splices, taps and terminations with pressure-indented connectors or lugs as appropriate or as specified herein. Tape or seal the ends of the spare conductors as accepted.

Run the signal light conductors continuously from the terminal block located in a cabinet or signal head to a similarly located terminal block without splices. The Contractor may splice the branch signal light neutrals at pullboxes. Leave at least five feet of slack in each conductor at each standard and at least two feet of slack at each pullbox.

Join the conductors by a 'western union' type splice. Use the connectors for splicing conductors No. 8 AWG, or larger. Solder the splices by the pouring or dipping method.

Pencil the conductor insulation well, trim the conductor insulation to conical shape, and roughen the conductor insulation before applying splice insulation.

Splice insulation includes layers of thermoplastic electrical insulating tape not over 0.007-inch thick applied to a thickness equal to and well lapped over the original insulation. The splice insulation shall conform to Federal Specifications MIL-I-7798. On high voltage and multiple lighting conductor splices, apply two layers of synthetic oil resistant rubber tape conforming to ASTM D 119 over each conductor before placing the thermoplastic tape. Then cover the splice well with at least two layers of asphaltic impregnated open mesh fabric tape and a coating of high grade insulating paint or similar material. Leave at least two feet of slack for each conductor at each splice.

Furnish the cables on reels and handle the cables with great care to avoid damage to the conductors or the jacket.

Install the communications cable, connect the communication cable to terminals, and wire the communication cable to the proper equipment to produce a closed loop network suitable for operating within the traffic signal control system. Cable runs shall be continuous between controller cabinets without splices.

Tape the cable ends to exclude moisture and shall remain so until the Contractor attaches the terminal equipment. For cable connections in terminal cabinets, use Bell Telephone System or equivalent connectors accepted for outside use.

Pull the cable in the conduit with a cable grip designed to provide a firm hold on the exterior covering of the cable. Pull the cable with a minimum dragging on the ground or pavement. Use powdered soapstone, talc, or other accepted lubricants to ease the pulling of the cable.

Preemption Detector (Opticom) Cables will be continuous without splices from the detector to the cabinet.

(8) Bonding and Grounding. Make the metallic cable sheaths, conduits and standards mechanically and electrically secure to form a continuous system. Ground the system effectively. Bonding and grounding jumpers shall be No. 8 AWG copper wire or equivalent copper strap of the same cross-sectional area.

Bond the standards by a bonding strap attached to an anchor bolt or a three-sixteenth inch or larger, brass or bronze bolt installed in the lower portion of the shaft.

Ground the conduits and the neutral wires at the service points as required under the Code, except that grounding conductors shall be No. 6 AWG or equal.

Install a copper-clad steel or pure copper ground rod five-eighth inch diameter by eight feet long alongside each traffic signal standard and controller concrete base.

The Contractor shall connect them with No. 6 AWG wire to the No. 8 AWG ground wire loop and power system neutral.

On wood poles, ground all equipment mounted less than 8 feet above ground surface.

(9) Continuity of Service. During relocation, reconstruction or other improvements of existing traffic signal systems, keep the existing system operational until the reconstructed or new traffic signal system can be started and put into service. Arrange the work accordingly and shall provide temporary relocations and wiring as necessary.

(10) Salvaging Electrical Equipment. Remove and salvage the controller and electrical equipment not needed in the new system. Stockpile the salvaged equipment neatly and deliver the stockpile in a designated locations or as specified by the Engineer.

Either remove the existing controller foundations completely or level the existing controller foundations flush with grade.

The Engineer will consider salvaging of existing electrical equipment as incidental to the various items of work.

(11) Approach-Only Microwave Vehicle Detector. Temporarily mount the detector on the side of an existing traffic signal standard, highway light standard, or at the location specified by the Engineer. The detectors shall be operational before disabling the existing pavement loop detectors. Install the required conductors in the existing conduits and controller or at the location specified by the Engineer. After the permanent pavement loop detectors becomes operational, remove the microwave detectors and conductors and deliver them to a location specified by the Engineer. Also, repair any holes and/or damages which was caused by mounting the detector to the existing traffic signal and/or highway lighting standards.

(12) Preemption (Opticom) Detectors. Install all optical detectors for the preemption system according to the manufacturer's recommendation and the plans.

(D) Painting. Supply the steel traffic signal standards including mast arms with a natural, zinc-coated finish. The standards require no painting.

Paint the signal head mountings with two coats of weatherproof dark enamel. The enamel shall conform to Subsection 708.03 - Dark Green Enamel Paint.

Paint the controller cabinet, if of metal other than aluminum, with one coat of accepted metal primer and two coats of aluminum paint conforming to AASHTO M 69.

Supply the aluminum signal standard and controller cabinet with polished natural aluminum finish. They shall not require painting.

(E) Electric Service. Electric power shall be 120 volts, single phase, 60 cycle. Install the service underground in a steel conduit of the size shown in the contract from the local power company's pole to the controller.

Furnish and install service connections such as conduits, weatherhead, wires, and meter loops, and comply with the power company's requirement for electric service. The cost of service connections shall be at no cost to the State.

(F) Field Test. Before the acceptance of the work, do the following tests on traffic signals and circuits, in the presence of the Engineer:

(1) Test for continuity of each circuit.

(2) Test for grounds in each circuit.

(3) A megger test on each circuit between the circuit ground. The insulation resistance shall not be less than the values specified in Table 622-I - Insulation Resistance when measured with an instrument having a voltage rating of 500 volts.

(4) A functional test to show that the system functions as specified or as intended herein.

Replace or repair the fault in material or the installation revealed by these tests according to the contract. Repeat the same tests until no fault appears.

(G) Services Provided By The Counties On Their Respective Projects.

(1) Department of Transportation Services (DTS), City and County of Honolulu will be responsible for the following:

(a) making all splices and connections in the pullboxes and cabinet locations pertaining to signal heads, pedestrian buttons, vehicle detectors, preemption detectors, and intertie circuits.

(b) installing and programming the Controller Timings and Conflict Monitor Cards.

(c) aligning and taping the Programmed Visibility Heads.

(d) inspecting the traffic signal construction.

(2) In association with the City's work, the Contractor shall be responsible for the following work and cost:

(a) Perform documented factory testing according to CALTRANS requirements for each controller and cabinet before leaving the factory. Dry-store the controller assemblies at its site. Do a second documented diagnostic testing procedure. If passed, cycle the controller assembly through 8 vehicle phases and 4 pedestrian phases for 120 continuous hours before field installation.

Testing and documented validation includes controller, cabinet output and input, C1/C2/C20 operations, load switches, detector cards, dc cards, modems, flash condition, time source, preemption system, and conflict monitor. The Contractor shall have all necessary testing hardware and software to perform an accurate and dependable test and validation of the output signal displays, controller and cabinet functions, and conflict monitor certification. Submit a testing plan and procedure to DTS for acceptance before starting any tests. The Engineer will consider any controller assembly or auxiliary equipment which fails within 30 calendar days after field installation as defective. Replace with a new controller assembly or auxiliary equipment within five calendar days instead of repairing. The Engineer will bill the Contractor any cost incurred by DTS for any malfunction repairs due to controller assembly or auxiliary equipment failure during the 30-day interval.

(b) Install the controller assembly at the field site which includes installing anchor bolts, sealers, grouting, rerouting existing cables, extending power cables, ground wires, signal cables, and all other adjustments to the base, conduits, and cabinet for a fully-operational system.

(c) Remove existing cabinets and deliver to a DTS designated storage facility in Honolulu.

(4) With the above work, the Contractor shall be responsible for the following:

(a) Furnish and deliver the controller equipment to a location specified by the Engineer for testing.

(b) After DTS or DPW completes the testing, load and transport the controller equipment to the construction site and install in place.

(c) Arrange for phases of work with the appropriate County agency or as specified by the Engineer.

(d) give at least three days of advance notice to the appropriate County agency when phases of the work requires the services of that agency.

(H) Restoring Pavements and Other Improvements. Restore the existing pavements and other improvements such as driveways, sidewalks, curbs and gutters disturbed by excavation to their original condition according to the contract. Materials used for restoration work shall be equal to or better in quality than the materials the Contractor will replace, and matching in thickness, texture, and color whenever applicable. The grades of the restored surfaces shall conform to the existing grades.

(I) Warranty. Materials and equipment installed for permanent construction shall be new. The contract contemplates the use of first-class material and equipment throughout the performance of the contract.

Secure from the manufacturer(s), a warranty or warranties guaranteeing equipments from defects in materials, design and workmanship for not less than 12 months from the date of acceptance.

When requiring adjustments or repairs during the warranty period, adjust or repair the existing unit within 24 hours from the time of notification.

When requiring repairs that need factory corrections during the warranty period, replace the existing unit with an accepted temporary operational replacement unit within 24 hours from the time of notification until the Contractor can install the new unit. Install the new, identical non-defective unit within 30 days from the time of notification.

623.05 Method of Measurement. The Engineer will measure the controller assembly, traffic signal standard, foundation for traffic signal standard, re-grouting traffic signal pole base, pedestrian or traffic signal assembly, pedestrian pushbutton, pullbox, loop detector sensing unit, riser, opticom receiver, microwave vehicle detector, conflict monitor tester, systems monitor tester, load switch analyzer and tester, and loop detector amplifier tester per each complete in place.

The Engineer will not measure traffic signal ductline, cable, meter socket, and software for controller for payment.

623.06 Basis of Payment. The Engineer will pay for the accepted controller assembly at the contract unit price per each complete in place. The price includes full compensation for submitting the equipment list and drawing; furnishing and mounting the controller cabinet; furnishing, assembling, wiring, and housing the controller and auxiliary equipment; painting the controller cabinet; testing; providing turn-on service; submitting warranty; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted traffic signal standard at the contract unit price per each complete in place. The price includes full compensation for submitting the equipment list and drawing; furnishing and installing the traffic signal standard; wiring; bonding and grounding; testing; providing turn-on service; submitting warranty; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted foundation for controller cabinet, traffic signal standard, and re-grouting the traffic signal pole base at the contract unit price per each complete in place. The price includes full compensation for excavating and backfilling; forming; furnishing and placing the reinforcing steel; mixing, placing, and curing the concrete; furnishing and setting the anchor bolts; restoring the pavement; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted traffic signal assembly at the contract unit price per each complete in place. The price includes full compensation for submitting the equipment list and drawing; assembling the signal heads; wiring; bonding and grounding; painting the signal head mounting; testing; providing turn-on service; submitting warranty; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted pedestrian pushbutton with instruction sign at the contract unit price per each complete in place. The price includes full compensation for submitting the equipment list and drawing; furnishing and installing the pedestrian pushbutton with the instruction sign; wiring; bonding and grounding; testing; providing turn-on service; submitting warranty; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted pullbox at the contract unit price per each complete in place. The price includes full compensation for submitting the equipment list and drawing; furnishing and installing the pullbox at the designated locations; coating the fames and covers; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted loop detector sensing unit at the contract unit price per each complete in place. The price includes full compensation for saw cutting; cleaning and blowing the saw cut area; furnishing and inserting the loop cable; splicing in the pullbox; filling the saw cut groove with epoxy sealer or hot applied rubberized sealant; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted riser at the contract unit price per each complete in place. The price includes full compensation for furnishing and installing the riser as shown in the contract; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted preemption detector cable at the contract unit price per each complete in place. The price includes full compensation for furnishing and installing the preemption detector cable from the detector to the cabinet; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted approach-only microwave vehicle detector at the contract unit price per each complete in place. The price includes full compensation for furnishing and mounting the detector; making it operational; removing the detector after installing the permanent loop detector; delivering them to the designated location; repairing any damages caused by mounting the detector; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted conflict monitor tester, systems monitor tester, load switch analyzer and tester at the contract unit price per each complete in place. The price includes full compensation for furnishing these testers, software; delivering them to the designated office; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted traffic signal ductline on a contract linear foot complete in place. The price includes full compensation for saw cutting; excavating and backfilling; furnishing, installing, bonding, and grounding the conduits; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted traffic signal cables on a contract linear foot complete in place. The price includes full compensation for furnishing, installing, splicing, and taping the cable; making the connections; providing turn-on service; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted meter socket, breaker on a contract unit price per each complete in place. The price includes full compensation for furnishing and installing the meter socket and breaker; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will pay for the accepted software for the controller on a contract unit price per each complete in place. The price includes full compensation for furnishing the software for the controller; and furnishing equipments, tools, labor, materials and other incidentals necessary to complete the work.

The Engineer will consider full compensation for additional materials and labor not specifically shown or called for that are necessary to complete the work incidental to the various contract items in the proposal.

The Engineer will make payment under:

Remove and Relocate Existing Type I Traffic Signal Standard	Each
Remove and Relocate Existing Type II Traffic Signal Standard	Each
New Type I-10 Traffic Signal Standard	Each
New Pedestrian Pushbutton Pedestal with 2 Pushbuttons	Each
New Pedestrian Pushbutton Pedestal with 1 Pushbutton	Each
New Type I Traffic Signal Standard Concrete Foundation	Each
New Foundation for Type I Signal Standard	Each
New Type II Traffic Signal Standard Concrete Foundation	Each

Demolish and Dispose of Existing Type I Traffic Signal Standard Concrete Foundation	Each
Remove and Relocate Type I Standard, and Demolish and Dispose of Existing Foundation	Each
Demolish and Dispose of Existing Pedestrian Foundation	Each
Demolish and Dispose of Existing Type II Traffic Signal Standard Concrete Foundation	Each
Remove and Relocate Existing Traffic Signal Head, Provide New Mounting Brackets and Equipment	Each
Relocate Existing Traffic Signal Head	Each
Remove and Relocate Existing Pedestrian Signal Head, Provide New Mounting Brackets and Equipment	Each
Remove and Relocate Existing Pedestrian Signal Head	Each
Remove and Relocate Existing Opticom Detector Head, Provide New Mounting Brackets and Equipment,	Each
New Pedestrian Pushbutton with Instructional Sign, Provide Mounting Equipment	Each
New Pedestrian Pushbutton with Instruction Sign,	Each
Remove and Dispose of Existing Pedestrian Pushbutton	Each
Loop Detector Sensing Unit (Two 6' x 6') Loops per Lane	Each
Loop Detector Sensing Unit (Four 6' x 6') Loops per Lane	Each
Loop Detector Sensing Unit (Two 6' x 6') Loops per Lane	Each
Remove and Dispose of Existing Pedestrian Pushbutton	Each
New Type "A" Traffic Signal Pullbox	Each
Demolish Existing Pullbox and Replace with New Type "A" Traffic Signal Pullbox	Each
Demolish Existing Traffic Signal Pullbox, Replace with New Type "C" Traffic Signal Pullbox	Each
Demolish Existing Pullbox, Replace with New Type "C" Traffic Signal Pullbox	Each

Adjust Existing Traffic Signal Pullbox to New Finish Grade	Each
Adjust Existing Traffic Signal Standard to New Finish Grade	Each
Replace Street Light Pullbox	Each
Conduit Entries into Existing Pullbox, Repair Pullbox to Match Existing Condition	Each
One 2-Inch PVC Schedule 40 Conduit, Concrete Encased Between Traffic Signal Standard and Pullbox, Provide Cables to Match Existing as Required	Lin. Ft.
Traffic Signal Ductline, One 2-inch Conduit Trenching, Backfilling, Concrete Encasement	Lin. Ft.
One 2-Inch PVC Schedule 40 Conduit, Concrete Encased	Lin. Ft.
Four 2-Inch PVC Schedule 40 Conduit, Concrete Encased	Lin. Ft.
One 2-Inch PVC Ductline, Concrete Encased for Lighting System	Lin. Ft.
No. 14, 26-Conductor with #8 Ground Traffic Signal Control Cable	Lin. Ft.
No. 14, 2-Conductor Traffic Signal Detector Cable	Lin. Ft.
Opticom, DRN-PRE Emption Cable	Lin. Ft.
Remove and Dispose of Existing Traffic Signal Cable	Lin. Ft.
No. 14, 5-Conductor Traffic Control Cable	Lin. Ft.
No. 14, 2-Conductor Pedestrian Pushbutton Cable	Lin. Ft.
3-#4, 1-#8 RHW-USE Conductor(s)	Lin. Ft.
Intercept Street Lighting Circuit with Type "C" Pullbox	Each
Sawcutting and Repairing of Existing Concrete Sidewalk, Curb & Gutter and AC Pavement	Lin. Ft.
Adjust Pullbox 36" x 32" to New Finish Grade	Each
Replace Galvanized Handhole Cover	Each
Replace Street Light Pullbox (2' x 4')	Each

Regrout Traffic Signal Pole Base Each

The Engineer will not make additional lump sum payment due to overruns or underruns in comparison with the estimated quantity shown in the proposal. The Engineer will make additional lump sum payment only if the Engineer specifies an alteration in the work."

END OF SECTION