

SECTION 02893

TRAFFIC SIGNAL CONSTRUCTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This specification consists of the requirements to construct traffic signals in the City of Schertz.

1.02 UNIT PRICES

- B. Unit Prices

Items discussed in this specification shall be measured separately from the unit price items identified in Bid Proposal - Schedule or Unit Price Work. Items and work processes discussed in this section are incidental to furnishing and installing a functioning traffic signal.

No separate payment shall be made for Traffic Signal Construction under this Section. Payment will be included under various unit price items included in Bid Proposal - Schedule of Unit Price Work.

1. Measurement and payment of traffic signal items shall be per each unit furnished and installed complete and in place with all appurtenances.
2. Payment for traffic control devices will be on the basis of each device installed as shown on the drawings or as directed by the City Engineer and/or the approved City of Schertz Representative.
3. Refer to Section 01270 – Measurement and Payment for unit price procedures.

- C. Stipulated Price per Intersection (Lump Sum) If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 SPECIAL REQUIREMENTS

The requirements of this contract encompass the construction of new traffic signal installations either installed 1.) concurrent with the street or roadway improvement phases of the work so that the signals will be in operation at the time the intersection is open to traffic, or 2.) as traffic signal or traffic signal related improvements.

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. The Contractor shall also install items furnished by the City of Schertz, specified herein. All materials and equipment furnished for installation under this contract shall be new and unused, unless otherwise specified. Contractor shall furnish and install or install materials as specified herein.

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 on all project specific contracts. On work order type projects all bidders shall thoroughly familiarize themselves with City of Schertz requirements and general field conditions. Any discrepancy between drawings and specifications shall be resolved prior to bidding.

These specifications together with the reference Drawings and Contract Documents require the furnishings of all superintendence, labor, tools, equipment and apparatus necessary for the complete working system of the traffic signal installation(s). All submittals need to be pre-approved prior to the job and by the inspector as directed by the Engineer and/or the approved City of Schertz Representative.

Call Public Works, 210-619-1800 for coordination and inspection of traffic signal work.

All control equipment shall confirm to ITE and NEMA specifications and in accordance with the drawings and specifications.

All construction will be in accordance with the Texas Manual on Uniform Traffic Control Devices, latest revisions, and in accordance with the drawings and specifications.

All wiring throughout each traffic signal installation shall be in strict accordance with the National Electric Code, all local applicable codes and shall also comply with all requirements of the appropriate power provider, in order that service may be obtained from them. All costs for code compliance are to be included in the bid for this contract.

1.04 1.04 REFERENCES

- A. References: References to known standard specifications in the Specification shall mean and intend latest edition of such specification adopted and published at date of invitation to submit Proposals.

B.

Reference to technical society, organization

or body is made in Specifications in accordance with the following abbreviations:

AASHO	American Association of State Highway Officials
ACI	American Concrete Institute
* AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ASA	American Standards Association
ASTM	American Society for Testing and Materials
AWSC	American Welding Society Code
FS	Federal Specification
IMSA	International Municipal Signal Association
IPCEA	Insulated Power Cable Engineers Association
ITE	Institute of Traffic Engineers
MUTCD	Manual on Uniform Traffic Control Devices for Streets and Highways
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
OSHA	Occupational Safety and Health Association
UL	Underwriters' Laboratories
* IEEE	Institute of Electrical and Electronics Engineers - name changed from AIEE & IRE (Institute of Radio Engineers)

1.05 PERMITS, LAWS, CODES, ETC.

The contractor and subcontractors shall comply with all Federal, State and local Laws, Codes and Ordinances applicable to the work and all requirements of the National board of Fire Underwriters having jurisdiction. If the above laws, codes or ordinances conflict with specification, then the laws, codes or ordinances shall govern except where Specification exceeds them in quality of quantity of materials or labor. Obtain and pay for all permits required in connection with the execution of the work as required. The Engineer and/or the approved City of Schertz Representative shall be furnished with certified copies of these permits if he so requests.

1.06 COOPERATION WITH BUILDING OFFICIALS

Cooperate with local and other governmental officials and inspectors at all times. If such official or inspector deems special inspection necessary, provide assistance and facilities that will expedite his inspection. Any materials and or workmanship which are rejected by the Traffic Signal Inspector by reason of

failure to conform to the requirements of the drawings or specifications, shall be removed and replaced by the contractor at his own expense.

1.07 SUBSTITUTIONS

- A. Except in special instances, the Technical Sections of these specifications list more than one manufacturer of the products specified. Products of listed manufacturers conform basically to design and performance requirements as indicated on the Drawings and specified herein and Contractor in proposing their use shall indicate by detail drawings and/or descriptive data any modifications of items or assemblies necessary to provide the indicated and/or specified work.
- B. Requests for substitutions of materials must be submitted in writing to the Engineer and/or the approved City of Schertz Representative by the Contractor. These substitutions will only be considered if fewer than three manufacturers are listed in the Specifications.
- C. Under no circumstances will the Engineer and/or the approved City of Schertz Representative be required to provide that a product proposed for substitution is, or is not, of equal quality to the product specified. It is mandatory that the Contractor submit to the Engineer and/or the approved City of Schertz Representative, in Writing, all evidence necessary to support this contention that the item proposed for substitution is equal to the item indicated by the Contract Documents. Items submitted for substitution must be submitted one month prior to bid opening.

1.08 MANUFACTURER'S SPECIFICATION AND INSTRUCTIONS

Install all manufactured items, materials and equipment in strict accordance with the manufacturer's recommended specifications except that the Specifications herein, where more stringent, shall be complied with.

1.09 MEASUREMENTS

Before doing any work or ordering any materials, the Contractor and Subcontractors shall verify all measurements of existing and new work and shall be responsible for their correctness. Any difference which may be found shall be submitted to the Engineer and/or the approved City of Schertz Representative for consideration before proceeding with the work. No extra compensation will be allowed because of differences between actual dimensions and measurements indicated on the drawings.

1.10 RECORD DRAWINGS

Provide and maintain in proper order and in good, clean condition at the project sites, one complete set of prints of all project drawings. On this set of drawings

Contractor shall neatly print and accurately inscribe, in red pencil, any and all changes or deviations from construction and installation as originally indicated in the plans and specifications. This set of prints shall be delivered to City of Schertz PUBLIC WORKS at the time of final acceptance of the work by the City in order to provide the City with an "AS BUILT" set of plans.

1.11 TEMPORARY FACILITIES

A. Weather Protection

1. Contractor shall at all times provide protection against weather, so as to maintain all work, materials, apparatus, and fixtures free from injury and damages. At the end of the day's work, all new work likely to be damaged shall be covered or otherwise protected.
2. Wet work shall not be performed when temperature is below 40° F, or is likely to go below 40° F, within the ensuing 48 hours, except when sufficient protective heat is provided and the Engineer's and/or the approved City of Schertz Representative's approval in writing is obtained.
3. Contractor shall construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations, pits and trenches free of water.

B. Operation of Equipment

When electrical or other equipment is installed, it shall be the responsibility of the Contractor to check out same for a period of time as required by the Engineer and/or the approved City of Schertz Representative for proper testing of the equipment. All items of equipment, testing instruments and incidentals necessary for proper testing of equipment shall be furnished by Contractor.

- C. When any temporary facility is no longer needed for the proper conduct of the work as determined by the Engineer and/or the approved City of Schertz Representative, the Contractor shall completely remove it from the project and shall repair or replace all material, equipment and finished surfaces damaged in doing so.

- D. Contractor shall provide a portable toilet as needed.

1.12 PROTECTION

Provide barricades, fences, lights, etc., for protection of property and the public as required by local and/or State Ordinances. Contractor will be held liable for all damage to property and/or persons.

- A. All barricades and signs shall conform to Texas MUTCD. Such barricades and protective signs shall be provided by the Contractor at his expense.
- B. Flow of traffic shall not be interrupted completely without the approval of the Engineer and/or the approved City of Schertz Representative. Restriction and minor diversion will be kept to a minimum. No work will be permitted in the traffic lanes during peak hours from **7:00 to 9:00 AM and 4:00 to 6:00 PM Monday through Friday**. Any open cuts in the intersections during these hours will be covered with steel plates to maintain uninterrupted traffic.
- C. Flag-men shall be certified flag-men or off-duty uniformed peace officers of the law. Contractor shall provide flag-men to direct traffic when directed by the Area Engineer and/or the approved City of Schertz Representative of the Traffic Management and Maintenance Division. This does not relieve Contractor of responsibility of taking other steps and providing other personnel who he may deem necessary for protection of work and public.
- D. Appropriate Personal Protective Equipment shall be worn by all contract personnel when on the job-site.

1.13 RESTORING DAMAGED AREAS

For all work at identified intersections and along communication cable routing, in the event that sidewalks, pavement, curbs, wheelchair ramps, driveways, landscaped areas, areas with special pavement treatment, sprinkler systems, lighting systems, or other items or properties both public and private that are damaged during this construction, shall be restored to their prior condition without expense to the City of Schertz. No separate payment will be made for the restoration of these items.

Where signal poles are installed inside the existing 4 foot sidewalk or within 12 inches of either side of the existing sidewalk, the Contractor shall provide a minimum of 4 foot paved sidewalk 12 inches away from edge of the signal pole. The horizontal slope for the sidewalk shall be 2 percent.

PART 2 PRODUCTS

2.01 MATERIALS

Contractor is responsible for furnishing all materials and labor for construction of items as shown on drawings and other incidentals necessary to provide a fully operational traffic control signal. The Contractor shall furnish and install all materials, with exception of materials to be provided by the City of Schertz.

Material should be installed according to the technical specifications and standard details under the direction of the City of Schertz representative assigned to the project.

In addition to all items to be furnished and installed by the Contractor, the Contractor shall furnish and install all items necessary for the complete signal system including but not limited to the following incidental materials:

- All conduit nipples, couplings, grounding bushings, elbows, sweeps and service heads.
- All reinforcing steel and ties.
- Concrete, sand, cement, gravel, asphalt, earth fill.
- Span guy, down guys, anchor rod assemblies.
- Sidewalk guy assemblies (if necessary).
- Guy guards, three bolts clamps, lag screws.
- 5/8" Thru-bolts, nuts, washers, thimble-eye nuts and bolts.
- 5/16" Stranded galvanized steel cable for guys and catenaries.
- 1/4" Stranded galvanized steel cable for messengers.
- Strand vises and links as needed.
- Meter loop assemblies complete.
- Signal mounting hardware.
- Copperweld ground rods and clamps furnished and installed in all foundations and each pullbox.
- Flexible stainless steel cable strap ties. Cable ties shall be Panduit Part #MLT 4H-LP or equivalent.
- #6 or #8 Soft bare copper wire for grounding poles, conduits, etc.
- Miscellaneous hardware.

Interconnect cable shall be communications grades as follows:

- Type PE-38 or PE-22 (aerial)
- Type PE-39 (underground)

All proposed changes in the signalization plan must be submitted to the City of Schertz, in writing, for approval.

The Contractor shall be responsible for the protection of all present utilities that have been located by the various utility companies. He shall also maintain and protect the existing traffic signals and their related equipment from damage caused by subcontractors and employees under his Contract but only to the extent of the Contractor's normal work operation, and he shall not be responsible for routine maintenance, normal wear and tear or an act of God, unless otherwise specified.

The contractor shall bag all newly installed signal heads and/or pedestrian signal heads with burlap until final inspection and acceptance by the City of Schertz

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Representative. The signal shall be wrapped with burlap at least twice so that the entire signal head is covered, and cannot be seen until it is placed in operation. The signal shall be de-energized while not in use. If, in the opinion of the Engineer and/or the approved City of Schertz Representative, the new heads would create a hazard condition to motorists and/or pedestrians, the heads shall not be installed until one hour before turn on the new equipment.

All existing traffic signal equipment removed by the Contractor shall be tagged to identify location. A representative of Traffic Signal Engineering and Operations shall be given **24 hour** notice before delivery of an approval location by the Engineer and/or the approved City of Schertz Representative. Equipment not identified will not be accepted and equipment not returned will result in the withholding of payment to the Contractor. Traffic Signal Engineering and Operations personnel will issue a receipt to Contractor for returned equipment.

When the City Traffic Engineer and/or the approved City of Schertz Representative determines that the need for a traffic signal is critical to the public welfare, early "turn on" of the signal shall be required before the completion of the project. If the need arises, the City of Schertz will assume the responsibility for maintenance and liability, or negotiate with the Contractor for maintenance and liability for such a signal.

The City Traffic Engineer and/or the approved City of Schertz Representative may, at any time, authorize City of Schertz personnel to enter the controller cabinet in order to restore any and all signal equipment to proper operation if the malfunction or non-function of such equipment poses a hazard or inconvenience to motorists or pedestrians. Such authorized entry may occur at any time within the period of the Contract and such authorized entry shall in no way relieve the Contractor or manufacture of his respective warranties.

During the burn-in period, the Contractor shall restore operation of the installation within **four (4) hours** after notification of a malfunction. If the Contractor does not respond within **four (4) hours**, the City of Schertz shall have the option of making the necessary repair and billing the Contractor for the actual time and materials required.

When replacing sidewalks or curb and gutters, it shall be the responsibility of the Contractor to reinstall them to match existing color and/or surface texture.

Materials specified herein shall be installed as per Traffic and Transportation Construction Details drawings-3900 series and the City of Schertz Traffic Signal Standard Specifications.

Each work order or intersection shall be a stand alone "Turn Key Job" by the Contractor.

A steel template of the proper dimensions shall be furnished and used by the Contractor to secure anchor bolts while constructing pole foundations.

Flexible stainless steel cable ties for strapping signal cable to messenger shall be min: 13.38 inches long, 120 lb. min. tensile holding strength, 3/16" to 3-1/2" wire bundle range. (Panduit Part #MLT 4H-LP or approved equal).

2.02 PRECONSTRUCTION MEETING

The Traffic & Transportation Division for Traffic Signal Contracts shall schedule a Preconstruction Meeting at Public Works after award of contract and prior to commencement of construction. The Contractor or his authorized representative will be required to attend.

For roadway contracts, the preconstruction meeting for the traffic signal work shall be coordinated by Public Works.

2.03 MATERIALS FURNISHED BY THE CITY

Prior to material pick up, a written notice is required sixty (60) calendar days in advance. This letter shall be addressed to:

**City of Schertz
Public Works
10 Commercial Place, Bldg #2
Schertz, Texas 78154**

Materials furnished by the City shall be picked up by the Contractor at the Public Works yard, Schertz, Texas, after giving a minimum of two (2) working days notice to the Construction Inspection Superintendent. This is in addition to the written requirements listed above. These materials will be furnished at no cost to the Contractor.

Any and all material furnished by the City to the Contractor which is not used in this contract is the property of the City of Schertz and shall be returned to the locations specified by the Traffic Signal Inspector before final payment is made to the contractor.

2.04 PRODUCT DATA, SHOP DRAWINGS, AND SAMPLES

Contractor shall provide **three (3)** complete bound sets of Product Data, including: illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information to illustrate materials or equipment for all Contractor furnished equipment.

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Contractor shall furnish shop drawings, as required in the standard specifications and standard details, or as required by the Engineer and/or the approved City of Schertz

Representative. As a minimum, Contractor shall be required to furnish shop drawings for all structural elements, including cabinets, traffic signal poles, traffic signal arms, luminaires, luminaire supports, vehicular traffic signal head mounts, and pedestrian signal head mounts prior to ordering or fabricating these elements. Shop drawing submittals are required for each of the preceding elements. Contractor is not required to furnish shop drawings for any equipment furnished by the City of Schertz.

Contractor shall furnish samples, or prototypes, of the following equipment within the specified time frame.

<u>Item</u>	<u>Calendar Days from Bid Award</u>
Controller Cabinet Assembly	45
Traffic Signal Controllers	60

PART 3 EXECUTION

3.01 OPERATION OF NEW & EXISTING TRAFFIC SIGNALS DURING CONTRACT PERIOD

To facilitate construction, the Contractor shall be required to install temporary poles, guys, cables, signals, conduits, wiring and adjustments as needed for temporary traffic signal operation during construction. **The Contractor will be responsible for furnishing and installing all materials as directed by the City of Schertz Signal Inspector for temporary traffic signal installation.** The Contractor shall contact the signal inspector assigned to the project with a daily progress report. The Contractor shall coordinate and obtain approval from the City of Schertz signal inspector for all material as well as the configuration of the temporary traffic signal prior to installation. Proposed configurations and materials for the temporary traffic signal installation shall be submitted to the City of Schertz Traffic Signal Engineering and Operations no less than five (5) working days prior to implementation. Operational timing and phasing of the temporary traffic signal installation during construction will be the responsibility of the City of Schertz Traffic Management & Maintenance Branch personnel. Temporary traffic signal work will not be paid for directly, but shall be considered incidental to Traffic Control during construction. All temporary facilities shall be removed as directed by the signal inspector and remain the property of the Contractor upon operation of the new traffic signal construction.

The Contractor shall maintain existing signal installation(s) operational during construction of the new signal system. The Contractor may be required to photograph the existing signal to document existing status and functionality of all signal hardware and devices before beginning construction. It is the Contractor's responsibility to maintain all existing signal hardware and devices including signal

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heads and bulbs, interconnect, pedestrian elements, etc. The Contractor will not be responsible for power consumption of the signal during construction, and for work with the controller or inside the cabinet unless a city representative is onsite or as directed otherwise by the City of Schertz. The Contractor shall submit all existing intersection documentation to the City Inspector for the project before commencing work. The Contractor shall respond within **two (2) hours** after notification from appropriate City of Schertz personnel. If the Contractor does not respond, the City of Schertz will make necessary repairs and bill the contractor at an overtime rate (1.5X) for work performed.

The Contractor shall provide a minimum of five (5) working days notice to City of Schertz representative at 210-619-1800 when seeking approval for a change in location, method of operation of traffic signals or traffic lanes, or change in traffic patterns or timing plans.

The Contractor shall provide a minimum of two (2) days notice when seeking approval regarding the replacement of an existing traffic signal installation.

The Signal Contractor shall be billed for any repair work performed on overtime (1.5X) for any repairs required because of Contractor negligence.

Uniformed Police Officers shall be employed by the contractor and are required to be on the job site. It shall be mandatory to have Uniformed Police Officer(s) for traffic signal turn-ons. Certified flagmen or Uniformed Police Officers may be used, as needed, for lane closures. It is the Contractor's responsibility to use the appropriate personnel for lane closures. The Texas Manual on Uniform Traffic Control Devices will be observed for all lane closures.

All work in this contract, requiring signal outages, or lane closures, shall be performed **between the hours of 9:00 A.M. and 4:00 P.M. Monday through Friday**, unless prior authorization has been obtained from the Engineer and/or the approved City of Schertz Representative.

Down time, if any, shall be kept to an absolute minimum. The switch over from the old system, or signal turn-on, shall be accomplished within the **six (6) hours between 9:00 A.M. and 3:00 P.M.** Contractor shall furnish and install all temporary traffic control (stop signs, flagmen, uniformed officers, etc.) during any down time, in addition to all required construction signs. Contractor shall inform the City of Schertz to schedule a turn-on date **a minimum of 72 hours** in advance of need.

The Contractor shall hire a traffic engineer approved by the City of Schertz to implement the traffic signal timings for the temporary signal system(s) and any modifications to the traffic control plan.

The Contractor shall furnish the City of Schertz 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, the City of Schertz 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 work order. All City of Schertz labor expense shall be billed at overtime (1.5X) rates.

Contractor will be required to respond immediately and to initiate emergency maintenance operations on the jobsite a **maximum of four (4) hours** after the call is received from City of Schertz. The Contractor shall pursue repairs to the traffic signal system and have it back in normal operation within a **maximum of six (6) hours** after call is received by the City of Schertz, or a representative of the City of Schertz.

3.02 CHARACTER OF WORKMEN AND EQUIPMENT

All equipment and workmen provided by the contractor for work hereunder shall be the best available for the kind of work being performed. Any person employed by the Contractor whom the City of Schertz may deem temporarily or permanently incompetent or unfit to perform the work, shall under written instruction of the Engineer and/or the approved City of Schertz Representative be removed from the job, and such person shall not again be employed on the work. Failure by the Contractor to provide adequate equipment may result in annulment of this contract as herein provided.

3.03 LICENSED ELECTRICIANS

A master electrician currently registered with the Building Inspections Department of the City of Schertz is required to supervise all electrical work performed on this project by the contractor. The master electrician shall be available upon request to report to the job site.

A journeyman electrician shall be on the job site or within sight, hereby defined as 300 feet, of jobsite, when electrical work is being performed.

3.04 ELECTRICAL WORK

Electrical work is defined as installing cables, electrical terminations, and signal turn-ons. Connection of loop leads to homerun cables is considered electrical termination and shall require a journeyman electrician. Installation of conduits is EXCLUDED from electrical work. Installation of loop wire in sawcut is EXCLUDED from electrical work.

All electrical work shall be by journeyman electricians (or apprentice electricians being supervised by journeyman electricians) having current City of Schertz journeyman electrician license card on their person for verification by either the City's Electrical Inspector or the City's Traffic Signal Inspector. All Contractor personnel working on City of Schertz traffic signals performing duties directly involving setting up or installing signs, signals, pushbuttons, or traffic control shall

be International Municipal Signal Association (IMSA) certified Level I, or greater. An IMSA certified Level II technician shall be present on site during all cabinet terminations and during the installation of all signs, pavement markings, signals, pushbuttons, and traffic control.

3.05 SALVAGED MATERIALS

At existing traffic signal installations which are to be updated or modernized by the Contractor, all abandoned wire, cable, signals, poles, pole bases, pole tops, mast arms, signs and other miscellaneous equipment shall be taken down and/or removed. All equipment shall be reduced to simplest form. These salvaged materials are the property of the City of Schertz and are to be delivered and unloaded to the location or locations designated by the City of Schertz Traffic Signal Inspector assigned to the project.

3.06 ELECTRICAL SERVICE

The Contractor shall notify the City of Schertz Traffic Signal Inspector assigned to the project **within seven (7) days of Contractor award** for power at intersection.

Upon completion of the meter service, the Traffic Signal Inspector will conduct the meter service inspection. If installation is correct, he will forward the pertinent information to Traffic Signal Engineering and Operations (210-619-1800). The City of Schertz will contact the energy provider to have the service turned on.

3.07 SUBCONTRACTING

If a vendor subcontracts any portion of a contract for any reason, he must include, in writing, the name and address of the subcontractor, name of the person to be contacted including telephone number and extent of work to be performed. This information is to be submitted with bid proposal. In the event of a change during construction, Contractor is required to submit new information to the Engineer and/or the approved City of Schertz Representative, for approval, **five (5) days** prior to using the subcontractor on the job. City of Schertz reserves the right to reject a bid of any bidder if the bid names a subcontractor who has previously failed in the proper performance of an award or failed to deliver on time contracts of a similar nature, or who is not in a position to perform properly under this award. City of Schertz reserves the right to make determination as to the foregoing.

3.08 SYSTEM GROUNDING

All poles, cabinets, conduits, signal common, and service common shall be bonded with a No. 8 AWG bare copper wire, or equal, to form a continuous system and effectively grounded to 5/8-inch x 8 foot copperweld ground rods.

3.09 STRANDED GALVANIZED STEEL CABLE

Guy, messenger and catenary wires shall be Siemens Martin Grade, seven strand, galvanized, high strength steel cable, 5/16 inch diameter for guy and catenary wires and ¼ inch diameter for messenger wires.

3.10 POLE RAKING

Poles shall be set with a sufficient amount of rake so that they are plumb with the signal load or slightly raked away from the signal load. Cantilever pole structures and 4-1/2" OD steel poles should be plumb, strain poles should have a slight backward rake (1 to 2 inches); wood poles shall utilize down guys to maintain appropriate signal height clearance during construction. The Contractor shall rake the poles to the satisfaction of the Traffic Signal Inspector.

Rake is hereby defined as the inclination to the vertical measured at the top of the structure in the opposite direction of the strain axis.

3.11 ABANDONED FOUNDATIONS

The tops of unused foundations shall be removed to a depth of two feet (minimum) below grade and back-filled according to specifications.

3.12 LOADS AND STRESSES DUE TO CONSTRUCTION OPERATIONS

Contractor shall have full responsibility for preventing over-stresses of any structure, cables, poles or any part of them during construction. This also applies to existing work facilities affected by his operations. He shall fully check the effect of his operations in this regard, and shall provide temporary supports and connections required to assure safety and stability of both new and existing work to prevent over-stress of any part thereof.

3.13 APPARATUS LOCATION

The locations of all poles, controllers, actuators and signals shown on the plans are diagrammatic only. The specific locations of such devices shall be decided by the appropriate design personnel and shall be staked out under his direction. Vehicular and pedestrian traffic signals shall be placed and aligned as the City of Schertz Traffic Signal Inspector directs.

3.14 CONCRETE POUR

The time of day of the concrete pour shall be stipulated by the Contractor.

3.15 SEQUENCE OF WORK

Each new signalized intersection shall be in operable condition including electrical service within **fourteen (14) days** after the first signal pole is installed, unless

conditions caused by a paving contractor or roadway construction contractor prevents the completion of the intersection(s).

The order in which the intersections are to be completed may be specified by the Engineer and/or the approved City of Schertz Representative and it shall be the sole responsibility of the Contractor to schedule and coordinate his work, all work shall be coordinated in such a manner as to prevent delays resulting from work to be performed by others and to complete his work within the specified time.

On the day when the intersection is to be turned on or its "Turn On" date, the Contractor will be given a "punch list" from the Signal Inspector for any items that need attention concerning the conditions of signal equipment. These items shall be completed within **ten (10) days** of the date on the "punch list" given to the contractor.

3.16 UTILITY COORDINATION

The Contractor shall contact the Lone Star Notification Center 800-669-8344, **72 hours** before commencing any work to locate any utility lines in the construction area. It is the Contractor's responsibility to physically locate any water and sewer lines and to adjust the location of any foundation(s), for approval by the City of Schertz Traffic Signal Engineering and Operations.

3.17 UNDERGROUND UTILITIES

The exact location of underground utilities and pipelines is not certain. The Contractor shall contact the Utility Coordinating Committee (U.C.C.) to determine exact locations of underground utilities prior to drilling for foundations or any other work that might interfere with or damage present facilities. Contractor shall be responsible for keeping the transmittal number from the U.C.C. current during construction.

3.18 LOCAL CONDITIONS

The Contractor shall make any additional investigations he deems necessary to properly bid any and all work related thereto. No additional compensation will be made available to the Contractor for work arising from failure to examine the site and/or subsoil conditions. Staking of specific locations by the Engineer and/or the approved City of Schertz Representative shall not remove the Contractors responsibility for any damage caused by the Contractor to any underground utility.

3.19 RIGHTS OF VARIOUS INTERESTS

Wherever work being done by the City's forces or by any other Contractor is contiguous to work covered by this contract, the respective rights of the various interests involved shall be established by Engineer and/or the approved City of

Schertz Representative, to secure completion of the various portions of the work in general harmony.

3.20 TRENCHING

No trenching shall be allowed within five feet of a tree.

3.21 DIRECTIONAL DRILLING, BORE, AND JACK

No open cutting or trenching of streets, driveways and sidewalks shall be allowed without prior approval of the Engineer and/or the approved City of Schertz Representative at each location. All conduit runs under streets, driveways or sidewalks shall be by directional drilling, bore, or jack. Water jetting methods shall not be accepted.

3.22 PUBLIC SAFETY AND CONVENIENCE

All work done under this contract shall be done in compliance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD). Each operation shall be considered a work zone area and shall be treated in accordance with the TMUTCD.

The Contractor shall have a Certified Worksite Traffic Supervisor who will be responsible for initiating, installing, and maintaining all traffic control devices as described in the TMUTCD. The Worksite Traffic Supervisor shall have at least one (1) year of experience directly related to worksite traffic control in a supervisory or responsible capacity and shall be certified by the American Traffic Safety Services Association or International Municipal Signal Association. The Worksite Traffic Supervisor will be incidental to Maintenance of Traffic and will not be measured separately for payment.

The Worksite Traffic Supervisor shall be available on a **twenty-four (24) hour day** basis and shall review the project on a day to day basis as well as being involved in all changes to traffic control. The Worksite Traffic Supervisor shall have access to all equipment and materials needed to maintain traffic control and handle traffic related situations. The Worksite Traffic Supervisor shall insure that routine deficiencies are corrected with a **twenty-four (24) hour** period.

The Worksite Traffic Supervisor shall be available on the site within **forty-five (45) minutes** after notification of an emergency situation, prepared to positively respond to repair the work zone traffic control or to provide alternate traffic arrangements.

Failure of the Worksite Traffic Supervisor to comply with these provisions may be grounds for decertification or removal from the project or both. Failure to maintain a designated Worksite Traffic Signal Supervisor or failure to comply with these

provisions will result in temporary suspension of all activities except traffic and such other activities deemed to be necessary for project maintenance and safety.

The Contractor shall at all times so conduct his work as to insure the least possible obstruction to normal pedestrian and vehicular traffic including access to all public and private properties during all stages of construction, and inconvenience to the general public and the residents in the vicinity of the work, and to insure the protection of persons and property, in a manner satisfactory to the City Engineer and/or the approved City of Schertz Representative.

The Contractor shall provide all barricades and take all necessary precautions to protect buildings and personnel. All work shall be complete in every respect and accomplished in a workmanlike manner and contractor shall provide for removal of all debris from City of Schertz property.

The successful bidder shall at all time guard against damage or loss to the property of the City of Schertz or of other vendors or contractors and shall be held responsible for replacing or repairing any such loss or damage. Any damage to landscaping in the work area, including sod shall be replaced at the Contractor's expense.

Prior to closing any section of the project to traffic, the Contractor shall furnish, erect and maintain barricades and warning signs at and in the vicinity of all construction projects at all times, both day and night, during the construction period of the contract, and all such barricades and warning signs, shall be in conformance with the requirements of Part 6 Temporary Traffic Control of the Texas Manual on Uniform Traffic Control Devices and as shown on the drawings.

Unless otherwise set forth in these specifications, the Contractor shall receive no direct compensation for furnishing, erecting, and maintaining the necessary barricades, lights, flares, 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 City of Schertz.

3.23 SPECIAL REQUIREMENTS

- A. A Steel Template shall be furnished by and used by the Contractor to secure anchor bolts while constructing pole foundations.
- B. Pole Foundations shall be capped where needed, in order to provide a smooth, flat, and level surface. Capping shall consist of a one (1) inch thick mortar cap prepared with a 1:3 sand-cement mortar ratio. The cap shall be steel trowel finished.
- C. Extra-length Concrete Pole Foundations shall be provided when required by site conditions. Reinforcing steel shall be increased by the same length as the increase in foundation length. Rods shown on Foundation Details shall be

increased as follows: Each extra foot of foundation shall require on additional foot of length for hooked rods and two additional turns for helix.

- D. All Special Foundations shall be designated and approved by the appropriate design engineer and/or the approved City of Schertz Representative.
- E. Sono Tube shall be used when the City of Schertz Traffic Signal Inspector deems it necessary.

3.24 CONCRETE FINISHING

Honeycombed surfaces or other defects shall be patched with mortar of the same consistency as the mortar from which the concrete is made. Such mortar shall be well trowelled and then floated to remove trowel marks.

- A. Finish for Formed Surfaces After patching above specified, exposed formed surfaces shall be finished by removing form marks, fins and other projections.
- B. Finish for Uniformed Surfaces
 - 1. Patches in streets, driveways and walks shall be finished to match adjacent surfaces.
 - 2. Surfaces not Otherwise Specified – Steel trowel finish.

3.25 CONCRETE CURING

Immediately after placing or finishing, concrete surfaces shall be protected against moisture loss for **a minimum of seven (7) days**. Wet earth, waterproof paper, vinyl sheets or cotton mats shall be placed over concrete during curing period in order to insure fulfillment of this requirement. Membrane curing method may be used **EXCEPT when** concrete surfaces are to receive additional concrete or mortar, or are to be painted.

3.26 CONCRETE/PAVEMENT REPAIR

Repairs to concrete pavement shall be in accordance with Public Works Drawing Numbers 02902-01 and 02902-02 titled, "Pavement Repair Details for Street Cuts".

3.27 FLEXIBLE BASE PAVEMENT REPAIR

Repairs to flexible base pavement shall be made in accordance with Public Works Drawing Number 02902-01 titled, "Pavement Repair Details for Street Cuts".

3.28 TRAFFIC SIGNAL TESTING SERVICES

A. PROCEDURES

- 1. Selection:

City of Schertz shall employ an Independent Testing Laboratory to ensure Contract Document compliance.

2. Test Reports

Testing laboratory will furnish reports to the Engineer, Structural Engineer, City of Schertz and Contractor covering all of its determinations and all of its control services. Reports will show all data customarily listed by the laboratory in reporting such tests including daily reports on quantities and types of materials together with location in the project. Form of reports will be as approved by the Engineer and/or the approved City of Schertz Representative.

3. Test Methods

Tests and inspections will be conducted in accordance with the requirements of these Specifications or, if not herein specified in accordance with the latest standards of the American Society for Testing and Materials or other recognized authorities.

4. Contractor's Responsibility

(a) Cooperate with the testing laboratory and:

- (1) Make available, without cost, samples of all materials to be tested.
- (2) Furnish such normal labor as is necessary to obtain samples at the project and to assist in making slump tests and casting and curing cylinders.
- (3) Advise the laboratory of the identity of material sources and instruct these suppliers to allow inspections by the laboratory, and notify the laboratory sufficiently in advance of operations to allow for completion of initial tests and assignment of inspection personnel.
- (4) Contractor shall provide laboratory testing for each different concrete load.

(b) Rejected Materials and/or Workmanship

If, after initial tests have been performed, any materials and/or workmanship are rejected by the testing laboratory, Contractor shall

- (1) Pay for any subsequent testing required for materials which have been rejected and/or replaced.

Any materials and/or workmanship which are rejected by the testing laboratory by reason of failure to conform to the requirements of the Drawings and/or Specifications, shall be removed and replaced with new acceptable materials by the Contractor at his own expense.

5. Additional Responsibility

- (a) The testing of all cable furnished shall be properly tested by the manufacturer and data submitted through the Contractor to the Engineer and/or the approved City of Schertz Representative.
- (b) All cable furnished to the job site shall be properly tested on the reel use.

3.29 PRELIMINARY WORK

A. PROCEDURES

1. City Requirements

- (a) City requirements relating to the work of this section shall be ascertained by the Contractor. Contractor shall comply with all such requirements, including those relating to continued maintenance until completion of the project.

(1) If the City should require that certain portions of the work be performed by City personnel and equipment, all costs in connection therewith which are chargeable against the project shall be paid by the Contractor as an obligation of this Section

(2) If re-routing of vehicular and/or pedestrian traffic is necessary to complete work of this Contract, Contractor shall submit a copy of his proposed re-routing plan to the City and the Engineer and/or the approved City of Schertz Representative for approval **seventy-two (72) hours** before proceeding with the work.

(3) Re-installation and restoration of use of existing public and private installations, which are temporarily and/or permanently removed and/or relocated for work of this Contract, shall be performed as a part of the work of this Section

2. Existing Installations of City-Owned Property

- (b) Perform all work relative to removal, storage and/or protection of existing installations of street lights and signs, fire hydrants, manholes, and other existing installations in the way of project construction.
- (c) Provide and maintain approved temporary protection of existing installations until project completion and acceptance. Remove temporary protection when, and as, directed by the City.
- (d) Existing facilities which are no longer required shall be disconnected as directed. Comply with the requirements of municipal agencies having jurisdiction over such work.

- (e) Unless otherwise directed, all abandoned facilities shall be removed by Contractor and the holes and trenches filled with approved compacted fill.

3.30 GUARANTEES

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 so required to conform with the manufacturer's guarantee, and all such manufacturer's guarantees, warranties and bonds shall be forwarded to the City of Schertz representative.

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 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.

END OF SECTION