Council Meeting: August 31, 2010

SUBJECT: Award of a Contract for Traffic Signal Preventative Maintenance and Repair Services (F0905-95)

BACKGROUND

Approval is requested for the award of a ten (10) month contract, through the end of FY 2010/2011, with option to extend for four additional one year periods, in an amount not to exceed $324,767 to Team Econolite Traffic Engineering and Maintenance, Inc. of Santa Clara to provide routine traffic signal maintenance and repair services as required by the Public Works Transportation and Traffic Division.

The City of Sunnyvale currently operates and maintains 128 traffic signals, nine signal interconnect systems, five flashing beacons, and seven in-roadway warning light (IRWL) systems. Traffic signal maintenance and repair involves ongoing and regular field preventive maintenance and the repair of traffic signals and other associated equipment. Current service levels require quarterly preventative maintenance on all signals and more comprehensive maintenance on an annual basis. In addition to scheduled maintenance, services must be performed "as-needed". "As-needed" services typically include repairs to malfunctioning or damaged traffic signals due to equipment failure, vehicular collisions, vandalism, weather or other miscellaneous repairs required to maintain safe and efficient operation of the traffic signals.

Historically, preventative maintenance and repair of the City's traffic signals has been outsourced through a competitive bid or proposal process. The most recent contract for these services, which was with Team Econolite, expired June 30, 2010. A two-month blanket purchase order was put in place to allow for the competitive proposal process and evaluation of proposals received.

DISCUSSION

Specifications were prepared by Public Works and Purchasing staff. The Request for Proposal (RFP) process was selected because, unlike an Invitation for Bids, it allows for consideration of factors in addition to cost during proposal evaluation. In this instance, staff determined that proposals would be evaluated based on the following criteria:

1.	Qualifications and ability to meet the performance requirements. Appropriateness and qualifications of the personnel, experience, training, certifications, equipment and facilities for the specified services. Ability to perform the services described in the specifications in the required manner and time frame.	35%

2.	Computerized traffic signal maintenance program and inventory management system for City of Sunnyvale. Appropriateness and ability to implement and maintain the required computerized system as detailed in the specifications.	15%
3.	Costs, based on proposal pricing indicated on the Proposal Form.	35%
4.	References; comments from references regarding proposer's responsiveness to customer requirements, compliance with the contract terms and conditions, and work quality.	15%

Request for Proposals No. F0905-95 was issued on June 28, 2010. The RFP package was directly distributed to three firms known to provide the required services and broadcast to other potential contractors through the DemandStar by Onvia public procurement network. Six firms requested RFP documents.

Sealed proposals were publicly opened on July 28, 2010. Two proposals were received: Team Econolite of Santa Clara and Republic ITS of Novato.

Routine (scheduled) maintenance costs proposed are as follows:

Proposer	Scheduled Maintenance
Team Econolite	$77,448
Republic ITS	$92,453

Annual totals should remain relatively static over the life of the contract (i.e. the same signal should receive the same level of service at the same interval) unless the City chooses to modify the required service levels at some future date. Price comparisons on repair services are more difficult to make as it is impossible to determine how many collision "knockdowns" will occur during the contract period, as well as how many and what classification of technicians and what types of equipment will be required to respond. Team Econolite and Republic are essentially comparable in their hourly rates and equipment rates for non routine tasks; both firms were higher in some areas and lower in other areas. Team Econolite proposed both rate increases and rate reductions from their last pricing modification in 2008.

An evaluation committee composed of representatives of Public Works and Purchasing reviewed and evaluated the proposals on pricing and other factors listed above. The committee unanimously agreed that the proposal submitted by Team Econolite offers the best value to the City based on its routine maintenance rates, qualifications and experience. Based on the information presented above, staff recommends award of the Traffic Signal Preventative Maintenance and Repair Services to Team Econolite.

FISCAL IMPACT

Transportation and Traffic Operations Program 119 includes funding for routine scheduled maintenance and non-routine repairs. Routine (scheduled) maintenance costs for the ten (10) month contract period will be $64,767.00. (The $77,448.00 proposed by Team Econolite was for a full 12 month period). The cost of non routine repair services is harder to determine, but based on Public Works repair records for pervious years, costs will not exceed $260,000 for a ten-month period. Total contract cost will not exceed $324,767. Should non-routine repairs exceed $260,000 due to unforeseen circumstances, staff will return to Council to amend the contract accordingly.

PUBLIC CONTACT

Public contact was made by posting the Council agenda on the City's official-notice bulletin board outside City Hall, at the Sunnyvale Senior Center, Community Center and Department of Public Safety; and by making the agenda and report available at the Sunnyvale Public Library, the Office of the City Clerk and on the City's Web site.

RECOMMENDATION

It is recommended that Council award a ten (10) month contract, through the end of FY 2010/2011, with option to extend for four additional one year periods, in substantially the same form as the attached draft and in an amount not to exceed $324,767, to Team Econolite Traffic Engineering and Maintenance Inc., to provide routine traffic signal maintenance and non-routine repair services.

Reviewed by:

Grace K. Leung, Acting Director, Finance
Prepared by: Pete Gonda, Purchasing Officer

Reviewed by:

Marvin Rose, Director of Public Works

Approved by:

Gary M. Luebbers
City Manager

Attachments

A. Draft Service Agreement

DRAFT

SERVICE AGREEMENT BETWEEN CITY OF SUNNYVALE AND TEAM ECONOLITE TRAFFIC ENGINEERING AND MAINTENANCE, INC. FOR TRAFFIC SIGNAL PREVENTATIVE MAINTENANCE AND REPAIR SERVICES

THIS AGREEMENT, dated _____, is by and between the CITY OF SUNNYVALE, a municipal corporation ("CITY"), and Team Econolite Traffic Engineering and Maintenance, Inc. ("CONTRACTOR").

WHEREAS, on June 29, 2010, CITY issued Request for Proposals #F0905-95 for Traffic Signal Preventative Maintenance and Repair Services; and

WHEREAS, CONTRACTOR has submitted a bid in response to the Request for Proposals; and

WHEREAS, CITY has determined that CONTRACTOR is the lowest responsive and responsible bidder;

NOW, THEREFORE, THE PARTIES ENTER INTO THIS AGREEMENT.

1. Services

(a) There are attached and incorporated by this reference the following exhibits:

(1) Exhibit "A", consisting of Pages 2 through 6, inclusive, of that certain document entitled "Request for Proposals #F0905-95". The document consists of the Notice Inviting Proposals, Instructions to Proposers, Specifications, Terms and Conditions, and Instructions for Completion of Proposal Form as well as Attachment A (Detailed Specifications), Attachment B (List of Signalized Intersections), Attachment C (Quarterly Preventative Maintenance Checklist), Attachment D (Annual Preventative Maintenance Checklist), Attachment E (IRWL Preventative Maintenance Checklist), Attachment F (Flashing Beacon Preventative Maintenance Checklist), Attachment G (Loop Test Log), Attachment H (SOP Bicycle and Pedestrian Safety) and Attachment I (City of Sunnyvale Traffic Signal Standards), which was submitted to all prospective proposers.

(2) Exhibit "B", consisting of Pages 7 through 12, inclusive, of that certain document presenting the response to "Request for Proposals #F0905-95", as submitted to CITY by CONTRACTOR with the pertinent information provided by CONTRACTOR in response to the Request for Proposals.

(b) CONTRACTOR shall perform the services described in Pages 5 through 6, inclusive, of Exhibit "A" (III. Specifications).

(c) The performance of such services shall be governed by Page 6 of Exhibit "A" (IV. Terms and Conditions).

2. Time for Performance

Time of performance of this Agreement will be for ten (10) months, effective September 1, 2010 through June 30, 2011. This Agreement may be extended by four (4) one-year periods if service and pricing remains acceptable to CITY.

Time is of the essence in the performance of the Agreement. If services cannot be performed at the specified time, CONTRACTOR shall promptly notify CITY of the earliest possible date for performance of the services. Notwithstanding such notice, if CONTRACTOR, for any reason whatsoever, fails to perform the services within the time specified, CITY may terminate the Agreement or any part thereof without liability except for services previously performed and accepted.

3. Duties of CITY

CITY shall supply any documents or information available to CITY required by CONTRACTOR for performance of its duties. Any materials provided shall be returned to CITY upon completion of the work.

4. Compensation

CITY agrees to pay CONTRACTOR as full compensation for the services rendered pursuant to this Agreement, the amounts set forth in Exhibit "B". In no event shall the total amount of compensation payable under this Agreement exceed the sum of Three Hindered Twenty Four Thousand Seven Hundred Sixty Seven and no/100 Dollars ($324,767.00) unless upon written modification of this Agreement.

5. CONTRACTOR'S Wage and Benefit Structure

Contractor warrants that it offers to its employees the wages and benefits described in Exhibit "C" attached and incorporated by reference, if, during the term of this Agreement, its wages and benefits structure changes, CONTRATOR shall provide written notice of each change to CITY at least thirty (30) days to its effective date.

6. Conflict of Interest

No officer or employee of CITY shall have any interest, direct or indirect, in this Agreement or in the proceeds thereof. During the term of this Agreement CONTRACTOR shall not accept employment or an obligation which is inconsistent or incompatible with CONTRACTOR's obligations under this Agreement.

7. Confidential Information

CONTRACTOR shall maintain in confidence and at no time use, except to the extent required to perform its obligations hereunder, any and all proprietary or confidential information of CITY of which CONTRACTOR may become aware in the performance of its services.

8. Compliance with Laws

(a) CONTRACTOR shall strictly adhere to all state and federal laws with respect to discrimination in employment and shall not discriminate against any individual on the basis of race, color, religion, gender, sexual orientation, marital status, national origin, age or disability.

(b) CONTRACTOR shall comply with all federal, state and city laws, statutes, ordinances, rules and regulations and the orders and decrees of any courts or administrative bodies or tribunals in any manner affecting the performance of the Agreement.

9. Independent Contractor

CONTRACTOR is acting as an independent contractor in performing the work required by this Agreement and is not an agent, servant or employee of CITY. Nothing in this Agreement shall be interpreted or construed as creating or establishing the relationship of employer and employee between CITY and CONTRACTOR. CONTRACTOR is responsible for paying all required state and federal taxes.

10. Indemnity

CONTRACTOR shall indemnify, defend, and hold harmless the City, its officers, officials, employees and volunteers from and against all claims, damages, losses and expensed, including attorney fees, arising out of the performance of the services described in Exhibit "A"., caused in whole or in part by any negligent act or omission of CONTRACTOR, and subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, except where caused by the active negligence, sole negligence or willful misconduct of the CITY.

11. Insurance

CONTRACTOR shall take out and maintenance for the life of this agreement policies of insurance as specified in Exhibit "D" attached hereto and incorporated by reference, and shall provide all certificates or endorsements as specified in Exhibit "D".

12. CITY Representative

Carmen Talavera, PW/Division of Transportation and Traffic, as City Manager's authorized representative, shall represent CITY in all matters pertaining to the services to be rendered under this Agreement. All requirements of CITY pertaining to the services and materials to be rendered under this Agreement shall be coordinated through the CITY representative.

13. CONTRACTOR Representative

John Cane, Regional Manager, shall represent CONTRACTOR in all matters pertaining to the services and materials to be rendered under this Agreement. All requirements of CONTRACTOR pertaining to the services to be rendered under this Agreement shall be coordinated through the CONTRACTOR representative.

14. Notices

All notices required by the Agreement shall be in writing, and shall be personally delivered or sent by first class mail, postage prepaid or by commercial courier, addressed as follows:

To CITY: Carmen Talavera, Sr. Transportation Engineer
Public Works, Division of Transportation and Traffic
CITY OF SUNNYVALE
P. O. Box 3707
Sunnyvale, CA 94088-3707

To CONTRACTOR: Team Econolite Traffic Engineering and Maintenance, Inc.
Attn: John Cane, Regional Manager
3360 E. La Palma Avenue
Anaheim, CA 92806

Nothing in this provision shall be construed to prohibit communication by more expedient means, such as by telephone or facsimile transmission, to accomplish timely communication. However, to constitute effective notice, written confirmation of a telephone conversation or an original of a facsimile transmission must be sent by first class mail or commercial carrier, or hand delivered.

Each party may change the address by written notice in accordance with this paragraph. Notices delivered personally shall be deemed communicated as of actual receipt; mailed notices shall be deemed communicated as of three days after mailing, unless such date is a date on which there is no mail service. In that event communication is deemed to occur on the next mail service day.

15. Assignment

Neither party shall assign or sublet any portion of this Agreement without the prior written consent of the other party.

16. Termination

If CONTRACTOR defaults in the performance of this Agreement, or materially breaches any of its provisions, CITY at its option may terminate this Agreement by giving written notice to CONTRACTOR. If CITY fails to pay CONTRACTOR, CONTRACTOR at its option may terminate this Agreement if the failure is not remedied by CITY within thirty (30) days from the date payment is due.

Without limitation to such rights or remedies as CITY shall otherwise have by law, CITY also shall have the right to terminate this Agreement for any reason upon ten (10) days' written notice to CONTRACTOR. In the event of such termination, CONTRACTOR shall be compensated in proportion to the percentage of services performed or materials furnished (in relation to the total which would have been performed or furnished) through the date of receipt of notification from CITY to terminate. CONTRACTOR shall present CITY with any work product completed at that point in time.

17. Entire Agreement; Amendment

This writing constitutes the entire agreement between the parties relating to the services to be performed or materials to be furnished hereunder. No modification of this Agreement shall be effective unless and until such modification is evidenced by writing signed by all parties.

18. Miscellaneous

Time shall be of the essence in this Agreement. Failure on the part of either party to enforce any provision of this Agreement shall not be construed as a waiver of the right to compel enforcement of such provision or any other provision. This Agreement shall be governed and construed in accordance with the laws of the State of California.

IN WITNESS WHEREOF, the parties have executed this Agreement.

ATTEST:

By_____
City Clerk

APPROVED AS TO FORM:

By _____
City Attorney

CITY OF SUNNYVALE ("CITY")

By_____
City Manager

Team Econolite Traffic
Engineering and Maintenance, Inc.
("CONTRACTOR")

By _____

_____
Title and Date

By _____

_____
Title and Date

EXHIBIT A

TABLE OF CONTENTS

SECTION I. NOTICE INVITING PROPOSALS

The City of Sunnyvale is seeking proposals from qualified contractors to provide a comprehensive Traffic Signal Preventive Maintenance and Repair Program for a one-year period with an option to extend the contract up to four (4) additional one-year periods.

SECTION II. INSTRUCTIONS TO PROPOSERS

A. **Preparation of Proposals** – Proposals shall be made on the Proposal Form included in this Request for Proposals. Proposers shall enter all requested information in the appropriate spaces on the Proposal Form. No oral, telephone, facsimile or electronic proposals will be accepted. All costs of proposal preparation shall be borne by the proposer.

B. **Examination of Proposal Documents** - The Proposal Documents consist of this Request for Proposals, each and every document listed in the Table of Contents of the request, and any addenda which may have been issued. Proposers shall thoroughly examine and be familiar with all Proposal Documents. Submission of a proposal shall constitute proposer's acknowledgment upon which the City may rely that the proposer has thoroughly examined and is familiar with the Proposal Documents. Failure or neglect of a proposer to receive or examine all or part of the Proposal Documents shall in no way relieve the proposer from any obligations with respect to this Request for Proposals or any resultant Contract. No claim for additional compensation will be allowed which is based upon a lack of knowledge of any part of the Proposal Documents.

C. **Conformance to Proposal Requirements** - Proposals shall conform to the requirements of this Request for Proposals. All requested attachments shall be submitted with the completed Proposal Form and in the designated format. Failure to comply with all requirements may result in proposal rejection.

D. **Interpretation of Proposal Documents and Addenda** - Should a proposer discover conflicts or ambiguity in the Proposal Documents that require a decision or explanation, the proposer may request an interpretation. Such a request shall be made in writing and delivered to the person identified on the cover page of this Request for Proposals no later than five (5) calendar days before the deadline for receipt of proposals. Every interpretation made to proposers will be in the form of an Addendum issued by the City. Addenda, if issued, will be sent as promptly as possible to all parties that have been issued Proposal Documents. Only properly issued Addenda shall be binding upon City; any oral and/or other form of interpretation or clarification will have no legal or contractual effect. Proposers shall acknowledge the receipt of Addenda on the Proposal Form.

E. **Submission of Proposals** - Proposers shall submit original (clearly marked 'Original') and four (4) copies (clearly marked 'Copy') of the completed Proposal Form, together with any required attachments or explanatory materials, prior to the time and date set for receiving proposals as stated on the cover page of this Request for Proposals or any modifying Addenda. Proposals shall be delivered in a sealed envelope ***clearly marked with the applicable proposal number*** addressed to:

City of Sunnyvale
Purchasing Division
City Hall Annex
650 West Olive Avenue
PO Box 3707
Sunnyvale, CA 94088-3707

F. **Modification or Withdrawal of Proposals**

1. Before Date and Time for Receipt of Proposals - Proposals that contain mistakes discovered by a proposer before the date and time for receipt of proposals may be modified or withdrawn by written notice to City's Purchasing Officer received prior to the deadline. Any modification shall be clearly identified as such and shall be made in writing, executed and submitted in the same form and manner as the original proposal.

2. After Date and Time for Receipt of Proposals - A proposer may not modify its proposal after the date and time set for receipt of proposals. A proposer alleging a mistake in a proposal may be permitted to withdraw its proposal if the proposer alleges that a mistake was made in its proposal that made the price materially different than intended, provided that bidder gives written notice of the mistake and the manner in which it occurred to City's Purchasing Officer within five (5) calendar days following the deadline for receipt of proposals and City's Purchasing Officer deems it to be in the best interest of the City.

G. **Late Proposals** - Proposers shall be responsible for the timely delivery of proposals. Proposals received after the deadline for receipt of proposals shall not be accepted and shall be returned to the proposer unopened unless necessary for identification purposes.

H. **Public Opening of Proposals** - Each proposal irrespective of any defects or irregularities, that has been received prior to the deadline for receipt of proposals, except those that have been properly withdrawn, will be publicly opened by a representative of the Purchasing Division at the date and time announced for such opening. If one or more members of the public are present, the name and address of each proposer will be read aloud at or shortly following the deadline for receipt of proposals. Further information will be made public after contract award.

I. **Proposals to Remain Open** - The proposer shall guarantee its proposal for a period of sixty (60) calendar days from the date of proposal opening.

J. **Non-Collusion Certification** - By submitting a proposal, proposer is certifying that it has not directly or indirectly been collusive with any other proposers in the preparation and submission of the proposal. If at any time it shall be found that the proposal to whom a contract has been awarded has, in presenting the bid, colluded with any other party or parties, said proposer shall be liable to the City for all loss or damage which the City has or may suffer as the result of the collusive activity, including, but not limited to, the cost of advertising and awarding a new contract.

K. **Evaluation Criteria -** Proposals will be evaluated based on the following criteria:

Criteria	Percentage
1. Qualifications and ability to meet the performance requirements. Appropriateness and qualifications of the personnel, experience, training, certifications, equipment, and facilities for the specified services. Ability to perform the services described in the Detailed Specifications (Attachment A) in the required manner and time frame.	35%
2. Computerized traffic signal maintenance program and inventory management system for City of Sunnyvale. Appropriateness and ability to implement and maintain the required computerized maintenance and inventory system as specified in the Detailed Specifications (Attachment A).	15%
3. Costs, based on proposal pricing indicated on the attached Proposal Form. The payment of prevailing wage is neither required nor precluded. However, proposer shall include with the Proposal Form proposer wage and benefit structure for proposer's employees who will perform work under this contract (question #11).	35%
4. References. Comments from references regarding proposer's responsiveness to customer requirements, compliance with the contract term and conditions, and work quality.	15%

L. **Sunnyvale Business License** – The successful proposer must either possess a current, valid Sunnyvale business license or must have submitted a Sunnyvale business license application and fee at the time of award.

M. **Contract Award** - Contract award will be made to the proposer whose proposal offers the best value to the City of Sunnyvale. The acceptance of a proposal will be evidenced by a written contract delivered to the successful proposer for execution.

N. **Contract Documents** - Contract documents will consist of this Request for Proposals; its attachment(s) and addenda, if any; the successful proposer's completed and signed Proposal Form; the successful proposer's proof of insurance coverage; and an executed Service Agreement (Attachment G).

O. **Reservations** - The City reserves the right to:

1. Postpone the date and time announced for receipt of proposals by issuance of an Addendum at any time prior to the deadline for receipt of proposals;
2. Reject any proposal that is conditional in any way or that contains erasures, items not called for, items not in conformity with applicable law, changes, additions, alternate proposals, or any other modifications of the Proposal Form which are not in accordance with the Proposal Documents;
3. Make any investigations deemed necessary to determine proposer's ability to satisfactorily meet City requirements;
4. In the event that only one proposal is received in response to this Request for Proposals, require the sole proposer to submit cost or pricing data to assist in determining if the price is reasonable;
5. Reject any or all proposals;
6. Waive minor defects or irregularities in any proposal, provided that the discrepancy does not affect the proposal amount or give the proposer an advantage over others;

SECTION III. SPECIFICATIONS

A. **Background** - The City of Sunnyvale's Traffic Signal Preventive Maintenance and Repair Program involves ongoing and regular field preventive maintenance and repair of traffic signals and other related equipment by a licensed contractor with properly trained, experienced and qualified personnel. The City of Sunnyvale currently operates and maintains 128 traffic signals, 7 in-pavement crosswalk light and 4 flashing beacon installations, which are listed in Attachment B.

The City requires quarterly preventive maintenance on all traffic signals and flashing beacons listed in Attachment B. In addition, the City requires an annual preventive maintenance check and an annual inventory of all components of each traffic signal.

The contract which may result from this Request for Proposals will include, but not be limited to, the following provisions:

- Regular quarterly preventive maintenance services and cleaning and inspection of traffic signals on an ongoing basis.
- Regular quarterly daylight inspection of all traffic signals and in-pavement crosswalk lights.
- Semi-annual night inspection of all traffic signals and in-pavement crosswalk lights.
- Annual preventive maintenance of all traffic signals, in-pavement crosswalk lights, and flashing beacons.
- Repair or replacement of traffic signal control devices, as requested.
- Warranty service and management of warranty claims for any and all traffic signal equipment used by the City.
- Advance notification to City staff for any and all planned work.
- Regular submission to the City of accurately maintained and detailed inventory records of traffic signal equipment.
- Regular submission to the City of accurate monthly activity records and reports of any and all work and service calls related to the City's traffic signals.
- Response to all service requests in a timely manner.
- An assessment of liquidated damages for failure to provide a timely response to service requests.
- Professional and diligent performance of all contract requirements.

B. **Detailed Project Specifications** – See Attachment "A" for detailed City of Sunnyvale project specifications.

C. **Contract Term** – The contract shall commence August 1, 2010, or on the contract execution date, whichever is later, and will continue through July 31, 2011. Beginning 2011, the City will have the option of extending the contract up to four (4) additional one-year period, each commencing on August 1 and continuing until midnight, July 31, provided that the City provides an annual written notice of intent to extend the contract. Under no circumstances shall the term of the contract continue beyond midnight, July 31, 2015.

After the initial contract term, the City may terminate the contract at any time by providing thirty (30) days' written notice to the successful proposer.

The successful proposer may give written notice to the City prior to June 1, 2011, or prior to June 1 of any subsequent year, that it does not consent to extending the contract beyond July 31. In the event that the City receives such timely notice from the successful proposer, the contract will expire at midnight, July 31.

D. **Proposer Qualifications** – Proposers shall be possess a valid California State Contractor's License, either Class "A" or Class "C-10" throughout with contract term, including extensions, if any, and shall be experienced performing similar services of similar scope for other public agencies.

E. **Compensation** – Rates may be reviewed annually by the successful proposer and the City; and rate increases may be requested in writing with detailed justification. Nevertheless, the maximum increase in labor and/or equipment costs in any calendar year shall be five percent (5%) or the most recent preceding increase in the Consumer Price Index (CPI) for the West Coast published by the United States Department of Labor, Bureau of Labor Statistics, whichever is less.

SECTION IV. TERMS AND CONDITIONS

A. **Service Agreement -** The terms and conditions which apply to this purchase shall be those set forth in the attached sample Service Agreement (Attachment K), including the City's insurance requirements for the successful proposer. Any exceptions to the City's Service Agreement must be submitted in writing as part of the proposer's response.

B. **Proposer's Wage and Benefit Structure** – Proposer warrants that if the wage and benefits structure described in Section 11 of the Proposal Form changes, the proposer shall provide written notice of each change to the City at least thirty (30) days before its effective date.

SECTION V. INSTRUCTIONS FOR COMPLETION OF PROPOSAL FORM

A. **Entries on Proposal Form -** All entries shall be printed in ink or shall be typewritten.

B. **Corrections** - Corrections shall be initialed in ink by the person signing the proposal.

C. **Project Pricing -** Proposal pricing shall be complete, including all costs for labor, supervision, methods or processes, implements, tools, machinery, equipment, transportation and materials required to complete the work described in this Request for Proposals.

D. **Required Information -** All information requested for entry on the Proposal Form must be provided. If necessary, proposers may attach additional sheets clearly cross referenced to the applicable item number. In addition, proposer shall attach and submit the detailed narratives described in Item 11 of the Proposal Form.

E. **Addenda** – Proposers shall indicate the number and date of all addenda received.

F. **Signature -** Proposals shall be signed by an authorized representative of proposer.

DETAILED SPECIFICATIONS

ATTACHMENT A

III. SCOPE OF WORK

A. SERVICES

The Contractor shall provide ongoing and regular field preventive maintenance and repair of traffic signal equipment, flashing beacons, and other related equipment by duly trained and qualified personnel.

The Contractor is required to have on staff and available to perform Services under this contract, designated solely for the City of Sunnyvale a minimum of 1 utility personnel and 2 Traffic Signal Technicians. If the Contractor fails to conduct and finish 11 Annual Preventive Maintenance checks within the first 11 days of the month for any 2 months within a 6 month window or finish all Quarterly Preventive Maintenance checks within any quart the City will require that the Contractor have on staff designated solely for the City of Sunnyvale, a minimum of 1 Traffic Signal Technician per 45 signalized intersections. The Traffic Signal Technician shall have a minimum of four years of experience in traffic signal repairs. The Traffic Signal Technician shall have experience with the operation and maintenance of type 170, 2070, and various NEMA controllers currently in use by the City of Sunnyvale. The Traffic Signal Technician shall also be familiar with all software in use by the City of Sunnyvale, including but not limited to BiTrans 233, BiTrans 200SA, BiTrans 210FM, Caltrans C7 and C8, SCATS Adaptive, RHODES Adaptive, Naztec Apogee and Fourth Dimension Traffic D4 Signal. The Traffic Signal Technician shall also have knowledge of the operation and maintenance of inductive traffic loops, video detection systems, EMTRAC emergency vehicle preemption devices, Microwave interconnect, twisted pair interconnect, wireless 2.4GHz Spread Spectrum Radio communications, and fiber optic cables. The Traffic Signal Technician shall keep up to date on the operation and maintenance of all state-of-the-art traffic signal control device and related equipment to ensure that the City's needs will also be supported in the future. The Traffic Signal Technician shall also be familiar with and adhere to all Caltrans and City programming standards for both traffic signal and coordination timing of traffic signal controllers. Traffic Signal technician and utility personnel must be available to work in Sunnyvale 8 hrs a day, 5 days a week.

The Contractor is required to have on staff and available to perform services under this contract a Traffic Signal Analyst with a minimum of ten years' of experience in traffic signal timing and coordination operations. The Traffic Signal Analyst, as directed by the City, shall focus on maximizing the overall efficiency of traffic signal timing and coordination operations in the City of Sunnyvale. The Traffic Signal Analyst shall be familiar with the BiTrans 233 software for type 170 controllers, BiTrans QuicTrac and QuicNet software, and Fourth Dimension Traffic D4 Signal controller software for VTA Light Rail, SCATS adaptive traffic signal control software, RHODES adaptive traffic signal control software, time of day coordination, traffic responsive coordination, and the various communications mediums used for traffic signal interconnection. The Traffic Signal Analyst shall also be knowledgeable about the operation of all traffic signal equipment currently in use by the City of Sunnyvale. The Traffic Signal Analyst shall maintain a good working knowledge on the operation of any state-of-the-art traffic signal control device or related equipment to ensure that the City's needs will also be supported in the future. The Traffic Signal Analyst shall also be familiar with and adhere to all Caltrans and City programming standards for both traffic signals and coordination timing of traffic signal controllers.

The Contractor shall provide and maintain emergency service response of the City's traffic signals on a 24-hour a day, 7 days per week basis, including all holidays.

The Contractor must provide a vehicle for the use of the Contractor's Traffic Signal Technician which shall be equipped with a permanently mounted arrow board; warning beacon/strobe lights; traffic cones; construction warning signs; a hydraulic bucket capable of reaching a height of 40 feet from the

roadway surface; proper lighting for illuminating the work area at night; necessary computer laptop for programming, maintenance and testing of traffic signal controllers and various equipment; and communications equipment for dispatch. In addition, Contractor's employee shall be required to have radio communication equipment for dispatch purposes. At a minimum, this shall be a cellular phone capable of numeric and text messages with vibration alert. All of the required equipment shall be properly maintained and functional 24 hours a day, 7 days a week, including holidays.

The Contractor shall ensure that any vehicle used within the boundaries of the City of Sunnyvale where lane closures or work within the travel lanes is required shall be equipped with an arrow board, warning beacons/strobe lights, the proper quantity and sized cones for a lane closure, and advance warning signs. All of the Contractor's employees working within the boundaries of the City shall be equipped with a communications device capable of instant 2-way communications for extended periods of time with the Contractor's shop or with City staff.

The Contractor must possess, and have readily accessible in functioning order, all required tools, equipment, apparatus, facilities, and materials need to perform all work necessary to maintain and repair the traffic signals and flashing beacons listed in Attachment B in compliance with current Caltrans and City standards and specifications. This includes but is not limited to LED Degradation Tester for 12" and 8" indications, Conflict Monitor Tester for 210, 2010, 2018 and NEMA type Conflict Monitor Units, Battery Tester for 12VDC and 24VDC batteries used in uninterruptible power supply systems, SPIRENT Tech X Field Tester for SIC cable, and grounding system tester. This equipment shall be available at all times for use solely in the City of Sunnyvale.

The Contractor shall furnish temporary replacement traffic signal controllers, coordination units, preemption units, traffic signal communications and monitoring equipment, detector amplifiers, conflict monitors, video detection systems, and uninterruptible power supplies for traffic signals and various other standard traffic signal equipment. Contractor furnished temporary spares shall be identical to the component being replaced in manufacture, make and model. The Contractor shall deviate from this requirement only upon written advance approval from the City. The Contractor shall provide the temporary equipment at no additional charge to the City whenever the original units are removed for repair or servicing.

The Contractor shall cooperate with the City in recalibrating traffic signal coordination timing and progression.

The Contractor shall change the timing of traffic signals only upon the direction or advance written approval of the City.

During emergency conditions, the Contractor shall assure full cooperation with the City of Sunnyvale Department of Public Safety, the Santa Clara County Sheriff's Department, the California Highway Patrol (CHP) and those employees of the City of Sunnyvale Department of Public Works Division of Transportation and Traffic as indicated.

The Contractor shall ensure that all staff shall obtain Rail Safety certification from Valley Transportation Authority (VTA) and Caltrain allowing them to work in and around VTA and Caltrain track right of way.

The Contractor shall not represent the City of Sunnyvale in matters of policy or procedures under this contract, shall not make any reference to City policy or procedures, and shall refer all questions or inquiries from the public regarding policy and procedures, or terms and conditions of this contract to the City.

The Contractor shall provide traffic control/lane closures that conform to the WATCH manual and/or Caltrans Traffic Manual. For any work impacting bicycle lanes, the Contractor's traffic control/lane closures shall conform to the City of Sunnyvale's Standard Operating Procedure for Bicycle/Pedestrian Safety (Attachment H).

B. FAILURE TO PERFORM

Should the Contractor fail to properly execute the work in a timely or correct matter as provided under the terms of this contract, the City, after providing the Contractor with three business days' notice, may perform or hire another Contractor to perform such work and deduct the cost plus 25% thereof from any payment due to the Contractor.

The Contractor shall provide the City with a written schedule of work within three business days of approval of any repair/service estimate. If the Contractor fails to provide the written schedule, the City shall consider the Contractor to be "failing to perform" a necessary task within a timely matter. The City shall then perform or hire another Contractor to perform such work and deduct the cost plus 25% thereof from any payment due to the Contractor.

C. ROUTINE MAINTENANCE

The Contractor shall enact a continuing comprehensive maintenance program designed to eliminate or reduce any incidence of malfunctions, complaints, and extension of the useful life of the City's traffic signal equipment. The program shall include at a minimum the following:

1. QUARTERLY AND ANNUAL PREVENTIVE MAINTENANCE

The Contractor shall provide quarterly preventive maintenance on the signalized intersections, In-Roadway Warning Lights (IRWL) and Flashing Beacon Systems listed in Attachment B. The Contractor shall complete a Quarterly Preventive Maintenance Checklist (Attachment C, Attachment E, & Attachment F) for each maintenance inspection and shall indicate the minimum work required for each item. The Contractor shall maintain one copy of the completed form for each intersection and for each inspection in the Contractor's business office throughout the term of this contract. The Contractor shall submit electronic version of the completed quarterly preventive maintenance forms as part of its monthly activity report. The April and October monthly preventive maintenance inspections shall be conducted at night and shall be considered the semi-annual night-time inspections required under this contract.

The Contractor shall provide annual preventive maintenance of the signalized intersections, In-Roadway Warning Lights (IRWL) and flashing beacons listed in Attachment B. The Contractor shall complete an Annual Preventive Maintenance Checklist (Attachment D, Attachment E & Attachment F), Loop Test (Attachment G), and CMU test reports on Company's Letter Head for each annual maintenance inspection and shall indicate the minimum work required for each item. The Contractor shall maintain one copy of the completed forms for each intersection and for each annual inspection in the Contractor's business office throughout the term of this contract. The Contractor shall submit electronic version of the completed annual preventive maintenance forms as part of its monthly activity report when completed. The Contractor shall submit a schedule for the annual maintenance inspection at the start of the contract. The Contractor shall maintain three copies of the following documents: annual preventive maintenance checklist, the full field test results of the traffic signal conflict monitor, and megger test of traffic loops from the cabinet.. One copy shall be left in the traffic signal controller cabinet, one copy shall be maintained at the Contractor's business office, and one electronic version of the forms shall be sent to the City with the monthly invoice.

The Contractor shall maintain two separate logs at each signalized intersection, flashing beacon systems and IRWL included under this contract. One log shall detail each quarterly and annual preventive maintenance inspection by the Contractor. The Contractor shall complete at a minimum on this log, the inspection date, arrival time, departure time, type of inspection, any findings or repairs, and the Contractor's employee name or ID. The other log shall detail any extraordinary repairs or service calls for the intersection. This log shall detail the nature of the emergency/service call, the Contractor's findings, the repair made, Repair Order number, if applicable, arrival time at the intersection, departure time, and the Contractor's employee name or ID.

It is understood and agreed that failure on the part of the Contractor to perform quarterly and annual preventive maintenance as required by this contract will cause the City to suffer an unascertainable amount of damage. Therefore, the Contractor agrees to pay to the City, not as a penalty but as liquidated damages, the amount of $500 per calendar day that the intersection is overdue for monthly or annual preventative maintenance and for failure to provide logs with requested information. The total amount of liquidated damages will be deducted from the monthly invoice payment. Liquidated damages will also be applied for any annual preventive maintenance check not completed by the end of the fiscal year and two annual preventive maintenance checks will be required per location not completed during the following Fiscal Year at no extra charge to the City for the additional annual preventive maintenance check.

2. TRAFFIC SIGNAL CONTROL EQUIPMENT

The Contractor shall repair, replace or otherwise render in good working order any and all defective parts of all traffic signal control equipment. Whenever the Contractor replaces any defective parts on either a temporary and/or permanent basis, the Contractor shall identify the parts being replaced by manufacturer's make and model. Further, the Contractor shall only use new parts for permanent replacement. Exceptions to this requirement shall only occur on an individual basis upon advance written approval from the City.

No permanent changes of traffic signal control devices shall be done without prior written approval from the City. Whenever any traffic signal equipment is removed/replaced/modified, the Contractor shall notify the City by telephone within one hour of the change, followed by written notification to the City within three working days. Furthermore, any changes shall also be indicated on the maintenance or repair log within the traffic signal controller cabinet.
The Contractor agrees to notify, the City in advance of any planned or scheduled traffic signal turn-offs/turn-ons necessitated by the Contractor's operations. The Contractor shall make turn-offs/turn-ons of traffic signals only upon prior written approval by the City. Furthermore, a City representative shall be present at all turn-offs/turn-ons of any traffic signals.

All traffic signal control equipment (poles, in-roadway warning lights, signals, conduits, conductors, camera, loops, UPS systems, and wireless communication systems) shall be maintained in accordance with the manufacturer's recommendations. The Contractor shall bear the cost for replacing any part of the traffic signal control equipment under the provisions of the maintenance program. When the traffic signal control equipment becomes obsolete or deteriorated to the point of being beyond reasonable or cost effective repair, the Contractor shall report such conditions to the City and provide satisfactory evidence that replacements are necessary. The Contractor shall prepare estimates showing the cost breakdown of materials and labor for replacement of such traffic signal control equipment and submit this information to the City.

3. NEW INSTALLATIONS OR DELETIONS

The Contractor shall maintain any new traffic signal equipment, in-roadway warning lights, flashing beacons, and any other related devices, which are installed for or by the City throughout the term of the contract. These devices will be deemed to be added to the existing signalized intersection listed on Attachment B when the City notifies the Contractor of the installation thereof. These added devices, regardless of the complexity of the technology shall be maintained in the same manner and for the same flat rate as those devices already covered by the contract.

In the event notification of the addition of any device is made any day other than the first day of the month, payment for that month shall be prorated from the first day the Contractor is notified to begin maintenance. Should responsibility for the maintenance of any current or future traffic signal device cease to be the City's, the City will notify the Contractor in writing of the last date to perform maintenance. The flat rate maintenance for any such affected device shall be prorated on the basis of the number of days that device was maintained by the Contractor.

4. IN-ROADWAY WARNING LIGHTS

The Contractor shall provide preventive maintenance for all in-roadway warning lights. The same service and maintenance requirements shall exist for in-roadway warning lights as for traffic signals. See attachment E for IRWL PM form.

5. WARRANTY SERVICE

During the warranty period for any traffic signal, LED, traffic signal controller, communications/monitoring/interconnection device, loop amplifier, video camera, electronic message sign, emergency preemption device, or any traffic signal related device, the Contractor shall be responsible for making contact between the equipment manufacturer, the installing contractor and the City regarding any required service determined to be under warranty. The Contractor shall notify the City of any undue delays in response due to the manufacturer or installing contractor and provide details of each incident.

D. CONTRACTOR SHOP AND EMERGENCY SERVICE

The Contractor shall have established an adequate shop and storage facilities within ten miles travel distance to the intersection of Mathilda Avenue and Olive Avenue. This facility shall house the necessary staff, traffic signal poles, signals, traffic signal controllers, traffic signal communications devices, LEDs, controller cabinets, service cabinets, uninterruptible power supplies, wiring, pullboxes, pullbox lids, and other necessary materials and vehicular equipment to perform all maintenance required and to perform temporary and permanent repair of accident damage to traffic signal equipment/devices. This facility shall also be equipped to perform twenty-one day bench test of traffic signal controller cabinets in accordance to Caltrans and City specifications. This facility shall have all test equipment necessary to test conflict monitors, load switches, flashers, detector amplifiers, controllers, LEDs, and controller cabinets. This facility shall be staffed and open for meetings/inspections at any time Monday thru Friday during normal working hours.

The Contractor shall maintain a single local telephone number during the entire term of the contract where he/she or a designated representative can be reached 24 hours a day, 365 days a year.

The Contractor shall also maintain and provide direct phone numbers, cellular phone numbers, fax numbers, and email addresses of various pertinent staff/employees with which the City can maintain regular and direct contact with regarding billing, estimating, service calls, status reports, scheduling, testing of equipment, and various other issues.

When notified of any traffic signal device malfunction, failure, loss of indication, accident damage, construction damage, or any traffic signal service call, the Contractor shall respond and be at the location within one hour following notification from the City, CHP, or County Sheriff first notifies the Contractor.

In the event of a knockdown, the Contractor shall provide temporary emergency replacement of a type acceptable to the City until permanent repairs can be accomplished. The Contractor shall not reinstall the damaged equipment even if there are no visible signs of damage. Public safety and reliability is of the utmost concern. The Contractor shall install a temporary device appropriate for the situation and consult with the City to identify a permanent replacement. Required replacement of equipment will require prior written approval from the City before such replacements are commenced in conjunction with an emergency call.

The requirement of the previous paragraph will apply except when a pedestrian pushbutton pole or 1B pole is knocked down with no damage to the existing foundation or anchor bolts. In both of these cases, the Contractor shall make a permanent repair with entirely new equipment during the initial service call.

At any time the Contractor is notified of an emergency situation by the City, CHP, or County Sheriff, or other duly recognized authority, the Contractor shall call the appropriate phone number or email

the appropriate City staff including Transportation and Traffic personnel of the nature of the emergency call.

Upon completion of the emergency work, the Contractor shall notify the City by telephone and/or email that the emergency work has been completed. In addition, the Contractor shall notify the City in writing within three calendar days that such repairs have been completed.

It is understood and agreed that failure on the part of the Contractor to respond within one hour to any emergency/service call as provided will cause the City to suffer an unascertainable amount of damage. Therefore, the Contractor agrees to pay to the City, not as a penalty but as liquidated damages, the amount of $500 per call not responded within the one hour requirement. The total amount of liquidated damages will be totaled and deducted from the monthly invoice payment.

The Contractor shall enter any emergency/service call onto the Extraordinary Repair Log at the intersection controller cabinet along with the minimum required information as stated in the previous sections. Failure to do so will be construed to be a failure to respond to the emergency/service call. In this case, the Contractor agrees to pay to the City, as liquidated damages, the amount of $500 per emergency/service call not logged and $500 per hour once the contractor has been notified of the failure to log the emergency/service call.. The total amount of liquidated damages will be totaled and deducted from the monthly invoice payment.

The City shall perform spot checks of the Contractor's response and response times to emergency/service from time to time throughout the term of the contract, through comparison of emergency/service notification time to the Contractor by the City with the arrival time noted in the intersection logs. The City may also choose to randomly time and respond to the emergency/service call along with the Contractor in order to check response times and workmanship of the Contractor.

E. SIGNAL UPGRADES, MODIFICATIONS, AND INSTALLATIONS

The Contractor shall install, modify, and/or upgrade traffic signals and all associated hardware or traffic safety devices as requested by the City. All such work shall be considered extra work and shall be performed to the satisfaction of the City.

No additional or extra work shall be commenced or undertaken by the Contractor unless authorized in advance in writing by the City. Said written authorization is a condition precedent to the Contractor's entitlement to reimbursement or remuneration for such services. Additional or extra work shall be performed in accordance with the most current version of the Caltrans Standard Plans and Caltrans Standard Specifications. This work shall be performed within a specified time limit established by the City and for a mutually agreed upon price.

The City shall retain discretionary right to perform any additional work through the use of City forces, by negotiated agreement, or to advertise such work for construction by others.

F. SAFETY LIGHTS AND INTERNALLY ILLUMINATED STREET NAME SIGNS MAINTENANCE AND REPAIRS

The contractor shall provide maintenance for all Safety Lights and Internally Illuminated Street Name Signs (IISNS). Any replacement of safety lights or IISNS parts found to be damaged while performing monthly or annual preventive maintenance shall be billed as separate items and as extra work.

The Contractor shall obtain City approval prior to scheduling any work to be performed under this provision. The Contractor shall provide documentation to support invoiced charges, including but not limited to time cards and material invoices, upon request by the City.

G. USA MARK-OUT AND LOCATING SERVICES

The contractor shall provide services to locate and mark traffic signal facilities within 24hr of notification by the City of underground work. USA mark-out and locating services shall be billed as separate item and as extra work.

H. RECORDS

1. PREVENTIVE MAINTENANCE CHECKLIST FORMS

The Contractor shall maintain and provide all required preventive maintenance checklists as described in the previous sections. The Contractor shall provide digital version of the maintenance checklists monthly to the City along with the Contractor's invoices.

2. COMPUTERIZED MAINTENANCE MANAGEMENT AND INVENTORY SYSTEM

Within thirty days of contract award, the Contractor must have a functioning and deployed comprehensive PC Windows-based, computerized traffic signal maintenance and inventory management system. This system shall be fully functional and implemented, in addition it shall be capable of incorporating existing and historical data for a period of no less than 5 years for traffic signals equipment inventory such as controller cabinet and main components, poles and standards, etc., routine maintenance activities, troublespot calls, traffic signal repair activities, and any other relevant data related to the maintenance management and inventory of traffic signals.. The City, at its option may request revisions or changes to the system to make it acceptable for use. Upon receipt of the City's requested changes/revisions, the Contractor shall ready the system for implementation within three months of the contract award. Any changes to the system requested by the City at this point will be accomplished by the Contractor at no charge to the City and within 30 days of the request. Any future upgrades of the system will be offered by the Contractor to the City at no additional charge during the term of the contract. Upon the end of the contract, the City at its option may retain possession of data in electronic and hardcopy format for future use related to the City's traffic signal maintenance management and inventory.

The City will make available to the Contractor, if needed, traffic signal as-built records that show inventory of all poles and equipment in service at each signalized intersection for integration into the computerized maintenance management and inventory system. The contractor must maintain an on-going schedule for the bar-coding and tagging of all equipment in order to integrate into the system and keep it updated as equipment is removed or upgraded.

The traffic signal maintenance and inventory management system shall provide the following features and equipment at all times:

a. *Intersections* - A complete database of signalized intersection In-Roadway Warning Lights, and flashing beacons locations, including all preventive maintenance histories, complete equipment inventory, design/construction as-built drawings in AutoCAD or PDF format,, electronic photo images, repair history and installation date of all equipment utilized at each location. The system should also have mapping capabilities and be compatible with GIS.

b. *Assets* - Asset inventory, maintenance/repair history, and allow for planned future replacement and budgeting.

c. *Repair/Replacement Parts* - Real-time available inventoried replacement parts, current status of reordered equipment, and inventory tracking.

d. *Service/Emergency Calls* - A record of all calls, date and time stamp moment of receipt, dispatch, Contractor arrival and departure times. The system shall also have the ability to prioritize all received calls and provide estimated time of arrivals, and corrective actions. All records shall be updated real-time utilizing Palm Pilots, Pocket PCs, handheld scanners or other like products.

If the Contractor fails to maintain a functioning system and fails to fully integrate the features mentioned in the previous section during the duration of this contract, the Contractor agrees to pay to the City, not as a penalty but as liquidated damages, the amount of $1000 per calendar day that the computerized maintenance and inventory management system is not functioning as requested. The total amount of liquidated damages will be totaled and deducted from the

monthly invoice payment until is demonstrated to the City that the system is deployed and all the features such as inventory management, maintenance history, and service/emergency calls status, etc. are fully functional and implemented as requested herein.

3. MONTHLY ACTIVITY REPORT

The Contractor shall submit to the City, at the same time as the submission of monthly invoices, a computerized report covering all Contractor's activities within the City of Sunnyvale during the previous month. This monthly activity report shall be provided in both electronic and hardcopy formats and shall be generated from a database, preferably using Microsoft Access (most recent version). Formatting shall be determined by the Contractor and the City. The Contractor shall be required to maintain a copy of the monthly activity report (either electronic or hardcopy) for a period of not less than five years. The monthly activity report shall include at a minimum:

a. Time any emergency/service calls were received by the Contractor, time at which the emergency/service call was dispatched to the technician, the arrival time of the technician at the requested location, the length of time spent repairing or diagnosing the problem, and the departure time.

b. A complete record of any and all work performed on the traffic signal equipment during the period covered by the monthly activity report, including the make, model, and serial number of any replacement or newly installed equipment at each intersection. The report shall also detail the make, model and serial number of any equipment replaced.

c. The date and time that any preventive maintenance work was performed.

d. Any and all pending repair work needed at each intersection along with Repair Order number.

I. MEETINGS

The Contractor and any of its staff shall be available to meet, when deemed necessary, with City staff at a mutually agreed upon time and place to review maintenance activities, operational and timing activities, pending work, estimates, work quality, and any items related to Contractor's work under this contract.

J. COMPENSATION

1. QUARTERLY AND ANNUAL PREVENTIVE MAINTENANCE

The Contractor shall be compensated for services required under this contract at a flat rate per intersection.

Included in this flat rate shall be compensation for the preventative maintenance and/or repair of any or all equipment within the traffic signal controller cabinet or signal equipment as identified in Attachments C, D, E and F. Any replacement of traffic signal equipment found to be damaged while performing monthly or annual preventive maintenance shall be billed as material cost only. Repairs for items found during the regular quarterly preventive maintenance check that take less than 45 minutes to complete shall not be billed as separate item and are included in cost of regular maintenance check.

Not included in this flat rate shall be painting of traffic signal poles, heads, cabinets, labor and material cost for the replacement of inductive loops, pedestrian pushbuttons, replacement of signs, LEDs, or repair to signal equipment when such equipment has been damaged by vehicular collisions, acts of God, or malicious damage.

2. EXTRA WORK

The City shall compensate the Contractor for extra work and repairs in accordance with agreed upon labor rates, material markups, equipment rates, and miscellaneous costs.

Extra work refers to the replacement, repair, upgrade or installation of any device utilized for traffic control or to insure the public's safety. The Contractor shall obtain City approval prior to scheduling any work to be performed under this provision. The Contractor shall provide documentation to support invoiced charges, including but not limited to time cards and material invoices, upon request by the City.

3. PAYMENT AND INVOICES

Payments will be made within thirty days following receipt of an accurate invoice and written verification of work performed by the City's Accounts Payable Unit. The written verification shall be submitted to the City in a format to be approved by the City. Invoices shall be submitted no more frequently than once per month.

CITY OF SUNNYVALE
List of Signalized Intersections

ATTACHMENT B

Intersection Number	Main Street	Secondary Street
7001	HOMESTEAD ROAD	HOLLENBECK AVENUE
7002	MATHILDA AVENUE	5TH STREET
7003	FREMONT AVENUE	MARY AVENUE
7004	FREMONT AVENUE	HOLLENBECK AVENUE
7005	FREMONT AVENUE	WOLFE ROAD
7006	MARY AVENUE	REMINGTON DRIVE
7007	HOLLENBECK AVENUE	REMINGTON DRIVE
7008	SUNNYVALE SARATOGA ROAD	REMINGTON DRIVE
7009	BERNARDO AVENUE	HEATHERSTONE WAY
7010	FAIR OAKS AVENUE	OLD SAN FRANCISCO ROAD
7011	FAIR OAKS AVENUE	EVELYN AVENUE
7012	FAIR OAKS AVENUE	KIFER ROAD
7013	FAIR OAKS AVENUE	ARQUES AVENUE
7014	FAIR OAKS AVENUE	MAUDE AVENUE
7015	FAIR OAKS AVENUE	DUANE AVENUE
7016	FAIR OAKS AVENUE	CALIENTE DRIVE
7017	MATHILDA AVENUE	MCKINLEY AVENUE
7018	MARY AVENUE	IOWA AVENUE
7019	TASMAN DRIVE	ADOBE WELLS-BIRCHWOOD DRIVE
7020	TASMAN DRIVE	REAMWOOD AVENUE
7021	SUNNYVALE AVENUE	MCKINLEY AVENUE
7022	WASHINGTON AVENUE	PASTORIA AVENUE
7023	MATHILDA AVENUE	WASHINGTON AVENUE
7024	MARY AVENUE	CALIFORNIA AVENUE - BUENA VISTA
7025	KIFER ROAD	PRICE CLUB - COSTCO
7026	HOLLENBECK AVENUE	CASCADE DRIVE
7027	SUNNYVALE AVENUE	WASHINGTON AVENUE
7028	MARY AVENUE	EVELYN AVENUE
7029	EVELYN AVENUE	AGENA WAY
7030	EVELYN AVENUE	FRANCES AVENUE
7031	EVELYN AVENUE	SUNNYVALE AVENUE
7032	SUNNYVALE AVENUE	HENDY AVENUE
7033	EVELYN AVENUE	REED AVENUE
7034	WOLFE ROAD	KIFER ROAD

7035	MATHILDA AVENUE	CALIFORNIA AVENUE
7036	SUNNYVALE AVENUE	ARQUES AVENUE
7037	WOLFE ROAD	ARQUES AVENUE
7038	ARQUES AVENUE	COMMERCIAL STREET
7039	ARQUES AVENUE	SANTA TRINITA AVENUE
7040	SUNNYVALE AVENUE	BORREGAS AVENUE - MAUDE AVENUE
7041	MATHILDA AVENUE	MOFFETT PARK DRIVE
7042	MATHILDA AVENUE	LOCKHEED WAY
7043	MATHILDA AVENUE	JAVA DRIVE
7044	JAVA DRIVE	BORREGAS AVENUE
7045	JAVA DRIVE	CROSSMAN AVENUE
7046	WOLFE ROAD	EVELYN AVENUE
7047	MATHILDA AVENUE	MAUDE AVENUE
7048	SUNNYVALE SARATOGA ROAD	FREMONT AVENUE
7049	EVELYN AVENUE	ASTER AVENUE
7050	MARY AVENUE	THE DALLES AVENUE
7051	MARY AVENUE	HEATHERSTONE WAY
7052	MARY AVENUE	WASHINGTON AVENUE
7053	MATHILDA AVENUE	OLIVE AVENUE
7054	DUANE AVENUE	DE GUIGNE DRIVE
7055	CARIBBEAN DRIVE	MOFFETT PARK DRIVE
7056	WOLFE ROAD	OLD SAN FRANCISCO ROAD
7057	FAIR OAKS AVENUE	CALIFORNIA AVENUE
7058	WOLFE ROAD	INVERNESS WAY
7059	HOMESTEAD ROAD	MARY AVENUE
7060	HOMESTEAD ROAD	HERON DRIVE
7061	MATHILDA AVENUE	ROSS DRIVE
7062	FAIR OAKS AVENUE	WOLFE ROAD
7063	MAUDE AVENUE	MACARA AVENUE (N)
7064	HOLLENBECK AVENUE	ALBERTA AVENUE
7065	WOLFE ROAD	MARIA LANE
7066	ARQUES AVENUE	LAKESIDE DRIVE
7067	WOLFE ROAD	CENTRAL EXPRESSWAY
7068	HOMESTEAD ROAD	WRIGHT AVENUE
7069	SUNNYVALE AVENUE	OLIVE AVENUE
7070	SUNNYVALE AVENUE	IOWA AVENUE
7071	PASTORIA AVENUE	IOWA AVENUE
7072	MATHILDA AVENUE	IOWA AVENUE
7073	SUNNYVALE AVENUE	CALIFORNIA AVENUE
7074	FAIR OAKS AVENUE	OLIVE AVENUE

7075	MATHILDA AVENUE	AHWANEE AVENUE - ALMANOR AVENUE
7076	WOLFE ROAD	IRIS AVENUE
7077	SUNNYVALE SARATOGA ROAD	ALBERTA AVENUE - HARWICK WAY
7078	MARY AVENUE	KNICKERBOCKER DRIVE
7079	MARY AVENUE	CASCADE DRIVE
7080	BERNARDO AVENUE	WASHINGTON AVENUE
7081	MARY AVENUE	TICONDEROGA DRIVE
7082	SUNNYVALE SARATOGA ROAD	CHEYENNE DRIVE - CONNEMARA WAY
7083	MATHILDA AVENUE	INDIO WAY
7084	HOLLENBECK AVENUE	DANFORTH DRIVE
7085	MATHILDA AVENUE	SUNNYVALE AVENUE
7086	HOLLENBECK AVENUE	TORRINGTON DRIVE
7087	FREMONT AVENUE	MANET DRIVE - BOBWHITE AVENUE
7088	ARQUES AVENUE	OAKMEAD PARKWAY
7089	FAIR OAKS AVENUE	TASMAN DRIVE
7090	MAUDE AVENUE	PASTORIA AVENUE
7091	FREMONT AVENUE	REMBRANDT DRIVE
7092	JAVA DRIVE	GENEVA DRIVE
7093	STEWART DRIVE	DUANE AVENUE
7094	STEWART DRIVE	SANTA TRINITA AVENUE
7096	IOWA AVENUE	TAAFFE STREET
7097	WASHINGTON AVENUE	TAAFFE STREET
7098	KIFER ROAD	SEMICONDUCTOR DRIVE
7099	KIFER ROAD PEDESTRIAN SIGNAL	
7100	MATHILDA AVENUE	BORDEAUX DRIVE - FIRST AVENUE
7101	JAVA DRIVE	BORDEAUX DRIVE
7102	FAIR OAKS AVENUE	AHWANEE AVENUE
7103	TASMAN DRIVE	VIENNA DRIVE
7104	WOLFE ROAD	STEWART DRIVE
7105	OAKMEAD PARKWAY	LAKESIDE DRIVE
7106	CARIBBEAN DRIVE	BORREGAS AVENUE
7107	REED AVENUE	SEQUOIA DRIVE
7108	MARY AVENUE	MAUDE AVENUE
7109	FAIR OAKS AVENUE	FAIR OAKS WAY
7110	REMINGTON DRIVE	MANET DRIVE
7111	EVELYN AVENUE	BERNARDO AVENUE
7112	MARY AVENUE	CORTE MADERA AVENUE
7113	MATHILDA AVENUE	ROUTE 237 EB ON/OFFRAMP
7114	MATHILDA AVENUE	ROUTE 237 WB ON/OFFRAMP
7115	REED AVENUE	TIMBERPINE AVENUE

7116	CARIBBEAN DRIVE	TWIN CREEKS
7117	HOMESTEAD ROAD	BERNARDO AVENUE - ROUTE 85 ON RAMP
7118	MANILA DRIVE	H STREET
7119	MATHILDA AVENUE	SAN ALESO AVENUE
7120	MOFFETT PARK DRIVE	ROUTE 101 NB ONRAMP
7121	MOFFETT PARK DRIVE	LOCKHEED WAY
7122	OLD SAN FRANCISCO ROAD	GAIL AVENUE
7123	WOLFE ROAD	MARION WAY
7124	CARIBBEAN DRIVE	CROSSMAN AVENUE
7125	HOMESTEAD ROAD	KENNEWICK DRIVE
7126	MATHILDA AVENUE	TENNIS CENTER
7127	HOMESTEAD ROAD	BELLEVILLE WAY
7128	FREMONT AVENUE	WRIGHT AVENUE
7129	ELKO DRIVE	LAWRENCE STATION ROAD
7201	MATHILDA AVENUE/WASHINGTON AVENUE FLASHING BEACON	
7202	TASMAN DRIVE/REAMWOOD DRIVE FLASHING BEACON	
7203	KIFER RD/GORDON FLASHING BEACON	
7204	ARQUES AT FUJITSU PEDESTRIAN CROSSING FLASHING BEACON	
7301	MAUDE AVENUE/BAYVIEW AVENUE IRWL	
7302	REMINGTON DRIVE/MANGO DRIVE IRWL	
7303	HOLLENBECK AVENUE/HOMESTEAD ROAD IRWL	
7304	BERNARDO AVENUE/BLAIR AVENUE IRWL	
7305	MARY AVENUE/HELENA DRIVE IRWL	
7306	HOLLENBECK AVENUE/HARVARD AVENUE IRWL	
7307	BERNARDO AVENUE/AYALA DRIVE IRWL	
IRWL – IN-ROADWAY WARNING LIGHTS		

ATTACHMENT C

QUARTERLY PREVENTIVE MAINTENANCE CHECKLIST

Intersection: _____ Number: _____

Date: _____ Start Time: _____ End Time: _____

A. CONTROLLER CABINET/SERVICE CABINET/UPS CABINET	
Appearance – Clean and vacuum cabinet, check and remove graffiti, posters and flyers.	☐
Door Fit, Gasket – Check door closure, plumb, gaskets still good, seal and weather tight.	☐
Lock Operation – Check lock operation. Lube all hinges and locks	☐
Fan Operation – Verify that fan turns on at 90ºF and above.	☐
Cabinet Light – Verify that light works with door and light switch, replace cabinet light(s) if necessary	☐
Air Filter Condition – Check air filter, and replace if necessary	☐
Terminal Blocks – Check and tighten all TB for all wires, DLC, interconnect and power.	☐
Documentation Present - Check for logs, timing sheets, manuals and cabinet prints, UPS wiring schematic, manufacturer test results for controller, cabinet and CMU, copy of Annual Preventive Maintenance Checklist and CMU, and Loops results, intersection drawings	☐
Remarks: _____	

B. SIGNAL CONTROLLER	
Controller LEDs Working – Check all LEDs on controller, cards, flasher and load switches. Replace if LEDs not functioning	☐
Controller Display – Check & verify controller display is working.	☐
Timing and Coordination – Verify timing per chart, time set and coordination plan in place.	☐
Phases on Recall – Verify only main street on recall. If not report reason to Traffic Engineer.	☐
Detectors and Loops - Check operation of ach detector card per cabinet print and per label on the shelves/DLC	☐
Isolators & Preempt – Check operation of all DC/AC isolators and preempt devices.	☐
Remarks: _____	

C. SIGNAL HEADS	
Lens Condition – Visually check for damage; wipe clean all lenses where necessary.	☐
Lamps and LEDs– Visually check for operation, proper orientation for arrows and seating of LEDs.	☐
3M Program Heads – Check for operation and proper programming.	☐
Signal Heads – Verify all signal heads are aimed properly.	☐
Remarks: _____	

D. PEDESTRIAN HEADS	
Aimed correctly – Visually check aiming of pedestrian heads, seating of LEDs, and check audible ped signals.	☐
Lens Condition – Check and clean pedestrian head lens where necessary.	☐
Remarks: _____	

E. PEDESTRIAN PUSH BUTTONS	
Placing Calls – Check operation and placing calls of all pedestrian push buttons.	☐
Cover Plates – Check condition of all pedestrian push buttons plates and proper arrow orientation, remove graffiti where necessary..	☐
Remarks: _____	

F. MISCELLANEOUS	
Pull Boxes – Check for cracked, chipped and missing pullbox lids, replace if necessary.	☐
Mast Arm Signs – Visually check Mast arm signs for tightness plumb and fading.	☐
UPS System – Check and test operations of UPS system. Deactivate signal power from Service Cabinet before test is initiated. Event Counter: _____ Hours of Operation: _____	☐
Communications equipment – visually inspect for proper operation, if malfunction noticed notify Traffic Engineer.	☐
Video Detection System – visually inspect for proper operation, if malfunction noticed notify Traffic Engineer.	☐
EMTRAC – Test unit by preempting through the toggle switches, if malfunction noticed notify Traffic Engineer.	☐
Traffic Signal Poles – Check all poles & mast arms for damage, remove graffiti, posters, flyers, correct torque/tightness of anchor bolt nuts.	☐
Traffic Loop Lead-In and Stub-outs – Check for displaced asphalt around detector stub-out and check for coverage of all loop wire in slots, DR where reseal is necessary.	☐
Remarks: _____	

TECHNICIAN

NAME: _____

SIGNATURE: _____

DATE COMPLETED: _____

ATTACHMENT D

ANNUAL PREVENTIVE MAINTENANCE CHECKLIST

Intersection: _____ Number: _____

Date: _____ Start Time: _____ End Time: _____

A. ROADWAY/LOOPS CONDITION	
Pavement Condition at loops location - Visually check pavement condition around loops, reseal if necessary. Excellent ☐ Good ☐ Poor ☐ Cracked ☐ Needs Immediate Attention ☐	
Condition of the loops – Megger, test, and record results for all loops, report if any megged less than 10 at cabinet	☐
Detector Cards – Check operation of each detector card per cabinet print and per label on the shelves/DLC	☐
Remarks: _____	

B. CONTROLLER CABINET/SERVICE CABINET/UPS CABINET	
Documentation Present - Check for logs, timing sheets, manuals and cabinet prints, UPS wiring schematic, manufacturer test results for controller, cabinet and CMU, copy of Annual Preventive Maintenance Checklist and CMU, Loops test results, intersection drawings.	☐
Ground Fault Interrupter – Check GFI operation	☐
Voltage Level at Entrance – Check and record voltage at terminal. VDC: _____ VAC: _____	☐
Controller Settings – Verify timing in controller matches timing sheets. No changes without Traffic Engineer Approval	☐
Controller Cabinet Clean – Vacuum and clean controller cabinet and service. Reseal conduits if necessary	☐
Replace filter, and check operation of the fan. Fan should be set at 90ºF	☐
Check for loose and burned terminals – Tighten all DLC's, field wires and other conductors. Replace MOV & noise suppressors if bad or missing. Check breakers, replace if necessary.	☐
Check load switch leakage – Replace if over 5v AC	☐
Conflict Monitor – Test CMU for permissive and overlap operation while in flash and supply report.	☐
Hinges and Locks – Oil and lube hinges and locks for controller cabinet and service	☐
Remarks: _____	

C. AFTER DARK	
Traffic Signal – Check signal heads for visibility and operation at night	☐
Pedestrian Signals – Check pedestrian heads for visibility and operation at night	☐
Luminaires – Check luminaires for operation at night	☐
Internally Illuminated Street Name Signs – Check for operation and visibility of all signs, including Guide, Regulatory, and Warning Signs.	☐
Remarks: _____ _____	

D. INFRASTRUCTURE	
Condition of Paint – Framework, Signal Heads, Backplates, Cabinet, Service, poles, check paint condition.	☐
Ground Rod Clamp & Wire Present and Secure – Check ground rod & wire in controller cabinet and pullboxes	☐
Hand Hole covers, present and secure – Check hand hole covers for all poles replace if missing	☐
Pull boxes clean & lid in good conditions – Open, check and clean all pull boxes. Replace cracked lids, check and seal all conduits.	☐
Lens – Wipe clean all lenses and check condition of all at signal heads.	☐
Conditions of Splices – Check splices in all pull boxes	☐
LEDs – Visually check all Red, Amber & Green LEDs for light output remove and replace those found defective.	☐
3M Program heads – Check operation, programming and aiming or all signal heads. Ensure louvers are aimed properly.	☐
Signal heads – Check aiming of all signal heads and tighten if necessary. Check, tighten backplates & visors. DR for missing equipment.	☐
Mast Arm Signs & Hardware – Check all signs and hardware for tightness	☐
Relamping of all signals – Relamp bulbs with LED if applicable	☐
Remarks: _____ _____	

D. MISCELLANEOUS	
Red Light Detector Devices (a.k.a. Rat Boxes) – Check for burned devices if so remove and replace, clean and tighten if necessary.	☐
Check audible pedestrian indications – Test all units and tighten if necessary.	☐
Video Detection System – Check programming and wiring. Visually check operation of video detection system.	☐
Video Detection Cameras – Check for loose cameras, clean lenses with damped cloth (water only), ensure images are clear and sharp. If malfunction notify Traffic Engineer.	☐
UPS System – Check and test operations of UPS system, test battery voltage under load and not. Deactivate signal power from Service Cabinet before test is initiated.	☐
Event Counter: _____ Hours of Operation: _____	

MISCELLANEOUS (CONT.)	
EMTRAC – Test devices for operation through the toggle switches. Notify Traffic Engineer if reprogram of unit is needed.	☐
Communication System – Visually check for proper operation of wireless communication equipment & SIC cable.	☐
4-Way flash operation – Test signal operation while on 4-way flash. Visually check flasher for proper operation.	☐

Remarks:

_____

_____

TECHNICIAN

NAME: _____

SIGNATURE: _____

DATE COMPLETED: _____

ATTACHMENT E

IRWL – QUARTERLY/ANNUAL PREVENTIVE MAINTENANCE CHECKLIST

Location: _____

Date: _____ Start Time: _____ End Time: _____

A. CONTROLLER CABINET/SERVICE CABINET	
Appearance – Clean and vacuum cabinet, check and remove graffiti, posters and flyers.	☐
Door Fit, Gasket – Check door closure, plumb, gaskets still good, seal and weather tight.	☐
Lock Operation – Check lock operation. Lube all hinges and locks	☐
Terminal Blocks – Check and tighten all TB for all wires.	☐
Documentation Present - Check for logs, timing sheet, manual and cabinet prints, etc	☐
Remarks: _____	

B. IN ROADWAY LIGHT FIXTURES AND SIGNS	
All lights operational	☐
All push buttons, flashing beacons and LED signs operational	☐
Sweep light fixtures, wipe clean all signs, remove, tape, flyers, posters, or any graffiti if applicable.	

C. ANNUAL CHECK	
Open up all fixtures, remove water and dirt.	☐
Ensure weatherproofing seal is in good condition, replace if necessary.	☐
Visually inspect light intensity of LED. If dim replace.	☐
Ensure all splices are in good conditions, re-do where necessary.	☐
Remarks: _____	

TECHNICIAN

NAME: _____

SIGNATURE: _____

DATE COMPLETED: _____

ATTACHMENT F

FLASHING BEACON – QUARTERLY/ANNUAL PREVENTIVE MAINTENANCE CHECKLIST

Location: _____

Date: _____ Start Time: _____ End Time: _____

A. FLASHING BEACONS, SIGNS, PUSH BUTTONS AND POLES	
All LEDs operational	☐
Ensure all pedestrian push buttons are placing all calls and activating flashing beacons where applicable.	☐
Check condition of all pedestrian push buttons cover plate and proper arrow orientation where applicable.	☐
Mast Arm Signs – Visually check Mast arm signs for tightness plumb and fading where applicable.	☐
Wipe clean all signs, remove, tape, flyers, posters, or any graffiti where necessary and applicable.	☐
B. ANNUAL CHECK	
Visually inspect light intensity of LED. If dim replace.	☐

Remarks: _____

TECHNICIAN

NAME: _____

SIGNATURE: _____

DATE COMPLETED: _____

ATTACHMENT G

Annual Preventive Maintenance

Loop Test Log

Intersection: _____ Number: _____ Date: _____

Ø1

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

Ø2

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

Ø3

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω

	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

Ø4

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

Ø5

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

Ø6

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

Ø7

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

Ø8

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

OLA

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

OLB

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100

Advance												
Stop bar												
Sampling												

OLC

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

OLD

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

	Lane 1			Lane 2			Lane 3			Lane 4		
	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω	µH	Ω	M-Ω
	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100	50<L<700	<5	>100
Advance												
Stop bar												
Sampling												

ATTACHMENT H

CITY OF SUNNYVALE

STANDARD OPERATING PROCEDURES
BICYCLE AND PEDESTRIAN SAFETY THROUGH WORK ZONES

Warning sign types and locations:

- For any lane closures on the right side of the street there will be four required signs.
  1. Road Work Ahead
  2. Right /Bike Lane Closed Ahead (depending on the situation)
  3. A Bike Warning Sign - either W-79, Share the Road, or Watch for Bicyclists. Staff prefers using the Watch for Bicyclists sign.
  4. Lane/Bike Lane Closed (depending on the situation)

Bike lane closures:

- For any bike lane closures there will be four signs required.
  1. Road Work Ahead
  2. Right /Bike Lane Closed Ahead (depending on the situation)
  3. A Bike Warning Sign - either W-79, Share the Road, or Watch for Bicyclists. Staff prefers using the Watch for Bicyclists sign.
  4. Lane/Bike Lane Closed (depending on the situation)
- Staff will try to provide a 14 foot wide travel lane in situations where bicycles and cars will need to share a lane. If this is not achievable, the Caltrans minimum of 10 feet will be required.

Sidewalk closures:

- A clear pedestrian path will be provided through any sidewalk construction.
  1. This could be attained by
     a) creating a pathway on the sidewalk around the construction, or through the parking strip
     b) creating a coned or barricaded area off of the sidewalk,
     c) designating a flagger to escort pedestrians safely through the work zones
  2. If there is no clear pathway immediately available, pedestrians will be detoured. Any detour will include detailed signage. The pedestrian will be notified of the detour before they reached the construction sites so that no backtracking would be required. Elaborate pedestrian detours will be avoided if possible because staff has found them to be ineffective.
- Issues concerning provisions for people with disabilities will be handled on a case by case basis.

Sign placement for work zones that will not be closing any travel lanes:

- Work crews must warn roadway users of the work being conducted on the side of the roadway even when no travel lanes are being closed. In this situation, the warning signs will be placed off of the roadway as much as possible. Bicycle and pedestrian travel will be considered in the placement of the sign. Sign visibility and proximity to the work zone will also be considered.

Duration of work:

- Work crews may use their discretion regarding warning signs and traffic control on jobs that will last under 1 hour. Short duration work is defined as work that occupies a location up to one hour. It is appropriate to use colored or marked vehicles with rotating strobe lights, arrow panels or truck mounted signs in place of advance signs and channelizing devices.

Nighttime visibility :

- Retro reflective 28" cones will be used to barricade work zones at night.
- Barricades with reflective striping will be used to hold warning signs.
- Arrow boards will be used under some circumstances.
- All work being conducted by the city at night will only done on an emergency basis.

Storage of Equipment on-street:

- No storage of construction equipment or debris is permitted on the street outside of working hours.

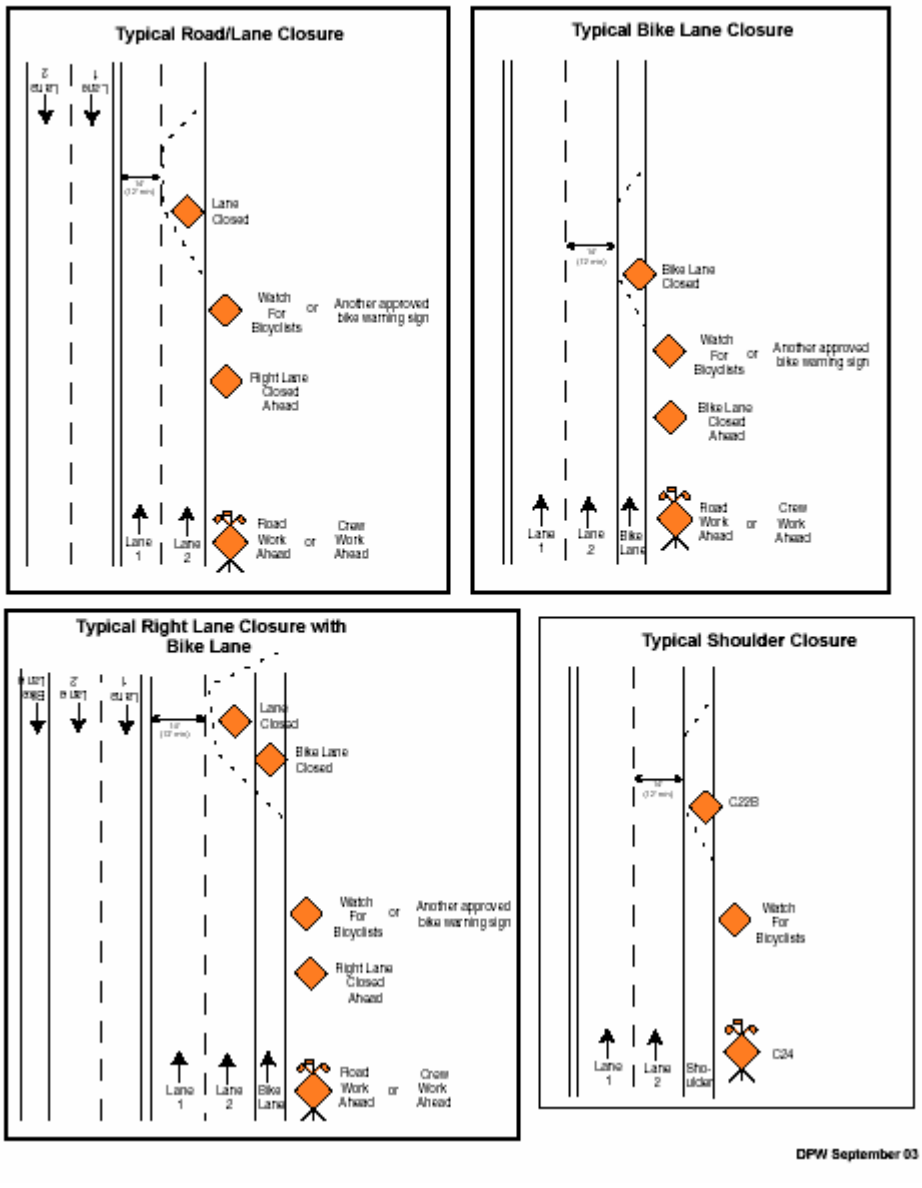
Outside contractor compliance:

- Provide all encroachment permitees with a copy of the city's SOP.
  1. Make contractors aware ahead of time that they will be required to secure their own signs.
  2. Staff will continue to make announcements to sign vendors that the City will be requiring these signs.

Complaint procedures:

- For complaints related to work done by city crews, all complaints will be routed through the "field services" answer point.
- For complaints related to work done for capital projects or by contractors with encroachment permits, all complaints will be routed to the Project Administration division.

City of Sunnyvale
SOP for
Right Lane and Bike Lane Closures



DPW September 03

ATTACHMENT I
City of Sunnyvale Traffic Signal Standards

TRAFFIC SIGNAL & LIGHTING:

1.1 DESCRIPTION

Traffic signal and street lighting installation is to be performed at selected locations:

1.2 WARRANTIES

The five- (5) year warranty shall apply to all traffic control equipment listed below:

- Model 170E or 2070 Controllers
- Wireless Communication Hardware
- LED Red, Yellow, Green Vehicle and Pedestrian Signals
- Astro-Brac Vehicle Signal Mounting Hardware
- Detector Amplifiers

The traffic signal UPS system manufacturer shall provide a two (2) year factory-repair warranty for parts and labor on the UPS from date of acceptance by the City. Batteries shall be warranted for full replacement for two (2) years from date of purchase.

In addition all red, yellow, and green ball traffic signal modules, red, yellow, and green arrow traffic signal modules, and pedestrian hand/walking man modules, shall be performance warranted to be in compliance with July, 1998 ITE and CALTRANS minimum intensity standards for LED traffic signal modules, at 74 degrees centigrade, for a period of three (3) years. All warranty related measurements will be made at an applied voltage of 120 volts AC, within one-minute of signal module turn-on.

IISNS LED light engine shall be warranted by the manufacturer for a period of no less than 7 years unconditionally and shall include all costs for labor and materials related to IISNS LED light engine replacement.

The respective manufacturers shall not be responsible for damage caused by negligence by others, acts of God, or use of equipment in a manner not originally intended. To obtain service under this warranty the City will deliver the control equipment to the manufacturer's designated address for repair. The manufacturer will repair and return the control equipment to the City within thirty (30) calendar days.

1.3 FOUNDATIONS

Sleeve nuts shall be used on Type 1-B standards.

Foundations for Type I-B standards shall conform to the details on State Standard Plan ES-6A, "Anchor Bolts with Sleeve Nuts", except that the bottom of the base plate shall be flush with the finished grade.

All anchor bolts shall be grounded and bonded to poles/standards/pedestals.

Ground rod/electrode shall not be embedded into the controller cabinet foundation. It shall be inserted into a sleeve through the concrete foundation into the earth. Contractor shall test the grounding system using appropriate grounding test equipment prior to signal activation. A reading of 25 ohms or less of the grounding system is desirable and acceptable. A written certification or report of this test is required to be provided by the contractor to the city. Test shall be done in the presence of the city assigned inspector.

1.4 STANDARDS AND STEEL PEDESTALS

The sign mounting hardware, as shown on Detail U of State Standard Plan ES-6T, shall be installed at the locations shown on the plans.

All traffic signal mast arms shall include 1 inch signal ports @ 5 foot intervals installed on underside of mast arm and flexible metal conduit between ports and signal heads.

All unused signal ports shall be plugged with square head pipe plugs.

1.5 PULL BOXES

Grout shall not be placed in bottom of pull boxes.

Where the sump of an existing pull box is disturbed by the Contractor's operations, the sump shall be reconstructed.

No. 3-1/2 pull boxes shall not be used. Contractor shall use a minimum of No. 5 or larger pull boxes unless otherwise indicated on plans.

All traffic signal pullbox lids shall be labeled “CSV Traffic Signal”. Traffic signal pullboxes with fiberoptic or communications cables shall have the pullbox lids labeled “CSV Communications” with hold down bolts and be either a N36 with a 12” concrete pullbox extension or N48 with a 10” concrete pullbox extension. N36 pullbox lids shall be Fibrelyte lids. PG&E Type 3 pull box lids shall be labeled “SERVICE”.

1.6 CONDUIT

All conduits to be installed across traffic lanes shall be installed using directional boring or open trench as determined by the Contractor. The Contractor shall determine clearance depths for utility crossings prior to conduit installation. Pull boxes shall be located behind the curb or as directed by the Traffic Engineer.

Conduits shall have at least 30” of cover from finished grade in all areas. All conduits shall have a mule tape installed, and a continuous No. 8 insulated solid copper wire for grounding and tracing of conduits.

All conduits shall be sealed with Duct-Seal after wires are installed to prevent moisture and rodents from entering the conduits. All conduit ends within pullboxes shall have bell ends installed.

All conduits entering concrete foundations shall be galvanized rigid steel covered with 10 mil pipe wrap. PVC conduits under roadways shall be Schedule 80. All other shall be Schedule 40.

All conduits shall enter pull boxes from the bottom, not horizontally or between pull boxes and extensions.

1.7 WIRE AND WIRING

Signal cable shall not be used. Conductors and DLC's shall be installed as shown in the Conductor Schedule on the plans.

All conductors shall be spliced in pullboxes using method described in the latest Caltrans Standard Specifications. Wiring for traffic signal indications or equipment shall not be daisy-chained.

All conductors and DLC shall be labeled and identified in each and every pullbox. A minimum of 6 feet (3 feet up and 3 feet down) of service loop shall be provided in each pullbox.

All Loop wire used shall be Type 2 Loop wire and Detector Lead-In Cables (DLC) shall be Type B lead-in cable. The Loop wire shall be suitable for use with Hot-Melt Rubberized Asphalt Sealant. The copper drain wire from the DLC shall be connected to the equipment ground in the controller cabinet. All DLC wires shall be twisted prior to landing on the detector input panel to prevent cross-talk and chatter. All conductors and DLC wire shall have soldered non-insulated spade forks installed in the controller cabinet end.

Hot-Melt Rubberized Asphalt Sealant shall be used to seal all traffic detector loops slots. Asphaltic Emulsion Sealant and Elastomeric Sealant shall not be used.

1.8 SIGNAL INTERCONNECT CABLE

Signal Interconnect Cable (SIC) shall consist of 25 pair No. 22 AWG, minimum, solid, annealed copper conductors. The conductors shall be in twisted pairs, with color-coding to distinguish each pair. Conductor insulation shall be foamed polyolefin with a sold skin of the same material. Conductors shall be twisted into pairs to minimize crosstalk. The cable core shall be filled with a waterproofing compound and wrapped with a non-hygroscopic core tape. A flooding compound shall be applied over the core and to all surfaces of the shield/armor to resist moisture entry and corrosion. The cable shall be finished with a black polyethylene jacket which is sequentially printed with footage markers at regular intervals. Cable shall conform to RUS/PE-89 design.

Splices of the SIC will only be allowed in the traffic signal controller cabinet. Contractor shall terminate SIC in cabinet as indicated in the plans. Contractor shall test the SIC cable for insulation resistance, continuity and distance between the cabinets utilizing an approved copper field tester unit such as the SPIRENT Tech-X Field Tester. The contractor shall furnish a report (Attachment K) showing ohm, megohm, and distance readings per pair to the city Transportation Engineer. For insulation resistance a value of 5 megohm or greater is desirable and acceptable. For continuity test a value of lower than 5 ohms is desirable and acceptable. For distance the value shall be equal to the actual distance of SIC tested. Test shall be performed in the presence of the city Transportation Engineer before connecting to the punchdown block.

1.9 SERVICE

Type III-AF service equipment enclosures shall be the aluminum type. Service Cabinet shall be powder coated the same color as the traffic signal controller cabinet at the factory, Sunnyvale Beige with Anti-Graffiti Coating, color code Beige #TCIP009-BG02. The contractor shall submit a paint chip for approval by the Traffic Engineer.

All overlapping exterior seams and doors shall meet the requirements for Type 3R enclosures specified in the NEMA Enclosure Standards. Continuous welding of exterior seams in service equipment enclosures is not required.

Type III-AF service equipment enclosures shall be configured and wired as shown on the plans or in the State of California Department of Transportation Standard Plans, July 2006, Std. Plan ES-2D, Page 428, also one (1) additional 30Amp unmetered Street Lighting breaker wired to Test switch, PEU control, and 60Amp Contactor.

Service cabinet shall incorporate the UPS system within the service cabinet or mounted to the rear of the service cabinet. Of mounting to the service cabinet, the cabinet shall be assembled as the factory (see Section 1.20).

Ground rod/electrode shall not be embedded into the service cabinet foundation. It shall be inserted into a sleeve through the concrete foundation into the earth. Contractor shall test the grounding system using appropriate grounding test equipment prior to service activation. A reading of 25 ohms or less of the grounding system is desirable and acceptable. A written certification or report of this test is required to be provided by the contractor to the city. Test shall be done in the presence of the city assigned inspector.

1.10 SIGNAL HEADS

All traffic signal heads shall be furnished with red, yellow, and green LED’s. The Contractor shall furnish all indications for traffic signal units.

The traffic signal housing doors, full circle visors and backplate shall all be painted black. The traffic signal housing shall be painted olive green. No plastic/polycarbonate traffic signal heads will be allowed.

1.11 SIGNAL HEAD MOUNTINGS

Adjustable Astro-Brac vehicle signal mounting hardware with terminal compartments, or equivalent, shall be provided for mast arm signal heads as noted on the plans.

Mast arm signals and mast arms shall include signal ports @ 5 foot intervals and flexible metal conduit between ports and signal heads. Contractor shall install enough flexible metal so that each signal head can be adjusted/moved 4 feet left or right of each signal port.

All unused signal ports shall be sealed with a square head pipe plug.

All signal mounting assemblies including pipe fittings, post-top slip fittings, and terminal compartments shall be cast bronze.

1.12 RED LIGHT ENFORCEMENT UNITS

The Red Light Enforcement units shall be used for enforcement by continuously monitoring the red light status of specific traffic signal indications as indicated on the plans. The units shall consist of the following minimum specifications:

- Utilize Omni-View technology for the LED indications.
- Viewable up to 200 feet under normal conditions.
- LEDs indications shall consist of red LEDs for through direction monitoring and blue LED's for left turn direction monitoring.
- Operate on 110 volts from the traffic signal conductors without use of external power supplies or transformers and shall have replaceable inline fuse for overload.
- Shall include a universal signal port mounting which allows adjustments up to 360 degrees in a horizontal plane and up to 215 degrees in the vertical plane.
- The barrel shall be constructed of welded 5052 grade aluminum.
- Unit shall be painted and powder coated black
- All hardware for installation shall be provided.
- Spade connectors for connection of standard traffic terminal signal blocks shall be provided.
- Shall come with a two (2) year warranty on all parts.

The Red Light Enforcement units shall be the Enforcer manufactured by McCain Traffic Supply or approved equal.

1.13 VIDEO DETECTION SYSTEM

The video detection system will be a modular system that shall plug into the I or J detector rack of a Caltrans type 170 controller cabinet.

The Video Detection System must be field programmable without the use of an auxiliary computer system. (Keypads, pointing devices, and video monitors are acceptable support equipment but must be included with the system as required.)

The System shall permit direct (no supplementary interface equipment) recording of video detection operation (background image plus detector zone status) using a standard video recorder from a panel jack on the video detector.

The System shall include provisions for field adjustment of camera zoom and focus. The Video Detection System shall be furnished with a Lens Adjustment Module or other camera adjustment equipment specifically designed for use with the furnished system. (Systems that permit camera zoom and focus adjustment of a pole-mounted camera from the traffic signal controller cabinet are preferred.)

The System shall allow for archival and external storage of detector programming parameters (this may be achieved through the usage of an external computer system). The System shall be capable of storing three detector configurations on the video processor module.

The System shall be furnished with a color LCD flat panel monitor with a minimum 17" diagonal measure. The 17" LCD monitor shall fold flat into a pull out tray when not in use. The LCD monitor shall be provided with each system to provide local video display at the intersection for use during system setup, programming, and maintenance.

Each camera installation shall include two separate surge protection assemblies. One for AC input power and one for video input signals and shall be furnished on a single panel using standard DIN rail mounted components. The system must provide adequate filtering of power by use of circuit breakers and video signals by use of Edco video surge suppressors to eliminate negative effects of nearby sources of electromagnetic interference and line spikes.

Cameras used for video detection system shall be color cameras. Black and white cameras shall not be used.

Camera mounts shall be powder coated to match the color of the camera housing. Both shall be powder coated White. All camera mounts shall be universal in design and provide for horizontal (mast arm) mounting or vertical (pole shaft) mounting unless otherwise noted on the plans. Universal camera mounts shall be manufactured by the video detection system manufacturer.

Cameras will be mounted on the traffic signal mast arm, centered over the approach being detected The System manufacturer shall conduct a field visit to verify final camera positioning and possible need for placement on the traffic signal mast arm and use of a vertical riser & mounting system to reliably and accurately detect desired traffic for stop bar and advance detection.

All cable connectors and terminations shall be positively retained and shall withstand a minimum 25-lb. Pull test with no loss of electrical or mechanical integrity.

Each installation shall include a video detection equipment list (including product serial numbers). All video detection equipment shall be new and unused. The manufacturing date of the material furnished shall be no more than 6 months prior to installation.

Each camera shall have a separate power source and circuit protection device of appropriate amperage. The circuit protection devices shall be installed in the traffic signal controller cabinet.

Cable splices between the camera and the traffic signal controller cabinet are not allowed, unless otherwise approved by the Transportation Engineer.

All power, grounding, and electrical neutral connections shall be made to the terminal busses provided in the traffic signal controller cabinet.

All exposed wiring and cables shall be “drip looped” for outdoor service.

All exposed electrical connections shall be rain tight.

Video detection system shall be provided with an addressable Ethernet module that shall compress detection camera video to mpeg4 format for remote viewing of camera images and remote programming of detection system.

The contractor shall arrange to have a technician, qualified to work on the video detection system and employed by the Video detection manufacturer or his/her representative present to setup and configure the System. The City Transportation Engineer shall be notified prior to completion of Video Detection System installation at the intersection. All Video Detection System equipment installation, cable termination, connections, camera alignment procedures, system setup, configuration, and programming of detector zones shall be completed prior to or during the pre turn-on work.

The Video Detection System shall be successfully running during the seven (7) day operational test prior to the scheduled turn-on. Further adjustment during the signal turn-on shall not be required.

The manufacturer shall supply two sets of operation and installation manuals.

The Video Detection System shall be provided with a standard 3 year warranty.

The manufacturer shall supply one additional color camera, camera mounting system, 17” LCD rack mounted video monitor, single camera processor, and two channel extension modules for use as spare equipment per signalized intersection constructed.

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1.14 INDUCTIVE LOOP DETECTORS

All detector amplifiers shall include LCD displays that indicate complete status and function setting of the detector including: loop frequency, loop inductance, delta L over L percent values, accumulated number of loop failure incidents since last reset, and a bar graph that displays inductance change to verify ideal sensitivity level setting. All detector amplifier functions shall be fully programmable from the front LCD menu. The detector amplifier shall be able programmable to emit an audible tone during detector activation.

The Contractor shall furnish and install one loop detector amplifier for each detector designation (i.e., 1I1U and 1I1L).

Where one detector consists of a sequence of 4 loops in a single lane, the front loop closest to the limit line or crosswalk shall be Type D and located one foot from the line. All loops shall be connected in series unless otherwise indicated on the plans.

Detector and Detector Lead-In Cable (DLC) Testing and Acceptance - The Contractor shall test all individual loops and all DLCs prior to splicing. Inductive loops. All DLCs shall be tested for continuity, inductance and for insulation resistance using a standard multimeter for continuity and an approved loop test meter for inductance and insulation resistance. For continuity test a value of lower than 5 ohms is desirable and acceptable. For insulation resistance test a value of greater than 100 megohms is desirable and acceptable. Inductance shall be more than 50 but less than 700 micro-henries. Test shall be performed in the presence of the city Transportation Engineer before any splices are made. See Attachment G for loops test log.

1.15 PEDESTRIAN SIGNALS

The Contractor shall supply and install Type A pedestrian signals.

All pedestrian signals shall be furnished with a combination Portland Orange “Up-Raised Hand”, and Lunar White “Walking Man” LED’s. All pedestrian indication symbols shall be completely filled in, outlined indications shall not be allowed. LED Pedestrian indications shall also have a Portland Orange “Countdown Indication” showing the remaining Walk/Don’t Walk time. Unit shall have uniform appearance symbols that exceed ITE PTCSI-2 requirements.

The Countdown Pedestrian Signal shall be user configurable through dipswitches allowing the user to deactivate the countdown operation or activate countdown of Walk+Don’t Walk time, countdown of Walk time and then Don’t Walk time and countdown of Don’t Walk time only.

Countdown display shall feature 2-row 9” high countdown digits that are MUTCD compliant for crosswalks over 100 feet. Countdown shall be fully preemption compatible, and revert to it’s previous timing immediately following a preemption call. Display shall have memory feature to allow countdown timing to be stored internally, even when power is off for extended time. Unit shall automatically adjust to traffic signal controller pedestrian interval changes. Unit shall be sealed for moisture resistance, lens shall be textured to reduce glare, and quick connect terminals and spade adapters shall be provided. Units shall be ENERGY STAR qualified.

Typical wattage at 25ºC shall be 5 watts for countdown display, 8 watts for hand display, and 6 watts for person display. The minimum luminance shall be 1400cd/m^2 for countdown and hand display and 2200cd/m^2 for person display. Unit shall operate within the voltage range of 80VAC to 135VAC with 120VAC nominal. Power factor shall be greater than 0.9 and total harmonic distortion shall be less than 20%. Turn on/turn off time for hand/person shall be 75msec maximum and operating temperature range shall be

-40ºC to +74ºC. Unit shall meet FCC Title 47, Subpart B, Section 15 Regulations for electrical noise. Unit shall conform to MIL-STD-810F for blowing rain, MIL-STD-883, Test Method 2007 for mechanical vibration, MIL-STD-883, Test Method 1010 for temperature cycling requirements. The Luminance uniformity and color uniformity shall exceed ITE PTCSI-2 LED Pedestrian Signal Specification requirements. Transient suppression shall exceed ITE PTCSI-2 LED Pedestrian Signal Specification and meet the following standards: NEMA TS-2 Sec 2.1.6 and 2.1.8, IEC 1000-4-5, 3KV, 2ohn source impedance, and ANSSI/IEEE C62, 41-2002; IEC 61000-4-12, 6KV, 200A, 100KHz ring wave. All units shall be traceable by serial number for warranty and manufacturing date purposes. All supplied LED pedestrian signal units shall be manufactured within 6 months of installation date.

Pedestrian LED signal shall e Dialight 430-6479-001X or approved equal.

Type SP-1-T mountings shown on the State Standard Plan ES-3B shall have a lower mounting bracket attached to the pedestrian signal housing in the same manner as the SP-2-T mounting.

The pedestrian signal housing and mounting bracket shall be powdercoated olive green and the pedestrian housing door and z-crate shall be powdercoated black.

The contractor shall ensure that the pedestrian signal frameworks provided will have enough clearance from the shaft of the traffic signal pole to allow proper aiming and access to the pedestrian signal for maintenance.

1.16 PEDESTRIAN PUSH BUTTONS

All pedestrian push button assemblies shall be Type B (5" x 7.5") per State Standard Plan ES-5C. Pedestrian push button signs shall be the international type (5" x 7.5"). Pedestrian push buttons shall be 2” ADA pushbuttons and be mounted 36” above the adjacent pavement. Pedestrian pushbutton assembly and housing shall be powder coated olive green from factory. Pedestrian push buttons shall have LED indication and audible speaker on pushbutton body to indicate activation of pushbutton. Pushbutton shall be Polara Navigator Accessible Pedestrian Signal (APS) or City-approved equivalent. The push button shall be a vibratory and tactile unit with a raised directional arrow and shall be as follows:

- Vibrator Power: 15 VDC
- Speaker: 8 ohms, 15 W max, weather proof
- Temperature Range: -40 Celsius to +105 Celsius
- Push Button: ADA compliant connects to control unit in parallel with traffic signal controller connection.
- LED: Sunlight visible, red.
- The control unit shall be as follows:
    - Power Supplied to Vibrator: 15 VDC pulsed. Operates during walk interval only.
    - Conflict Detection: WALK indication is ignored in the event of a WALK/DON'T WALK conflict.

  - Audio Amplifier Power Output: 10 W RMS into 8 ohms.
  - Volume Control: Control unit provides separate volume controls for setting locator tone and walk message volumes.
  - Volume Control Automatic Adjustment Range: 28 dB max.
  - Microphone For Ambient Noise: Approximate frequency range: 170 Hz to 2.3 kHz
  - Push Button Interface: Accepts 12 to 48 V AC/DC imposed by connection to push button in parallel with existing traffic signal controller.
  - LED Operation: The LED lights when button is pushed. The LED remains lit until the next walk phase.
  - Push Button Tone: A brief "tick" confirms each button push.
  - System Programmable Options shall include: Cuckoo, Peep-Peep, Walk Message, Selectable Walk Sound Duration, Location Message, Extended Push Activation, Locating Tone and Custom Street Name Message.
  - “Cuckoo” North-South audible signal (Electronic Bird Chirp) by method of two (2) combined frequencies. Duration of 0.6 seconds +/- 20%. Frequency base on 1,100 Hz +/- 20% with frequency deviation +120 Hz +/- 20%.
  - “Peep-Peep” East-West audible signal (Electronic Bird Chirp) by method of two (2) combined frequencies. Duration of 0.2 seconds +/-20%. Frequency base of 2,800 Hz +/- 20% with frequency deviation –800 Hz +/- 20%.
  - Audible locating tone. Duration of 0.1 seconds +/- 20%. Frequency base of 800 Hz +/- 20% plus harmonic.
- Testing of each Tactile Pedestrian Push Button with Combined Audible Unit shall be as follows:
  - Apply power to the WALKING PERSON/UPRAISED HAND pedestrian signal head.
  - Manually feel the arrow on the push button during the WALKING PERSON interval – a very noticeable vibration should be detected.
  - Manually feel the arrow on the push button panel during the UPRAISED HAND interval – there should be no noticeable vibration.
  - If the location beep option is used, it should sound every 3-seconds once power is applied.
  - The Custom Walk Message should sound during the same time the “arrow” is vibrating.
  - The “Voice of Location Parameter” should sound when the button is pushed and held for about 4-seconds.

All pedestrian pushbutton plates shall be secured to the pedestrian pushbutton assembly with 8-32 x 3/8” button head torx tamperproof stainless steel screws.

All 2” ADA pedestrian pushbuttons shall be secured to the pedestrian pushbutton assembly with 8-32 x 1” or other appropriate length button head torx tamperproof stainless steel screws.

The contractor shall provide two (2) torx tamperproof keys to the City.

1.17 PHOTOELECTRIC CONTROLS

Contactors shall be the mechanical armature type.

Photoelectric control shall be installed in accordance with Section 86-6 of the State Standard Specifications.

The contractor shall supply a photoelectric control unit to be used as a spare.

1.18 INTERNALLY ILLUMINATED STREET NAME SIGNS

The Contractor shall supply and install Type A IISNS double faced in accordance with the State of California, Department of Transportation, Standard Plan ES-33 and Standard Specification 86-6.065, and these Special Provisions:

The Contractor shall supply and install Hawkins Adjustable IISNS brackets or Pelco Adjustable IISNS brackets. The Contractor shall also supply and install a safety cable to secure and support IISNS in case of failure of brackets.

All sign faces shall include the street name, block numbers with directional arrows, and the City of Sunnyvale logo.

The sign faces shall be fabricated from flexible, colored, wide-angle prismatic retroreflective sheeting tape and related processing material designed to enhance the visibility of the traffic control signs. The retroreflective sheeting for sign faces/finished signs shall have a smooth surface with a distinctive interlocking diamond seal pattern and orientation marks visible from the face. The sheeting shall be preaccepted with a pressure sensitive adhesive backing protected by a removable liner. The adhesive shall require no heat for proper bonding when applied in accordance with the manufacturer's recommendations to substrates 65 degree F or above. The retroreflective sheeting shall be 3M, "Scotchlite", Diamond grade White Sheeting #3990, the green sheeting shall be 3M Green #1777, the yellow, blue, and black used in the Sunnyvale City logo shall be Spar-Cal Golden Yellow #1827, 3M Blue #1175 and 3M Black #1178, respectively. The IISNS panel shall not have any white border visible around the outer edges of the face, the entire panel shall be green except for lettering, block numbers, and Sunnyvale logo.

IISNS shall be illuminated with either a LED light system or an inductive light system. No fluorescent tubes shall be used.

If LED light system is to be provided, it shall be Plug & Play with no modification to the IISNS housing, panels shall be available in 4' increments, LED panel face shall be entirely conformally coated with a 2-part urethane resin, no thinner than 0.002 inches (dry) to protect the light engine from moisture and corrosion. Power supply shall be U.L Class 2 (24VDC) rated and damp location rated. The entire IISNS sign panel shall be evenly illuminated with the minimum surface luminance being 200 cd/m^2 with variance no more than +/- 20%. LED light engine shall be warranted for 7 years from manufacturer.

1.19 MODEL 170E OR 2070 CONTROLLER ASSEMBLIES

All controller assemblies shall be furnished by the Contractor and shall include Model 170E controllers unless 2070 controller are specified in the plans.

The controller cabinet shall be powder coated the same color as the Type III-AF service cabinet at the factory, Sunnyvale Beige with an Anti-Graffiti Coating, color code Beige #TCIP009-BG02. The contractor shall submit a paint chip for approval by city Transportation Engineer. Contractor shall supply one can of spray touch-up paint matching, Cardinal Industrial Finishes Beige #TCIP009-BG02 with Anti-Graffiti Coating to repair any minor paint damage to the controller cabinet or service cabinet during installation.

All controller assemblies shall conform to Section 86-3.11 of the State Standard Specifications. All controller cabinet prints shall indicate the following wiring and equipment modifications. The first two paragraphs of that section are amended to read as follows:

The controller assemblies shall consist of a Model 170E or 2070 controller unit, a fully wired cabinet and all auxiliary equipment required to control the system as shown on the plans, as specified in these Technical Specifications and as specified in Sections 86-3.01, "Controller Assembly" also including four (4) low profile fluorescent lighting fixtures (front/back of cabinets), a Siecor Rack-Mount Fiberoptic Splice Enclosure, a pullout drawer/shelf, red monitor board and cable capable of monitoring vehicle and pedestrian phases, C2 communications cable and C5 cable. The traffic signal controller cabinet shall have 2 hooks welded inside the front door and back door used to hang a factory supplied resealable document holders. A resealable document holder shall be supplied for each door. All controller cabinet doors shall have Normally Closed switch installed for the purpose of "Door Open" alarm, switches shall be wired so that opening of any door shall activate an input to lower channel of J11. Upon completion of circuit, DC isolator shall output a signal to controller indicating "Door Alarm". Upper channel of J14 shall be wired to the "On-Battery and Low Power Output" of the UPS system. This shall cause controller cabinet to force intersection to Flashing Red operation upon loss of Utility Power and Low Battery condition from UPS using Railroad 1 input. Controller cabinet shall be supplied with Model 242DC isolator for slots J11 and J14.

Rack-Mount Fiberoptic Splice Enclosure shall accommodate up to 12 splices of fiberoptic cable with ST connectors. Enclosure shall be mounted between PDA#2 power supply and Output Bay. The enclosure shall not interfere with access or wiring to rear of PDA and Output Bay.

Model 170E controller assemblies shall conform to the requirements in "Traffic Signal Control Equipment Specifications," issued by the State of California, Department of Transportation, and to all addendums thereto current at the time of project advertising.

Attention is directed to Section 209-2.42 "Conductor Identification" of the *City of Sunnyvale Standard Specifications for Public Works Construction 2000 Edition and Standard Details for Public Works Construction 2000 Edition.*

Controller units shall be furnished with the latest version BiTran Traffic Signal Program 233 and 412/C Memory Module. Controllers shall be furnished with the necessary modems for interconnection and for dial-up to the existing City of Sunnyvale BiTran QuicNet system. Internal modems for the traffic signal controller shall be capable of communicating at a 9600-baud rate. Modem shall be GDI-496 modem or approved equal.

If 2070 traffic signal controllers are specified, units shall be furnished with the latest version of software for 2070 controllers. 2070 controllers shall be furnished with a Field I/O Module(2070-2A), C1 connector for 170 controller cabinets, C11S connector, a 8 line x 40 character backlit LCD display panel(2070-3B), 10 Amp power supply module(2070-4A), 2 Asynchronous serial communications ports(2070-7A), an Ethernet port connection, and the necessary modems for interconnection and for dial-up to the existing City of Sunnyvale BiTran QuicNet system capable of communicating up to a 9600-baud rate(2070-1E). 2070 traffic signal controllers shall conform with the latest CALTRANS TEES and Errata. 2070 controllers will be supplied with the latest version of BiTrans 2033 or Transcore ITS SCATS software unless otherwise indicated on the plans. 2070 controller shall be supplied with a SFK5V 2M datakey.

Controller cabinet shall also be supplied with fused/surge protected a minimum 6 outlet power strip mounted to power panel or other approved area within controller.

If specified in the plans, the traffic signal controller cabinet shall be supplied with an Ethernet Bridge operating on G.SHDSL.BIS with 8 DSL ports supporting M-Pair, bandwidth of 5.7 Mbps per DSL pair, 4 port managed Ethernet switch, bridging (Full bridging support with DSL port bundle configuration) VLAN support, dynamic and static routing, RSTP and remote management (Telnet and SNMP with SSH support.) Ethernet Bridge shall be approved by the Transportation Engineer prior to any deployment. Ethernet Bridge shall be secured to 19” rack underneath the traffic signal controller and over the pullout 17” LCD monitor.

All supplied traffic signal controllers shall have a manufacture/assembly date of not more than 6 months prior to start of 21-day cabinet testing. Contractor shall provide paperwork documenting this from traffic signal manufacturer.

The controller cabinet shall be provided with a modular 66 terminal punchdown blocks (66M 50 block with bridging clips) with a separate standoff extension mounting bracket and panel to secure to the controller cabinet assembly.

Ground rod/electrode shall not be embedded into the concrete controller cabinet foundation. It shall be inserted into a PVC sleeve through the foundation into the earth. The Contractor shall test the grounding system using appropriate grounding test equipment prior to signal pre turn-on. A reading of 25 ohms or less of the grounding system is desirable and acceptable. A written certification or report of this test is required to be provided by the contractor to the city. Test shall be done in the presence of the city assigned inspector.

The supplier of the Traffic Control Equipment is required to furnish engraved plastic labels to be installed on all conductors in the bottom of the controller cabinet by the Contractor's field personnel.

The Contractor shall arrange to have a minimum of five (5) representatives present at the time the traffic signal equipment is turned on: A technician, qualified to work on the controller unit and employed by the controller unit manufacturer or his representative, a cabinet technician, qualified to work on the controller cabinet and employed by the controller cabinet manufacturer or his representative, and a Transcore SCATS engineer/representative if SCATS software is used, a technician qualified to work on the traffic signal service/UPS units employed by the service/UPS unit manufacturer and his representative, and a traffic signal technician from current Traffic Signal Maintenance Contractor. The contractor shall be responsible for all cost associated with each technician/manufacturer's representative required for activation of the traffic signal.

Contractor is responsible to contract for Sunnyvale Department of Public Safety Police Officers for traffic control for signal activation. Public Safety requires a minimum of three weeks notification prior to signal activation. Contractor is responsible for all related costs to this item.

1.20 TRAFFIC SIGNAL CONFLICT MONITOR

The traffic signal conflict monitor shall be configured for operation with 170E, 179, or 2070 traffic signal controller. The monitor shall provide the following functions in addition to those requirements set forth in the Caltrans Traffic Signal Control Specifications: enhanced functions of Red signal monitoring, dual indication monitoring, clearance monitoring, pedestrian phases "Walk& Don Walk" monitoring and provide a RYG full intersection display, provide a RS232 port to communicate with the traffic signal controller or personal computer, and store monitor status, event logs, and signal sequence history logs in nonvolatile memory for diagnostic and archival purposes. A communications cable shall be provided to allow communication between the traffic signal conflict monitor and the traffic signal controller through the RS232 ports. The traffic signal conflict monitor shall also have an Ethernet Port for remote monitoring. The traffic signal conflict monitor shall be capable of operating as an 18 channel conflict monitor with a 18 channel diode card and as a 16 channel conflict monitor with a 16 channel diode card. Traffic signal conflict monitor shall be Reno A&E 2018-G or approved equal.

1.21 TRAFFIC SIGNAL UPS SYSTEM

The traffic signal UPS system (UPS) shall include, but not be limited to the following: inverter/power transfer relay, with a maximum transfer time of 150 milliseconds, batteries and charging circuitry, a separate manually operated non-electronic bypass switch and all necessary hardware and interconnect wiring. The UPS shall provide reliable emergency power to a traffic signal in the event of a power failure or interruption. The UPS shall be capable of providing power for full run-time operation for an "LED-only" intersection (all colors red, yellow, and green). The UPS shall be designed for outdoor applications, in accordance with the Caltrans Transportation

Electrical Equipment Specifications (TEES), dated November 19, 1999, Chapter 1, Section 8 requirements.

The UPS shall be installed and tested by an authorized UPS manufacturer representative prior to the start of the 21-day controller assembly test. The Contractor shall arrange to have a manufacturer representative, qualified to work on the UPS and employed by the UPS unit manufacturer or his authorized representative, present at the time the equipment is turned on.

UPS unit shall be provided with optional external data/event logger.

Enclosure Specifications

The enclosure shall be aluminum; powder coated Sunnyvale beige (Cardinal Industrial Finishes #TCIP009-BG02) with Anti-Graffiti Coating and be weatherproof. The enclosure shall house UPS batteries. Enclosure shall be TIG welded construction with welding materials specifically designed for the material to be welded. Enclosure shall have frames side hinged outer doors with swaged close tolerance sides for flush fit with drip lip and closed cell neoprene flange compressed gaskets. Front door shall incorporate a full length piano hinge, pad-lockable welded-in place vandal-proof tabs (one upper area, one lower area on door-latch side, rated at 2000 lbs. each). There shall be no exposed nut, bolts, screws rivets, or other fasteners on the exterior of the enclosure. Maximum cabinet dimensions 46”H x 20” W x 9” D. Weight 250 lbs. with batteries. UPS shall be mounted in an interior tilt out housing with 800 lb rated stops. Battery connectors shall be Anderson Connectors with silver plated contacts. Batteries shall be installed in fixed position framed trays for seismic safety and be readily accessible for maintenance. Batteries shall be mounted allowing airflow front and back. Enclosure shall include two transfer bypass switches, one for UPS bypass the second for auxiliary generator. All switches must be panel mounted on interior dead front panel board. UV resistant plastic laminated nameplates shall identify all controls and major components. A plastic covered wiring diagram will be attached to the inside of the front door. All components shall be factory wired and conform to required NEMA, NEC, and UL standards. A chassis ground point shall be provided. Panel shall be UL 508 Industrial Control Panel rated.

UPS Panel Minimum Features

- UPS bypass and UPS isolation switch
- Generator switch
- Deadfront safety panel board with all switches, indicating fuses, plugs, and isolation fuses for each battery pre-wired with phenolic nameplates
- All nameplates shall be screwed on phenolic engraved type
- All wire terminating lugs shall be full wrap around type
- All batteries shall be captive spaced from external captive sides in earthquake-proof buckets
- Cabinet ventilation shall be by (qty. 4) 4” x ¼” louvers top and bottom with encapsulated bug screens, cleanable filters and a 100 cfm fan to completely exchange air 25 times minimum per minute.

- All DC terminals and connections shall incorporate safety covers such that the safety covers are in place for every normal maintenance mode.
- Event Counters and Total Run Time Counter

UPS Minimum Specifications

UPS unit shall provide a true sine wave output with minimum 1400 volt-amp continuous capacity. UPS must provide for utility service isolation when in operation. The minimum rating for wattage output will be 950 watts. The UPS shall be capable of running an intersection with LED lights (for Run Time consult manufacturer). The unit shall operate off-line, with transfer time of 2 ms or less, with battery condition indicator, with automatic test provisions, and with hot-swappable batteries (all batteries in system). UPS will automatically recharge batteries from full discharge to 95% capacity within 6 hours. UPS will provide in-line operation for a minimum input of 92 to 145 VAC, provide full load output of 120 VAC – 10% / +4% at 60Hz +/- 0.05% over a temperature range of -37 degrees celsius (optional adder) to +74 degrees celsius and be a UL approved design. The UPS unit will be delivered with maintenance manuals and schematic diagrams.

UPS Unit Minimum Features

- 1400 VA, 950 watts
- Surge energy withstand 480 joules, 6.5kA
- Common mode clamping 0 ns , 5ns typical UL 1449
- Conditioned power – computer quality
- Transient lighting protection – 160 joules
- Transfer to battery time – 2 ms
- Retransfer to utility – 2 ms
- Each battery shall be 24 volts @ 18 AH with heavy duty Anderson plugs and isolated fused (deadfront panel mounted 30 amp) connection to the UPS for greater system reliability and ease of maintenance. Series wiring is unacceptable.
- Fan cooling shall be fused for locked rotor current.
- Cooling air shall be ducted to cool the front and back of each battery with air space on all four sides of battery.
- UPS covers shall be 60% open on both sides to diminish the environmental effects of extreme temperatures.
- Includes a EIA-232, DB9 computer interface port.
- Low voltage safety design at 24v DC. (higher voltage DC systems are unacceptable).
- Generator Transfer Switch with UPS bypass and 30-amp external reverse service plug.
- UPS shall run a full LED intersection for a minimum of 4 hours.
- UPS shall be supplied with 7 batteries.
- UPS shall be supplied with an adjustable timer to force intersection to flashing red operation after determined battery operation period or upon low battery condition.

UPS Communications Module

Smart Slot Relay I/) Module;

Input #1	Turn the UPS on
Input #2	Turn the UPS off
Input #3	Start the UPS self-test
Input #4	Shut down the UPS (when on battery)
Output #1	The UPS is on-battery (during a power failure, self-test or run time calibration)
Output #2	UPS has a low battery – programmable
Output #3	the protected load is nit receiving power from the UPS
Output #4	Replace the UPS batteries

Batteries

Batteries shall be maintenance-free, type AGM/VRLA (Absorbed Glass Mat/Valve Regulated Lead Acid), such as APC Smart-UPS RMXL or approved equal. Batteries shall be independently pre-wired and individually fused. Batteries shall be furnished with heavy-duty 50 amp rated silver-plated Anderson connectors. 100 amp internal fuse by Battery supplier. Batteries shall be lightweight for personnel safety and protection plus ease of installation and maintenance. Batteries with a weight of over 26 lbs. are not acceptable.

Enclosure Temperature Compensation

Operating temperature shall be a minimum of -37 degrees celsius to +74 degrees celsius.

Power System Analyzer and Conflict Resolution Module

The UPS shall incorporate an integrated power system analyzer and conflict resolution module. The analyzer will evaluate and make limited adjustments to the incoming utility power and will automatically transfer load to the UPS battery back-up power if utility power is lost. When utility power becomes available, the system will provide automatic UPS failure detection and automatically isolate the failed UPS and transfer the load back to utility power. Once the failure has been corrected, the system will return the normal operation. This system shall include the following as a minimum:

- **Triple Bypass System for Off-Line UPS:**

1. SPACT – Smart Power Analyzer with Conflict Monitor Isolation and Transfer Module
2. PCM – Power Conflict Monitor
3. The PCM is a totally redundant failsafe system. The PCM monitors load bus power available continuously. If load bus power fails for 5 ms the PCM will transfer and isolate the UPS and guarantee that commercial power will be locked on.,

4. Watchdog timer – Redundant 5 ms delay and hard transfer to utility power.
5. The outboard Smart Transfer Switch shall not interrupt the normal controller function. Transfer time shall be 2 ms.
6. Onboard Smart I/O module will execute lockout of battery back up system upon Smart detection of any inverter UPS fault. If UPS resets itself, it will automatically be available for back up.

- Smart Battery Charger shall charge from shut off discharge to 95% fully charged in less than 6 hours. Batteries shall be ambient enclosure compensated to less the 120 degrees. The battery charger shall utilize Smart Cell technology to extend battery life.

- Smart boost and SmartTrim regulate under and over voltages without switching to battery.

- Battery replacement warning prevents downtime – the UPS shall automatically perform a self-test every two weeks. This ensures that the user will be alerted to degrading batteries before they wear out. Through software, or through the push of a button, self-tests shall be able to be performed at anytime.

- Faster recharge time – UPS battery charging system shall be microprocessor controlled to precisely charge batteries in les s time than legacy UPS systems.

- Manufacturers shall provide a two (2) year factory-replacement of parts warranty on the Battery Backup System. Batteries shall be warranted for full replacement for two (2) years. The warranty shall be included in the total bid price of the Battery Backup System.

Contractor will install 2 #18AWG conductors from the On-Battery and Low Battery outputs of the UPS and connect to the Railroad1 input on the Input Panel of the traffic signal controller cabinet. This will force the traffic signal into flashing red operation upon loss of utility power and low battery condition.

1.22 CONTROLLER ASSEMBLY TESTING

The Contractor shall have the controller assembly tested by:

Team Econolite
3390 De La Cruz Boulevard, Unit R
Santa Clara, CA 95054
(408) 496-6280

Approximately 21 days will be required for testing.

The Contractor shall be responsible for the cost of controller assembly testing, delivery and pickup.

1.23 EMERGENCY VEHICLE PREEMPTION EQUIPMENT

Contractor shall supply and install EMTRAC fire preemption equipment. All EMTRAC antenna enclosures shall be waterproof. The EMTRAC fire preemption receiver shall be installed in the traffic signal controller cabinet by the manufacturer's representative or authorized person prior to the start of the 21-day controller assembly testing.

1.24 LED (Light Emitting Diode) TRAFFIC SIGNAL MODULES

GENERAL DESCRIPTION

This specification covers LED pedestrian signal modules for 16" housings. It also covers red, green, and yellow LED modules to be used in place of the incandescent lamp, reflector, socket, gasket, and lens assembly of the vehicle signal sections. This technical performance specification is applicable to new construction projects and also the retrofit of existing signalized intersections.

Referenced vehicle type LED modules shall fit in all standard, incandescent vehicle traffic signal housings. Each module shall be complete and shall incorporate a red tinted lens for all red modules, a yellow tinted lens for all yellow modules, a green tinted lens for all green modules. *Screw-in* type products are not allowed for vehicle signals. Red, yellow and green signals shall utilize the *LumiLeds* (1) light engine/ robust hi-flux LED technology as their source of illumination. All indications shall fully comply with the latest versions of ITE VTCSH LED Circular Supplement, omnidirectional specifications of the ITE VTCSH LED Vehicle Arrow Traffic Signal Supplement, ITE PTCSI Part 2 LED Pedestrian Traffic Signal Module Specification. Manufacturers must be able to submit evidence of full compliance to all required testing methods, procedures, and sections as outlined in the ITE document Attachment 2, "Design Qualification Testing Flow Chart" without any changes, exceptions or omissions. Compliance testing reports must be from independent testing facilities such as ETL/Intertek. In addition, all yellow indications must comply with the corresponding specification across the temperature range of -40 degrees centigrade to +74 degrees centigrade without exceptions. All units shall be EPACT 2005 compliant

The housing of the LED signal module shall be marked 'TOP' to designate the proper orientation of the LED signal module in the traffic signal housing. Manufacturers part number, date code, and electrical characteristics of the LED signal module shall be visible on the rear of the assembly. The product shall be completely traceable by the serial number.

LED Ball, Arrow and Pedestrian Units shall conform to MIL-STD-810F, method 506.4, I for rain and for blowing rain and be provided with quick connect terminals and spade adapters.

LED pedestrian signals shall be furnished with a combination Portland Orange "Up-Raised Hand", and Lunar White "Walking Man" LED's. All pedestrian indication symbols shall be completely filled in, outlined indications shall not be allowed. LED

Pedestrian indications shall also have a Portland Orange "Countdown Indication" showing the remaining Walk/Don't Walk time. Unit shall have uniform appearance symbols that exceed latest ITE PTCSI Part 2 requirements.

The Countdown Pedestrian Signal shall be user configurable through dipswitches allowing the user to deactivate the countdown operation or activate countdown of Walk+Don't Walk time, countdown of Walk time and then Don't Walk time and countdown of Don't Walk time only.

Countdown display shall feature 2-row 9" high countdown digits that are MUTCD compliant for crosswalks over 100 feet. Countdown shall be fully preemption compatible, and revert to its previous timing immediately following a preemption call. Display shall have memory feature to allow countdown timing to be stored internally, even when power is off for extended time. Unit shall automatically adjust to traffic signal controller pedestrian interval changes. Unit shall be sealed for moisture resistance, lens shall be textured to reduce glare, and quick connect terminals and spade adapters shall be provided. Units shall be ENERGY STAR qualified.

All supplied LED signals shall have a manufactured date of no more than 6 months prior to installation date.

All LED signals shall be manufactured by Dialight or approved equal.

ELECTRICAL

All LED signal and pedestrian modules shall operate over the temperature range of -40°C (-40°F) to +74°C (+165°F). Power factor shall be 90% or greater, at nominal rated voltage, at 25°C, after 60 minutes of operation. Total harmonic distortion (THD) shall be less than 20% at rated voltage, at 25°C.

Maximum turn on/turn off time shall be 75msec.

All LED traffic signal modules shall be in compliance with FCC Title 47, Subpart B, Section 15 Regulations for electrical noise.

The LED signal modules shall be connected directly to line voltage, **120 Volts AC nominal**, and shall be able to operate over the voltage range of 80 VAC to 135 VAC.

The 8" and 12" red LED ball units shall consume no more than 8 watts, at 120 VAC, at 25ºC. The minimum luminous intensity shall be 165cd and 365cd for the 8" and 12" red LED ball units when measured at the initial peak intensity point. The dominant wavelength shall be 625nm. Both units shall be approved by Caltrans and meet latest ITE VTCSH-2.

The 8" and 12" yellow LED ball units shall consume no more than 9 and 12 watts respectively, at 120VAC at 25ºC. The minimum luminous intensity shall be 410cd and 910cd for the 8" and 12" yellow LED ball units when measured at the initial peak

intensity point. The dominant wavelength shall be 590nm. Both units shall be approved by Caltrans and meet latest ITE VTCSH-2.

The 8" and 12" green LED ball units shall consume no more than 8 and 9 watts respectively, at 120VAC at 25ºC. The minimum luminous intensity shall be 215cd and 475cd for the 8" and 12" green LED ball units when measured at the initial peak intensity point. The dominant wavelength shall be 500nm. Both units shall be approved by Caltrans and meet ITE VTCSH-2.

The 3-row LED Arrow units shall consume no more than 6 watts for Red, 9 watts for Yellow, and 6 watts for Green at 120VAC at 25ºC. The dominant wavelength shall be 628nm for the Red, 590nm for the Yellow and 500nm for the Green. All units shall be approved by Caltrans and meet ITE VTCSH-2.

The LED Pedestrian signal shall consume no more than 5 watts for countdown display,8 watts for hand display, and 6 watts for person display at 120VAC at 25ºC. The minimum luminance shall be 1400cd/m^2 for countdown and hand display and 2200cd/m^2 for person display. Unit shall conform to MIL-STD-810F, method 506.4, I for rain and for blowing rain, MIL-STD-883, Test Method 2007 for mechanical vibration, MIL-STD-883, Test Method 1010 for temperature cycling requirements. The Luminance uniformity and color uniformity shall exceed ITE PTCSI-2 LED Pedestrian Signal Specification requirements. Transient suppression shall exceed latest ITE PTCSI-2 LED Pedestrian Signal Specification and meet the following standards: NEMA TS-2 Sec 2.1.6 and 2.1.8, IEC 1000-4-5, 3KV, 2ohn source impedance, and ANSSI/IEEE C62, 41-2002; IEC 61000-4-12, 6KV, 200A, 100KHz ring wave.

(1) LumiLeds is a trademark of LumiLeds Corporation.

SPARE EQUIPMENT

The contractor shall supply one spare LED of each color (Red, Yellow, Green, Portland Orange, Lunar White), for each type (12" Ball, 12" Arrow, 8" Ball, Pedestrian Indication) supplied for this project.

1.25 WIRELESS COMMUNICATION EQUIPMENT

The wireless communication equipment shall use spread spectrum radio technology to allow communication between controllers with equal or superior function to signal interconnect cable. The wireless communication equipment shall include radio modems, directional antenna, cabling, and software required to transmit communication between controller assemblies. The Contractor shall have a authorized manufacturer's representative present on the day of the traffic signal turn-on to program and fine-tune the wireless communication equipment.

a. Spread Spectrum Radio Interconnect Equipment-The Contractor shall install spread spectrum radio-based interconnect equipment. The spread spectrum radio communications equipment shall be based upon a point-to-multi-point spread spectrum technology.

The purpose of the communications equipment is to provide a data link between the central traffic signal control system and the local signal controllers.

The radio shall be certified for use with the Bitrans Quicnet Traffic Signal Control Program Version 4.0. Written documentation of this certification shall be provided to the Engineer for approval.

The radios shall operate with the Model 170E controller-based traffic signal control and shall be transparent to the system (i.e., fully capable of operating with the communications protocol required by the traffic signal control system). These features of the installed system shall be well documented.

The radios shall meet FCC Part 15.247 requirements for unlicensed use, and operate with a communications protocol that is transparent to the central traffic signal control system (i.e., the radios shall be compatible with the central traffic signal control system communications protocol and with the configurations of the central traffic signal control system). The radios shall be able to function as either a master, repeater or remote, and use direct sequence techniques to spread the radio frequency (RF) carrier. The radios shall be encased in a hardened unit and meet the National Electrical Manufacturer's Association (NEMA) TS-1 environmental standards for traffic signal equipment. Other features to be provided by the radio are the following:

1) operate in the 2.4000 to 2.4835 GHz radio frequency range
2) provide for installation in the controller cabinet
3) offer at least nine user-selectable channels, with at least five non-overlapping channels
4) allow connection to either an omni-directional or directional antenna
5) offer point-to-point, point-to-multi-point and repeater capability
6) user-selectable power output (one watt, maximum as outlined by the FCC)
7) provide RS-232 interface
8) operate with 110 VAC

b. Radios, Antennas, Cabling and Connections--The Contractor shall install the remote radios inside the controller cabinets of the project signals as designated in the plans and as described in these specifications. The only portion of the radio that shall be installed outside the controller cabinet shall be the radio antenna. The antenna for the remote radios shall be installed by the Contractor at a location on a signal pole or street light pole at the intersection as determined in cooperation with the Engineer. All cabling and connections from the remote radios to the local controller and the antenna shall be installed by the Contractor in cooperation with the Engineer.

The Contractor shall use the facilities within the radio as well as external test equipment to maximize the signal strength through antenna placement and aim. This shall also include testing the 2.4000 to 2.4835 GHZ radio spectrum for signals that may interfere with the operation of the radios to be installed. The Contractor shall make adjustments to the radio to minimize the impact of any potential interference.

The Contractor shall provide the Engineer with written documentation of this testing. This documentation shall include printouts from the testing equipment. The Contractor shall also provide written documentation of all switch or jumper settings for each radio installed.

The Contractor shall install the 120-volt power connection such that it will not become disconnected by vibration of thermal stresses in the controller cabinet. The Contractor shall work with the signal maintenance staff to accommodate this requirement.

c. Antennas-Antennas shall be directional antennas compatible with the spread spectrum radio system.

Directional antennas shall be Yagi antennas, having a minimum of 16 dBi gain, connected with coaxial cable to the radios. The directional antennae shall be as recommended by the radio manufacturer. The directional antennas shall be installed at the local intersections.

All antenna mounting equipment shall be stainless steel or galvanized, and shall be furnished by the Contractor. The connections between the antenna and the coaxial cable feed shall be sealed to prevent moisture intrusion into the connection.

d. Cabling and Connections-Cabling and connections shall be materials intended for use with the radios and antennas.

The cable connecting the radios to the antenna shall be as follows or as recommended by the radio manufacturer. The cable between the directional antennae and radios shall be Times Microwave LMR400. The cables shall be suitable for installation in underground locations susceptible to moisture.

All exterior connections shall be taped and sealed to prevent moisture intrusion as directed by the traffic engineer.

e. Spare Equipment-The contractor shall provide one spare spread spectrum radio, up/down converter, directional YAGI antenna, cables to connect up/down converter to lightning suppressor, cable to connect radio to traffic signal controller and lightning suppressor, and lightning suppressors for the cabinet and antenna.

1.25 LED SAFETY LIGHTING

General Specifications

It is the intent of the attached minimum specifications to describe the said equipment, apparatus and supplies or materials to be purchased for the City of Sunnyvale. All items described within the specifications must be new, unused, and of the manufacturer's latest design and model unless otherwise specified. All Standard Equipment must be provided.

All necessary parts not mentioned, but needed for operation of the items specified must be supplied.

General Description

Slim, low profile design, that minimizes wind load requirements. Fixture is constructed from rugged extruded aluminum and cast aluminum components. LED drivers are mounted in the cast aluminum housing which is suitable for wet listed operation (per UL 1508 requirements). A High Performance aluminum heat-sink is specifically designed for LED 'Area Light' applications. Finish includes an E-coat epoxy primer with an ultra-durable powder topcoat providing excellent resistance to corrosion and ultraviolet degradation and abrasion.

1. **Luminaire Efficiency** – allow for thermal and optical losses- efficiency should be determined on a delivered lumens per watt basis for comparison at each luminaire drive current required
   Initial delivered lumens per watt minimums required with independent testing lab verification:
   60 Lumens per watt (L/W) at 350mA drive current
   50 Lumens per watt (L/W) at 525mA drive current
   45 Lumens per watt (L/W) at 700mA drive current

2. **Depreciation**

- Average Delivered Lumens – Average delivered lumens over 50,000 hours of operation should be a minimum of 95% of initial delivered lumens.
- LED's in the luminaire shall be rated for "life" in hours as defined by IESNA standards.
- Average delivered lumens for 350 mA drive current shall be 70% of initial delivered lumens after > 150,000 hours of operation at 15 C ambient
- Average delivered lumens for 525 mA drive current shall be 70% of initial delivered lumens after 117,000 hours of operation at 15 C ambient (does not apply to 40, 50 and 60 LED product)
- Average delivered lumens for 700 mA drive current shall be 70% of initial delivered lumens after 65,000 hours of operation at 15 C ambient (does not apply to 50 and 60 LED product)

3. **Light Distribution** – Specify light Distribution required and IESNA luminaire Classification (LCS). Fixture should have FVH and BVH values of equal to or less than 0.5%, and UP of 0%. The LCS values are intended to replace previous "Full Cutoff" designation which is no longer printed on test reports per IES TM-15-07 standard. Luminaire should have independent photometric test reports and be Dark sky compliant.

4. **Maximum System wattage (including driver loss)** –
LED wattage only not accepted.

Provide calculation of delivered lumens/total wattage with bid.
If LED lumens/watt increase between the time of specification and the time Product of ordering you will either get more light for the same energy or be Able to reduce the wattage to obtain the same delivered lumens.

5. **Color Temperature and CRI –** 6000K +/- 500 color temp, 75 CRI.

6. **Warranty –** 5years on the LEDs, 5 years on the driver**,**
10 years on the paint finish of the fixture. (Pole warranty listed separately)

7. **Electrical Safety** – wet listed in the US and Canada, UL, ROHS
and EMI, Class 1 rated luminaire

8. **Driver Specifications**
   - A. Electronic
   - B. Voltage range (120 – 277V) +/- 10%, (347-480V) +/-10% optional
   - C. Current .350 Adc (+/- 5%), .525 Adc (+/-5%), .700 Adc (+/-5%)
   - D. Frequency 50/60 Hz
   - E. Power Factor >90% at full load
   - F. THD < 20% at full load
   - G. Load Regulation: +/- 1% from no load to full load
   - H. Output ripple < 10%
   - I. Output should be isolated
   - J. Case temperature: rated for -40 through +80 C
   - K. Fully encased and potted
   - L. Overheat protection, self-limited short circuit protection
   And overload protected
   - M. Primary Fused
   - N. Life rating not less than 100,000 hours

9. **Mechanical / Other**
   - A. Tool-less entry
   - B. Utilizes terminal block for power input suitable for #6 AWG wire
   - C. Designed to mount on 1.25” IP and / or 2” IP horizontal tenon and is adjustable +/-5 degrees to allow for fixture leveling
   - D. Bubble leveling

10. **Factory installed options**
    A. Button Photocell
    B. IP66 Rating
    C. Fuse
    D. NEMA photo control receptacle
    E. Backlight Cut-Off

11. **Provide the Following information with the bid Proposal:**
    A. Literature
    B. Detailed Manufacturer's Specifications
    C. Test Reports

LED safety lighting fixture shall be BetaLED BLD-STR-T3-HT-068-LED-B-UL-SV-R LEDway Street Light-Type III, or approved equivalent.

1.26 NUMBERING SAFETY LIGHTS AND STREETLIGHTS

The placement of numbers on street light poles and safety light (traffic signal) poles will be done by the contractor. Alpha-numeric pole designation shall be provided by Transportation and Traffic staff, contractor shall provide aluminum signs, white sheeting with black numbers per plans or as directed by the city transportation engineer. Secure signs to the pole using rust proof screws as directed by the city Transportation Engineer. A paper plot of the sign must be submitted to the City Transportation Engineer for approval before fabricating signs.

1.27 TRAFFIC SIGNAL FUNCTIONAL TEST – PRE TURN-ON

A functional test for each new system shall consist of not less than seven (7) days of continuous, satisfactory operation (pre turn-on). During the functional testing period all vehicular and pedestrian indications shall remain dark until satisfactory operation is obtained. If unsatisfactory performance of the new system develops, the condition shall be corrected and the test shall be repeated until the seven (7) days of continuous, satisfactory operation is obtained.

The following steps should be followed for a typical traffic signal pre turn-on:

a. Service cabinet shall have been inspected by Building Inspection and must be energized and fully functioning.
b. Contractor shall have all field and cabinet wiring, signal equipment, EMTRAC, communications equipment, video detection, controller cabinet components and controller cabinet installed and functioning. All striping and pavement markings must have been completed as well.
c. Contractor shall requests a pre-turn on inspection through the Public Work Inspector once all items on "b" have been completed and once the City authorized Traffic Signal Technician has inspected and approved the installation, this

inspection will also include the cabinet wiring, auxiliary equipment and TESCO electric service/UPS cabinet wiring and operation. The Traffic Signal Technician will only inspect the signal for completeness. The Contractor shall complete items as necessary and reschedule another pre turn-on inspection if a deficiency if found. A one week notice is required to schedule this inspection. The pre turn-on inspection is not a final inspection.

d. Contractor performs a flashing pre turn-on operation after the City authorized Traffic Signal Technician finds the traffic signal satisfactory. Contractor will flash the signal while the City authorized Traffic Signal Technician verifies the operation and in the presence of the Public Works Inspector.
e. The contractor shall schedule the cabinet manufacturer's representatives and all necessary authorized traffic signal equipment technicians for the pre turn-on work as outlined in Section 1.19 of these specifications. The contractor shall be responsible for the any and all cost associated with their work.
f. If the flashing pre turn-on is successful the seven (7) day of continuous operation "run dark" can start.
g. Signal pre turn-on shall be performed on Tuesdays, Wednesdays, or Thursdays only. Pre Turn-On shall start at 9:30 a.m. and shall be completed by 2:30 p.m.

1.28 TRAFFIC SIGNAL TURN-ON AND ACCEPTANCE

Acceptance of new traffic signals shall be made only after all traffic signal circuits have been thoroughly tested and the seven (7) days functional test is satisfactory.

After the seven (7) days of continuous satisfactory operations the contractor shall schedule a final turn-on day through the Public Works Inspector. A one week notification is required to schedule the turn-on. The contractor shall coordinate with Sunnyvale Public Safety to have officers present during the signal turn-on at the contractor's expense.

The day of the final turn-on at the approval of the City Transportation Engineer and with officers from the Sunnyvale Public Safety present, the Public Works Inspector will direct the Contractor to place stop signs at all approaches, once this is done, the Contractor will proceed to de-energize the old traffic signal. The Contractor shall then proceed to remove the old traffic signal equipment, poles, signs, etc. After the new traffic signal heads are free of any obstructions from the old traffic signal the Public Works inspector will direct the Contractor to remove all the stop signs so 4-way red flashing operations on the new traffic signal can be initiated.

A walk through will be performed by the Contractor, City authorized Traffic Signal Technician, City Transportation Engineer and Public Works inspector prior to the final turn-on. During this walk through a check of all the signal and pedestrian heads proper alignment will be done. Contractor shall correct deficiencies as required.

The City Transportation Engineer and City authorized Traffic Signal Technician will verify traffic signal controller programming and operation including timing parameters against timing sheet as well as all the major components associated with the traffic signal operation.

After the traffic signal operation has been verified by the City Transportation Engineer and City authorized Traffic Signal Technician the Public Works inspector will instruct the Public Safety Officer to stop traffic in all directions so the new traffic signal can be placed in normal operations.

Once the new traffic signal system is successfully activated permanently the Contractor shall schedule a final inspection. The City Transportation Engineer, City authorized Traffic Signal Technician, and Public Works inspector will prepare a deficiency list. This deficiency list will then be delivered to the contractor by the Public works Inspector. All deficiency list item must be corrected by the contractor prior to final acceptance. A one week notification is required to schedule a final inspection.

Traffic Signal turn-on shall be performed on Tuesdays, Wednesdays, or Thursdays only. Turn on shall start at 9:30 a.m. and be completed by 2:30 p.m.

1.29 REMOVING AND SALVAGING ELECTRICAL EQUIPMENT

All salvaged electrical materials shall be hauled to the City of Sunnyvale, Traffic Engineering Storage Facility at 1010 Morse Avenue, Unit 15, Sunnyvale, CA 94089 and stockpiled.

The Contractor shall provide equipment, as necessary, to safely unload and stockpile the material. All salvaged controller cabinets and electrical equipment shall be securely fastened or bolted to wooden pallets. A minimum of two working days notice shall be given prior to delivery.

2. SIGNING, STRIPING & MARKINGS:

2.1 REMOVE TRAFFIC STRIPES AND PAVEMENT MARKINGS

Where blast cleaning is used for the removal of thermoplastic traffic stripes and pavement markings or for removal of objectionable material, and such removal operation is being performed within 10 feet of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the sand and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the blast cleaning operation.

2.2 REMOVE ROADSIDE SIGNS

Existing roadside signs and/or sign posts, at locations shown on the plans to be removed, shall be removed and salvaged to the City's Corporation Yard at 221 Commercial Avenue, Sunnyvale.

Existing roadside signs shall not be removed until replacement signs have been installed or until the existing signs are no longer required for the direction of public traffic, unless otherwise directed by the Engineer.

2.3 RELOCATE ROADSIDE SIGNS

Existing roadside signs shall be removed and relocated at new locations shown on the plans.

Each roadside sign shall be installed at the new location on the same day the sign is removed from its original location.

2.4 INSTALL ROADSIDE SIGNS

Roadside signs shall be installed at the locations shown on the plans or where directed by the Engineer, and shall conform to the provisions in Section 56-2.01 through 56-2.04, "Roadside Signs," of the State Standard Specifications.

2.5 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS

All new striping (including lane lines) and legends shall be thermoplastic.

The State Specification No. for glass beads in Section 84-202, "Materials," of the Standard Specifications is amended to read "8010-21C-22 (Type II)."

2.6 RESTORATION OF CURB MARKINGS

Contractor shall reference out and restore any curb markings (S-indicating sanitary sewer lateral; W-indicating water service lateral; arrows and Roman Numerals-indicating ties to water main valves; high-pressure gas main) that may be destroyed by its work. In the case of construction of curb ramps where the vertical curb is eliminated new ties to water valves shall be made on the closest available vertical curb with proper direction of arrows and proper distances from water valve to tie indicated in three-inch (3") high Roman Numerals.

2.7 RESTORATION OF PAVEMENT STRIPING AND MARKINGS

The Contractor shall repaint any pavement striping or markings that are damaged by trenching or other operations during the course of the project. The entire stripe element (individual stripe) or marking (cross walk lines, turn arrows, etc.) shall be repainted—"touch ups" will only be allowed if approved by the Engineer.

Unless approved otherwise by the Traffic Engineer, all repainted pavement markings shall be thermoplastic as described in Section 2.5 above.

3. CONCRETE WORK:

3.1 SIDEWALKS, CURB AND GUTTER, AND TRAFFIC SIGNAL POLE FOUNDATIONS

Portland Cement Concrete used for sidewalks, curb and gutter and traffic signal pole foundations shall meet the specifications for concrete class, minimum compressive strength, cement weight, combined aggregate gradation and maximum slump as indicated in the latest CALTRANS Standard Specifications.

Sidewalk and curb and gutter concrete mixtures shall include 1 pint of Lamp Black color admixture per 1 cubic yard of concrete.

4.0 TRAFFIC CONTROL

4.1 MAINTAINING TRAFFIC/TRAFFIC CONTROL

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and Section 12, "Construction Area Traffic Control Devices," of the State Standard Specifications and these Technical Provisions. Nothing in these Technical Provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.09.

Lane closures shall conform to the provisions in the section of these Technical Provisions entitled "Traffic Control System for Lane Closure." Arrow boards shall be used for all lane closures. The Contractor shall check with City Traffic Engineering to confirm any lane closure restrictions that may be in effect before closing any lanes.

The provisions of Section 7-1.08 of the State Standard Specifications regarding State-furnished signs are hereby revised to provide that all signs and other warning devices shall be provided by the Contractor and shall become his property after the completion of the contract. Section 12-2.02 is revised to provide that all flaggers and guards shall be furnished by the Contractor at its expense. The Contractor shall furnish, erect, maintain, and remove all necessary signs and devices during the length of this contract.

The Contractor shall provide a traffic control plan for each street included in the contract. The traffic control plans shall be specific for each street and for each phase of the project on each street. The traffic control plans must be reviewed and approved by the City prior to starting work. The traffic control plans shall be submitted for all streets in the project as one package for review by the City. Partial submittals will be rejected by the City. The traffic control as designed by the Contractor and identified on the traffic control plan shall be in place prior to the start of each day's work. At the pre-construction meeting, the traffic control requirements for the project shall be reviewed with the Contractor, and at the meeting, all of the Contractor's foremen or supervisors shall be present.

The Contractor will post "No Parking" signs, as necessary, not less than 72 hours in advance of scheduled work that will restrict parking. If the work is not performed during the timeframe indicated on the "No Parking" signs, the work will be rescheduled with at least five (5) working days advance notice. The Contractor shall leave the streets open to traffic until just prior to starting the work, and will provide all barricades, signs and traffic control necessary to protect the work. The Contractor will perform all re-posting of "No Parking" signs and re-notification occasioned by his failure to meet the posted schedule.

Any delays caused by failure of the Contractor to adhere to the approved schedule will be at the Contractor's sole expense. No additional compensation will be allowed for costs resulting from said delays.

Except for temporary interruptions approved by the Engineer, property owners shall be provided access to their property over both walkways and driveways at all times. The Contractor shall construct work to allow such access.

The Contractor shall maintain a safe workplace throughout the job including, but not limited to, providing flaggers, safety equipment, barricades, safe pedestrian passage along sidewalks, and maintenance of handicap access throughout the project site where applicable.

The Contractor shall fulfill the requirements of this section 24 hours per day, seven days per week, including holidays, from the time the Notice to Proceed is issued until the project is accepted as complete.

Whenever vehicles or equipment are parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed with fluorescent traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 25-foot intervals to a point not less than 25 feet past the last vehicle or piece of equipment. A minimum of 9 cones or portable delineators shall be used for the taper. A C23 (Road Work Ahead) or C24 (Shoulder Work Ahead) sign shall be mounted on a portable sign stand with flags. The sign shall be placed where directed by the Engineer.

Bicycle lanes shall be maintained by the Contractor at all times during construction. Appropriate warning signs designed for bicyclists shall be used by the Contractor, as necessary, so bicyclists can safely traverse the construction zone.

When entering or leaving roadways carrying public traffic, the Contractor's equipment, whether empty or loaded, shall in all cases yield to public traffic.

The provisions in this section may be modified or altered if, in the opinion of the Engineer, public safety and convenience will be better served and work expedited. Said modifications or alterations shall not be adopted until approved in writing by the Engineer.

The Contractor shall not direct any traffic while a traffic signal is in operation. The Contractor shall make arrangements 5 days in advance with the City Public Safety Department (408-730-7109) to have City police direct traffic for traffic control at the Contractor’s expense.

The Contractor shall coordinate closely with the City of Sunnyvale during the turnover of the existing traffic signal to the new traffic signal installation. The removal of existing traffic signal heads over existing travel lanes shall be performed after the new traffic signal heads for the same travel lanes have been tested and approved by the City. Once the new signal heads are approved for operation by the City, the Contractor shall conduct

traffic control in accordance with the requirements specified herein these special provisions.

4.2 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

A traffic control system shall consist of closing traffic lanes and ramps in accordance with the details shown on State Standard Plans T-11, T-12 and T-14, the provisions of Section 12, "Construction Area Traffic Control Devices," of the State Standard Specifications, the provisions under "Maintaining Traffic/Traffic Control" elsewhere in these Technical Provisions and these Technical Provisions.

The provisions in this section will not relieve the Contractor from the responsibility to provide additional devices or take measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the State Standard Specifications.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane roads shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with a Type II flashing arrow sign not involved in placing, maintaining, or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion.

If any component in the traffic control system is displaced, or ceases to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the component to its original condition or replace the component, and shall restore the component to its original location.

When lane closures are made for work periods only, at the end of each work period, all components of the traffic control system, except portable delineators placed along open trenches or excavations adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, approved by the Engineer.

ATTACHMENT J

City of Sunnyvale
Department of Public Works
Division of Transportation and Traffic

Signal Interconnect Cable Test Report

Project Name:				
Project Number:			Date:	
Field Tester Model:				

Pair No.	Insulation Resistance (T-R-Tip to Ring)	Continuity (T-R-Tip to Ring)	Distance
	≥ 5 Megohms	≤ 5 ohms	ft
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
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22			
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24			
25			

EXHIBIT "B"

RFP for No. F0905-95 for Traffic Signal Preventive Maintenance and Repair Services

PROPOSAL FORM FOR TRAFFIC SIGNAL PREVENTIVE MAINTENANCE AND REPAIR

Honorable City Council
City of Sunnyvale
Sunnyvale, California

The undersigned proposer hereby offers to perform the required services for the following price(s) in strict compliance with the specifications, terms and conditions set forth in this Request for Proposals.

A. Preventive Maintenance Rates*

1. Quarterly Scheduled Maintenance	$64	Per Intersection
2. Annual Scheduled Maintenance	$335	Per Intersection
3. Quarterly And Annual Scheduled Maintenance	$30	Per Lighted Crosswalk

*Includes emergency calls

B. Labor Rates for Extra Work, As Required

Labor Category	Straight Time ($ per hour)	Overtime ($ per hour)	Double time ($ per hour)
Technician	$88	$127	$163
Eng Tech	$98	$137	$173
Analyst	$130	$170	$210

C. Equipment Rates for Extra Work, as Required

Equipment Category	$ Per Hour	$ Per Job
Bucket Truck	$22	$120
Utility Truck	$20	$100
Pickup/Van	$14	$65

D. Miscellaneous Services, As Required

1. 21 Day Controller Cabinet Test Operation and Certification Including Controller and All Equipment (per Caltrans and City Specs.)

$850 Each cabinet

2. 21 Day Traffic Signal Controller Test Operation and Certification (per Caltrans and City Specs.)

$280 Each controller

3. Installation of Inductive Loops:

a) 6'x6' Type A, B, D, E, and Q

1) Quantity 1 to 4 — $500 Each Loop

2) Quantity 5 to 8 — $485 Each Loop

3) Quantity 9 or more — $465 Each Loop

b) 6'x15' Type C

1) Quantity 1 to 4 — $900 Each Loop

2) Quantity 5 to 8 — $650 Each Loop

3) Quantity 9 or more — $625 Each Loop

c) 2'x6' Type C Bicycle Loop

Quantity 1 to 4 — $500 Each Loop

E. Materials, As Required

1. Actual Cost plus — 15% Percent % markup

2. Permanent Traffic Signal Pole Knockdown Replacement With New Equipment (Per Current City Spec)

a) 36" high pedestrian pushbutton pole with necessary equipment (reuse existing foundation) (One PPB Assembly)

$420 Per Pole

b) 36" high pedestrian pushbutton pole with necessary equipment (provide new foundation) (One PPB Assembly)

$1100 Per Pole

c) 1 B pole with necessary LED indications and equipment (reuse existing foundation) (TV-1-T, SP-1-T, and one PPB Assembly

$2200 Per Pole

d) 1 B pole with necessary LED indications and equipment (provide new foundation) TV-1-T, SP-1-T, and one PPB Assembly)

$3250 Per Pole

F. Provide And Implement Computerized Traffic Signal Maintenance And Inventory Management System

Lump Sum Total — $0

RFP for No. F0905-95 for Traffic Signal Preventive Maintenance and Repair Services

Additional Information

1. Company Name *Econolite Traffic Engineering and Maintenance (TEAM Econolite)*

2. Address from which service will be provided: *3390 De La Cruz, Unit R, Santa Clara, CA 95054*

3. Location of Shop and Storage Facility (must be within ten miles of the intersection of Mathilda and Olive Avenues, Sunnyvale: *3390 E. De La Cruz, Unit R, Santa Clara, CA 95054*

4. Number of Years Providing the Specified Service *Eight years*

5. Business Organization (Check One):

   ☐ Individual Proprietorship

   ☐ Partnership

   ☑ *Corporation*

   ☐ Other

   If incorporated, provide the following information:

   Date of incorporation *March 2002* State of Incorporation *California*

   Name and Title of all Officers and Directors *Rodney Mathis, President; Valerie Bruno, Secretary*

If an individual or partnership, provide the following information:

Formation date of Company *N/A*

6. List the names, titles, and qualifications of the key personnel, including at least one Traffic Signal Technician and one Traffic Signal Analyst, who will perform under this contract as well as their roles in relation to this contract. Include their certifications, experience and training.

   Traffic Signal Technician: TEAM Econolite proposes Fernando Martinez to assume the role of lead technician for the City. Mr. Martinez has over six years experience working in traffic signal and lighting maintenance and repair and is very familiar with the equipment in the City of Sunnyvale. He worked for the City of Campbell and the City of Oxnard before coming to TEAM Econolite. He has extensive experience working with traffic signal equipment including communications for Intelligent Transportation Systems (ITS). Mr. Martinez is IMSA Level II certified and an NEC certified electrician. He plans to obtain Level III status in Sept. of this year.

   Traffic Signal Analyst: TEAM Econolite proposes Anthony L. Mori, P.E. as our Traffic Signal Analyst. Mr. Mori has prepared traffic signal improvement plans at over 150 intersections in Northern California over the past fifteen years. He specializes in the hands-on design of difficult signal systems which require high levels of field review and coordination with proposed civil improvements. Nearly all of these projects included street lighting and signing/striping improvements. Mr. Mori has also prepared numerous traffic signal interconnect plans for various

municipalities. Mr. Mori holds a B.S. degree in Civil Engineering and a M.S. degree in Transportation Engineering both from San Jose State University.

For further information on key personnel, please see section 9, Relevant Employees.

7. Indicate whether proposer has ever failed to complete any contract awarded to do it. If so, note when, where and why. Attach additional sheets, if necessary.

TEAM Econolite has not failed to complete any contract awarded to us.

8. Indicate whether proposer has been or is the subject of a bankruptcy or insolvency proceeding or subject to assignment for the benefit of creditors.

TEAM Econolite has not been the subject of a bankruptcy or insolvency proceeding or subject to an assignment for the benefit of creditors.

9. List subcontractors, if any, who will perform word under this contract. Attach additional sheets, if necessary.

A. Company *Anthony Mori and Company*

Location *1481 Rollins Road Burlingame, CA 94010*
Describe work to be subcontracted *Traffic engineering and transportation planning*

10. List three organizations for whom proposer performed similar services of a similar scope in the last three years.

A. Organization: *City of Sunnyvale*

Location *45 W. Olive Street, Sunnyvale, CA 94088*

Contact Person *Carmen Talavera* Telephone Number *(408) 730-7522*

Describe work performed by bidder *Full monthly and annual intersection maintenance, 24-hour emergency response to maintenance and repair of traffic control equipment, safety lighting, ISNS, in-pavement lighting, and flashers*

Date work was performed *2005-current*

B. Organization *City of Pleasanton*

Location *200 Old Bernal Avenue, Pleasanton, CA 94566*

Contact Person *Eric Kurz* Telephone Number *(925) 931-5668*

Describe work performed by bidder *Monthly, quarterly, semi-annual, and annual preventative maintenance; 24-hour emergency response for the City's 101 intersections. We maintain and repair 332 TS-1 and TS-2 configurations, Autoscope video detection systems, safety lighting, and ISNS.*

Date work was performed *2005-current*

C. Organization *City of San Ramon*

Location *500 Crow Canyon Road, San Ramon, CA 94582*

Contact Person *Pat Guiterrez* Telephone Number *(925) 973-2836*

Describe work performed by bidder *We perform regular maintenance and repair of 73 intersections comprised of: street lighting, safety lighting, ISNS, video detection systems, and in-pavement lighted crosswalks. Also perform 24-hour on-call services.*

Date work was performed *2007-current*

D. Organization *City of Galt*

Location *380 Civic Drive, Galt, CA 95632-2039*

Contact Person *Bill Cruickshank* Telephone Number *(209) 649-1533*

Describe work performed by bidder *We perform preventative maintenance and 24-hour on-call services for the City's intersections.*

Date work was performed *June 2008-June 2010*

11. Attach to this Proposal Form narratives which provide the following information. Check the box next to each item, indicating that a detailed narrative is attached for that particular item.

☑ A description of proposer's shop and storage facilities, including whether such facilities currently exist or will be established within ninety days of contract award, facility size, a list of activities that will take place at the facilities, etc. *For further information, see Section 1, Shop and Storage*

☑ A list of proposer's communications equipment that will be utilized under this contract, including telephone, radio, pager, cell phone, fax, email, etc. *For further information, see Section 2, Communications Equipment*

☑ An inventory of equipment (Le. poles, signals, LEDs, traffic signal controllers, etc.) which will be stocked for emergencies and maintenance spares and the location where the equipment will be stored. *For further information, see Section 3, Spare Equipment*

☑ A list of special equipment, testing services, repair facilities or special services which will be available to the City. *For further information, see Section 4, Special Equipment*

☑ A list of proposer's repair, utility and maintenance vehicles, including the number, type, age, location and condition. Include photos with the proposal. *For further information, see Section 5, Sunnyvale Vehicles*

☑ A description of proposer's training and safety programs for its field employees. *For further information, see Section 6, Training and Safety Programs*

☑ A description of the computerized traffic signal maintenance and inventory management system which will be provided and implemented in Sunnyvale. *For further information, see Section 7, Computerized Signal Maintenance System*

☑ A description of the proposer's wage and benefit structure as it applies to worker's performing under this contact. *For further information, see Section 8, Wage and Benefit Structure*

☑ List of relevant employees, with skill, experience, training, certifications, qualifications and office location. ***For further information, see Section 9, Relevant Employees***

Addenda

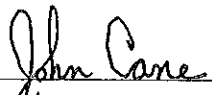
Proposer acknowledges receipt of the following Addenda:

Number N/A Date

Number N/A Date

Number N/A Date

Signature



Signature

Regional Manager
Title

John Cane
Name (printed or typed)

July 28, 2010
Date

(408) 496-6280
Telephone Number

(408) 496-6327
Fax number

81-0546725
Tax ID number

049507
Sunnyvale Business License Number

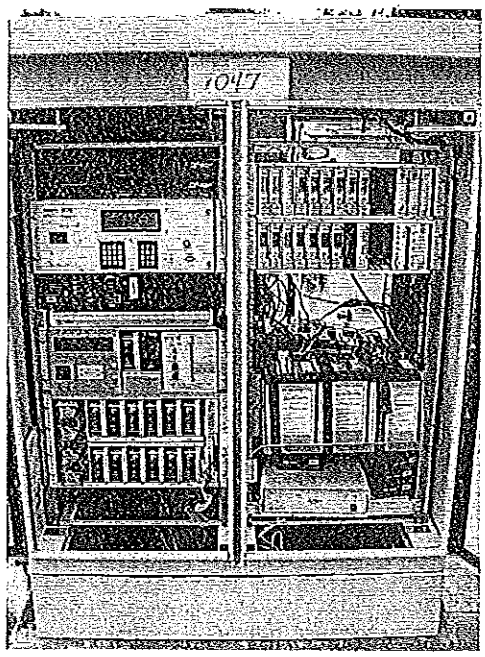
1. Shop and Storage Facility

TEAM Econolite currently operates out of two offices located in California. All offices have technical staff available and ready seven days a week, 24 hours a day and can travel to help other locations. The addresses of the two TEAM Econolite facilities are listed below:

TEAM Econolite
3390 De La Cruz, Unit R
Santa Clara, CA 95054
Phone: (408) 496-6280
Fax: (408) 496-6327
Technical Staff, 2400' Warehouse, Testing and Repair Facility

TEAM Econolite
3360 East La Palma Avenue
Anaheim, CA 92806-2856
Phone: (800) 411-0001
Fax: (714) 666-1123
Corporate Office, Technical Staff, Warehouse, Testing and Repair Facility

At our corporate office in Anaheim and in the Santa Clara office, administrative duties are performed and calls are dispatched during normal business hours. In our warehouse, we store all new and spare equipment, and in our testing facilities, we repair and test traffic signal control equipment.



2. Communications Equipment

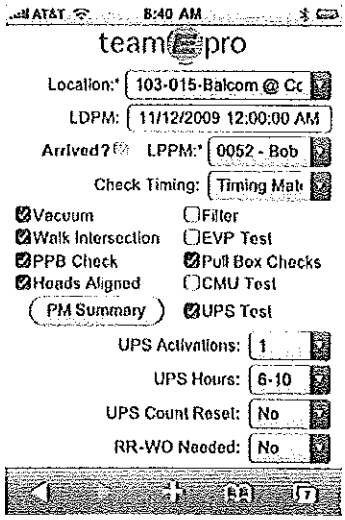
Communications between the City of Sunnyvale and our field and administrative staff is imperative to the success of this partnership. Therefore, we employ every means necessary to support modern communications techniques.

teamEpro – Maintenance Management System

At the heart of TEAM Econolite's communications with the City is *teamEpro*, TEAM Econolite's maintenance management system. TEAM Econolite uses *teamEpro* to consistently monitor the day-to-day operations of our field technicians in real-time. In addition, field assets are tracked and reports may be generated. *teamEpro* is further discussed in section, *Computerized Signal Maintenance Service.*

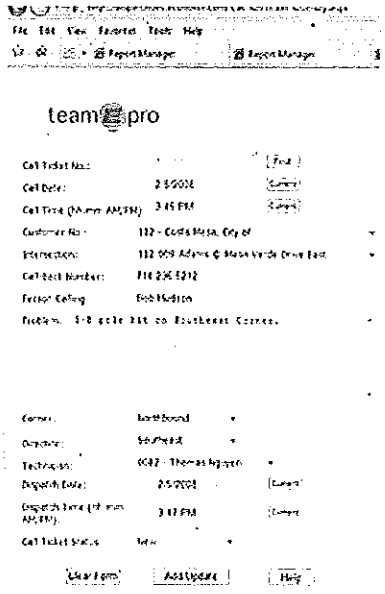
Smartphones

Utilizing the latest technology, TEAM Econolite dispatches to our service vehicles via PDA/cellular phones. This allows us to use text messaging, e-mail and traditional voice calls. Each technician has a PDA/cellular phone/camera (smartphone) that they use to communicate work that has been accomplished at each location they visit. The technician's phone number and e-mail address is available to the City staff directly. Although we encourage all calls for service to go through our dispatch center for logging purposes, we encourage our customers to talk directly with their technicians as well.



Smartphone interface

Telephone Dispatch Service



Dispatch data entry screen

TEAM Econolite will provide a 24/7 dispatch service to record and dispatch all calls. The Dispatch Console is integrated into *teamEpro*, our computerized traffic signal maintenance service. Using the Dispatch Console, TEAM Econolite receives all calls for the City of Sunnyvale, logs the calls, and dispatches the appropriate on-call technician.

This service is a 24-hour, 7-day-a-week existing operation that utilizes a toll-free number for all incoming calls. The calls are dispatched to whomever is on call for the City of Sunnyvale and all information is logged into the database to tie in with the field data. This allows for accurate reporting. All information entered during the call ticket process is viewable in real-time via the City of Sunnyvale's GUI.

Calls to the operation center, other than during "normal" working hours, will be handled by a qualified answering service that will also dispatch using the *teamEpro* Dispatch Console unit. All management personnel, as well as all field personnel, will be available to the City 24/7 to ensure that any and all problems are handled in the most efficient manner.

Monitoring Emergency Calls

TEAM Econolite will only respond to calls that have been phoned in by the City of Sunnyvale's designated representatives. We will verify calls with the listed numbers before "running" the call, but please note that our toll free number should only be given to those authorized to call in problem reports. The number is exclusive to our customers and, as such, should not be published.

Post- call notification will also be available on the City's computerized traffic signal maintenance service, *teamEpro*.

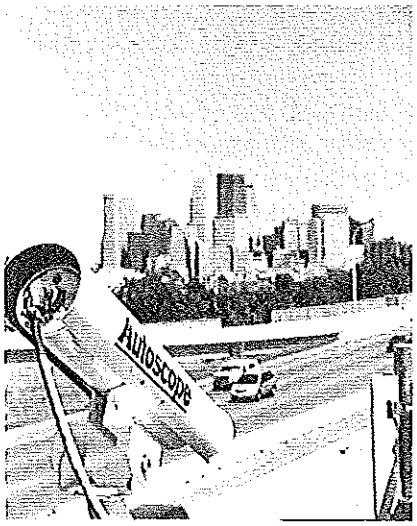
Fax

The City of Sunnyvale is also encouraged to use traditional means to contact our offices. Our fax number is available 24-hours a day, seven days a week at (408) 496-6327.

3. Spare Equipment

Traffic Signal Control Equipment

TEAM Econolite staff have access to traffic signal control equipment which enable us to meet the possible need for spare equipment. Additionally, our Santa Clara warehouse is stocked with everything from anchor bolts to z-crates, in an ongoing effort to meet the City's needs. In the event that we do not stock a specific item, we can contact one of our vendors and typically will-call most items the same day.



Our technicians carry enough temporary or replacement equipment to ensure that the location is in safe operation, and we have temporary base plates and poles up to a Type-24.

In the event that back up help is needed, we have additional employees on-call as well as a utility crew that can bring out a crane, the spare base plate and pole, or heavy equipment, if the need arises.

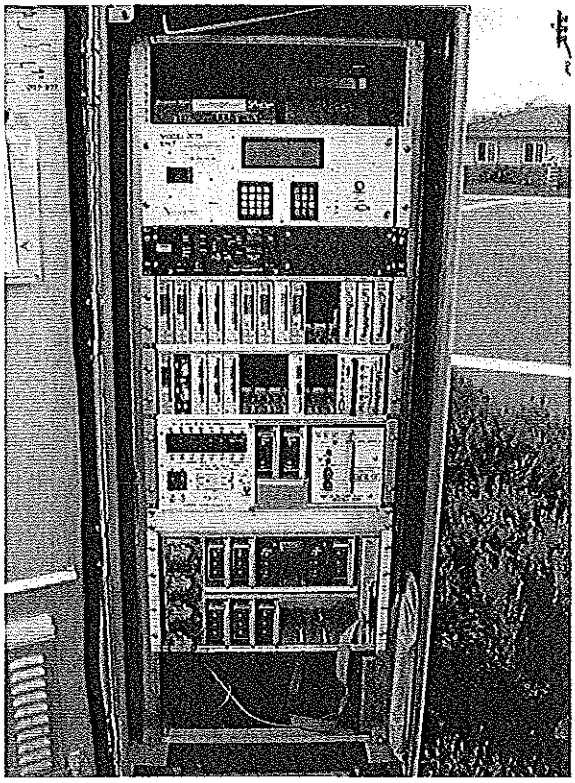
Inventory of equipment for emergencies:

- Type 1B Standards with self supporting bases
- Vehicle and pedestrian signals
- LED lenses
- Appropriate frame work
- PPB frame works, buttons with signs
- Type P cabinets
- 332 cabinets
- Type 170 controllers
- NEMA controllers
- Type II Service cabinets
- Type III Service cabinets
- Conflict monitors
- Load switches
- Flashers

- Detector amplifiers with LCD displays
- Fans
- Cabinet lamps
- Filters
- Pull boxes
- Pull box lids
- All phases of signal wire, street light and service wire
- Splicing material
- Conduit and fittings
- Extra batteries and availability of UPS systems

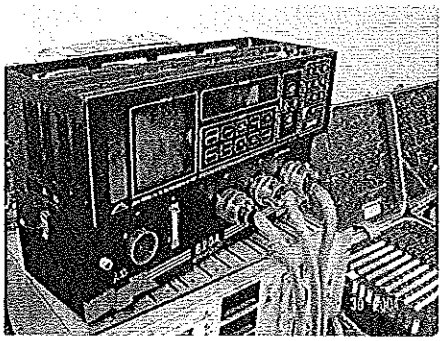
In addition to the above, the following materials will be stored at the same address for new or knock-down installations:

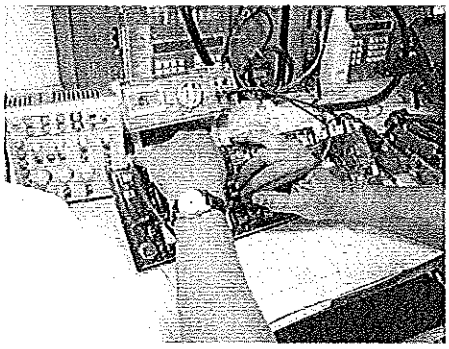
- Type 1B, & 1D Standards with anchor bolts, flanges, extension nuts, all thread, ground clamps and ground wire
- Type 17-2 with temporary base plate and weights
- Vehicle signals with Dialite ITE LED lenses, back plates and full circle visors
- Pedestrian signals with Dialite ITE LED lenses
- All vehicle and pedestrian frame works
- All pedestrian push button assemblies, signs and Bumble Bee ADA buttons and tamper proof screws
- Assorted available back plates and full circle visors
- Astro brackets for SMA heads
- Photo cells and assorted lamps for street light and ISNS repairs
- Sizes 1" thru 3" conduit and fittings
- All phases of vehicle and pedestrian signal wire
- Street light and service wire
- Number 3 ½, 5 and 6 pull boxes with lids and hold down bolts



4. Special Equipment

TEAM Econolite has one of the best in-house and fully-functional testing and repair labs in the state of California. From printed circuit boards to full cabinets, TEAM Econolite stands ready for whatever may arise.

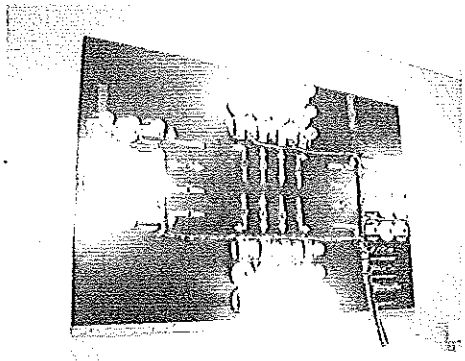


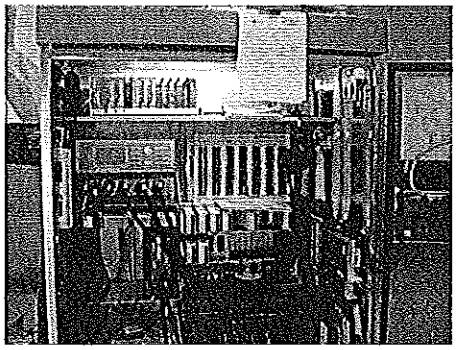


Lab Services

Our facility is able to repair all types of traffic control equipment from a variety of manufacturers. We have two environmental chambers available to test the repaired equipment if requested by the agency. We not only repair control equipment, but also *Autoscope* video detection equipment.

We also perform the cabinet test function for many cities, as well as for Econolite Control Products. Our tests conform to the current NEMA and Cal Trans standards, and we are considered an independent test lab, using the most qualified technicians available. In addition to testing new cabinets prior to installation, we also modify existing cabinets in our lab and run them through the same rigorous testing procedures that the new cabinets are required to fulfill.





In the unlikely event that our staff is not able to make repairs in a timely manner, the equipment will be sent to the original equipment manufacturer for repair.

Technical Support Equipment

Our technicians have available for use some of the best troubleshooting and repair tools in the industry. Due to our technicians' expertise in specialty areas such as the Video Detection and Intelligent Transportation Systems, we have development tools that cannot be purchased and, most importantly, we have experienced personnel to use them. Listed below are some of the tools used for trouble shooting and repair by TEAM Econolite:

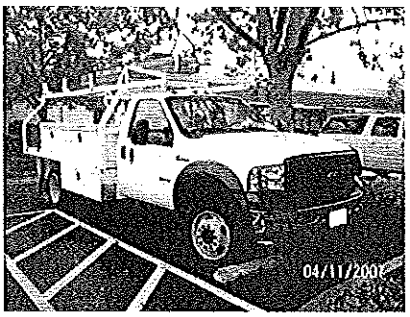
- Tone Generator
- Multimeters
- Amp Probes
- TDRs
- Loop Finders
- Diagnostic Chips with Loop Back Cables (Tuning Modems)
- IS232 Loop Back (VMS)
- Meggers
- Oscilloscopes
- Clamp on Ground Resistance meter
- Opticom Emitter Tester
- Metrotech Facility Locator
- PCMT-2600 conflict monitor tester
- Battery Tester for 12VDC and 24VDC
- SIC Cable Field Tester
- LED Degradation tester
- Laptops for Signal System programming

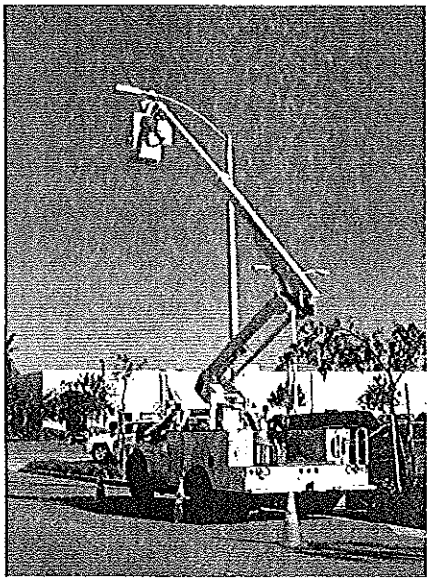
5. Sunnyvale Vehicles

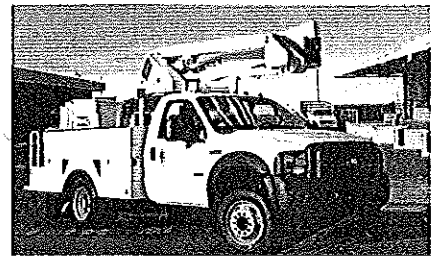
TEAM Econolite has the necessary vehicles to get the job done. We rotate equipment as necessary, between locations. Below is a comprehensive list of TEAM Econolite vehicles for use with the City of Sunnyvale traffic signal maintenance service.

Mobile Equipment Available for Use

Cond.	Location	Veh. No.	Year	Description
Exc	Anaheim	E-101	2002	Ford Winstar Van
Exc	Anaheim	E-102	2000	Ford F-450 AT200 Bucket
Exc	Anaheim	E-103	2000	Ford F-450 AT235 Bucket
Exc	Anaheim	E-104	2002	Ford F-350 Pickup
Exc	Anaheim	E-105	1999	Ford F-450 AT200 Bucket
Exc	Anaheim	E-106	2001	Ford F-450 AT235 Bucket
Exc	Anaheim	E-108	2003	Chevrolet Astro Van
Exc	Santa Clara	E-109	2000	Ford F-450 AT235 Bucket
Exc	Anaheim	E-110	2001	GMC C6500 50' Bucket
Exc	Anaheim	E-113	1997	Ford F-350 Utility Bucket
Exc	Anaheim	E-114	2002	Ford F-450
Exc	Anaheim	E-115	2004	Ford F-450
Exc	Anaheim	E-116	2000	Ford E-350
Exc	Anaheim	E-117	2004	Ford F-350
Exc	Anaheim	E-118	2005	Chevrolet Astro Van
Exc	Santa Clara	E-119	2000	Ford F-450 AT235 Bucket
Exc	Anaheim	E-120	2000	Ford Winstar Van
Exc	Anaheim	E-122	2000	Ford F-450 AT200 Bucket
Exc	Anaheim	E-124	2001	Ford F-450- Telsa 38' Bucket
Exc	Santa Clara	E-125	2005	Ford F-150 4x2
Exc	Anaheim	E-126	2005	Ford F-150 4x2
Exc	Anaheim	E-127	2005	Ford F-450 - Telsa 43'
Exc	Santa Clara	E-128	2005	Ford F-450 Telsa 43' Bucket
Exc	Santa Clara	E-129	2006	Ford F-450 Telsa 43' Bucket
Exc	Anaheim	E-130	2006	Ford F-450 Telsa 43' Bucket
Exc	Anaheim	E-131	2006	Ford F-450 Telsa 43' Bucket
Exc	Santa Clara	E-132	2006	Ford F-450 4X2
Exc	Anaheim	E-133	2006	Ford F-450 4X2







Exc	Anaheim	E-134	2005	International Crane
Exc	Anaheim	E-135	2006	Ford F-150 4x2
Exc	Anaheim	E-136	2006	Ford F-150 4x2
Exc	Anaheim	CP200		Compressor
Exc	Anaheim	SV300		Solar Arrowboard
Exc	Santa Clara	SV301		Solar Arrowboard
Exc	Santa Clara	CS001		Concrete Saw

6. Training and Safety Programs

TEAM Econolite believes high-quality traffic signal maintenance performance begins with properly trained staff. TEAM Econolite is devoted to the on-going, in-house training of our technical staff. To accomplish this, regular Monday morning roundtable discussions are held at TEAM Econolite with the senior maintenance operations manager selecting important technical topics to discuss. Topics range from troubleshooting loops to controller functions, video detection systems integration, safety procedures, and more. We also regularly host traffic signal manufacturers, who discuss new products and services. In addition, we have a mentoring program, which allows a senior technician to mentor a traffic signal worker and provide hands-on training with a variety of controllers and cabinets. These mentoring sessions take place in the lab and out in the field.

TEAM Econolite senior technical staff are responsible for training the Traffic Signal Maintenance workers. Training includes hands-on maintenance and repair of all ITS field components, equipment, and tools. This training is on a day-to-day basis and weekly technical topics are also discussed.

TEAM Econolite also encourages and supports the active pursuit of International Municipal Signal Association (IMSA) Work Zone Safety certification, which many of our staff currently hold.

7. Computerized Signal Maintenance Service

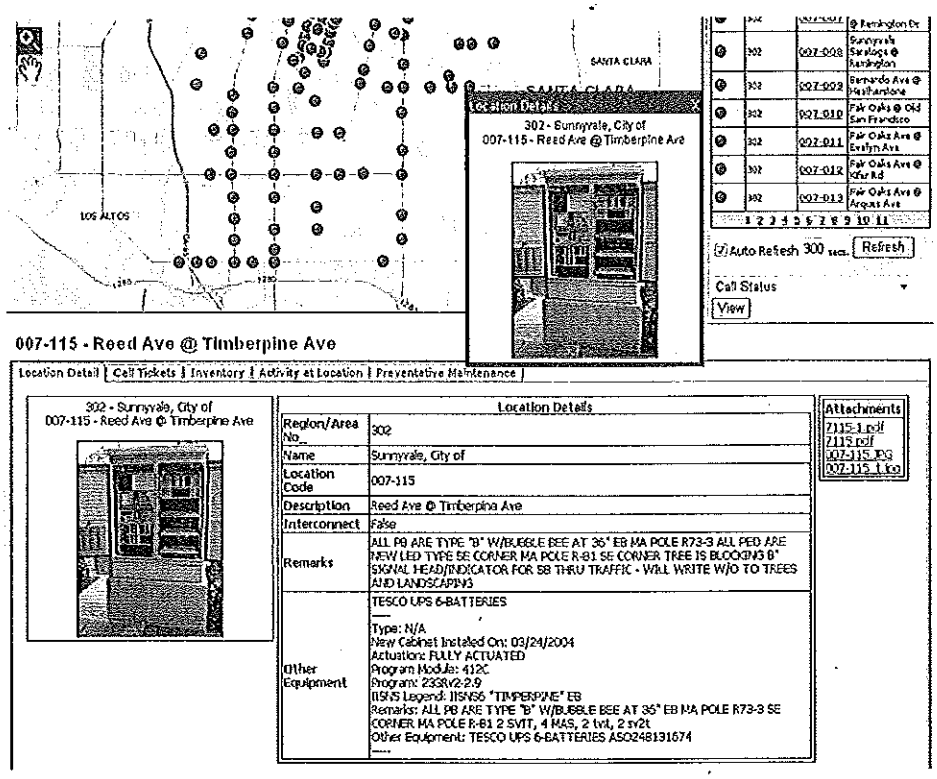
teamEpro™ is TEAM Econolite's computerized signal maintenance and inventory management system developed, optimized, and employed by TEAM Econolite, over the past five years. The benefits of *teamEpro* include gathering and sharing of traffic signal information, perpetual asset management of field components, real-time status of calls and work conducted at a given location, and a rich complement of reports for the City of Sunnyvale.

Preventive Maintenance Checklist Forms

TEAM Econolite maintains and provides all required preventive maintenance checklists within *teamEpro,* and the digital version of the maintenance checklists is submitted monthly to the City, attached to TEAM Econolite's invoices. *TeamEpro* is now capable of developing intersection specific PM checklists. Night check survey checklists have also been added to the *teamEpro.*

Computerized Signal System

TeamEpro is TEAM Econolite's comprehensive PC Windows-based, computerized traffic signal maintenance and inventory management system. This system is fully functional with the capability of incorporating existing and historical data for a period of no less than five years for traffic signal equipment inventory, such as controller cabinet and main components, poles and standards, etc., routine maintenance activities, troubleshoot calls, traffic signal repair activities, and any other relevant data related to the maintenance management and inventory of traffic signals.



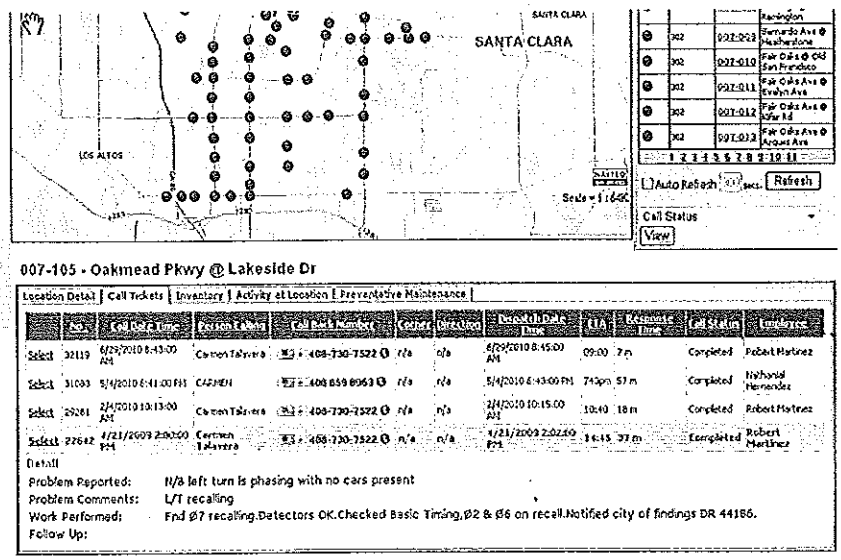
teamEpro interface includes GIS map, cabinet photo, and location detail

Should the City require revisions or changes to *teamEpro* to make it acceptable for use, TEAM Econolite will make adjustments to *teamEpro*. Upon receipt of the City's requested changes/revisions, TEAM Econolite will ready *teamEpro* for implementation within three months of the contract award. Any changes to the system requested by the City at this point will be accomplished by TEAM Econolite at no additional charge to the City and within 30 days of the request. Any future upgrades of *teamEpro* will be offered by TEAM Econolite to the City at no additional charge during the term of the contract. Should the contract between the City of Sunnyvale and TEAM Econolite be discontinued, the City will retain possession of the data from *teamEpro* in electronic and hardcopy format for future use.

As the City's current selected contractor, TEAM Econolite presently has access to the City's traffic signal as-built records that show inventory of all poles and equipment in service at each signalized intersection. With the use of *teamEpro*, TEAM Econolite maintain an on-going schedule for the bar-coding and tagging of all equipment in order to integrate into the system and keep it updated as equipment is removed or upgraded.

teamEpro provides the following features and equipment at all times:

a. **Intersections** - A complete database of signalized intersection In-Roadway Warning Lights, and flashing beacons locations, including all preventive maintenance histories, complete equipment inventory, design/construction as-built drawings in AutoCAD or PDF format electronic photo images, repair history and installation date of all equipment utilized at each location. *teamEpro* also has complete mapping capabilities that is compatible with GIS.
b. **Assets** - Asset inventory, maintenance/repair history, and allows for planned future replacement and budgeting.
c. **Repair/Replacement Parts** - Real-time available inventoried replacement parts, current status of reordered equipment, and inventory tracking.
d. **Service/Emergency Calls** - A record of all calls, date and time stamp moment of receipt, dispatch, and TEAM Econolite arrival and departure times. *teamEpro* also prioritizes all received calls and provides estimated time of arrivals, and corrective actions. All records are updated in real-time utilizing smartphones, Pocket PCs, handheld scanners or other like products.



***teamEpro* interface displaying call ticket tab with call detail**

Monthly Activity Report

TEAM Econolite submits to the City, at the same time as the submission of monthly invoices, a computerized report covering all of TEAM Econolite's activities within the City of Sunnyvale during the previous month. This monthly activity report is provided in both electronic and hardcopy formats and is generated from the *teamEpro* database. TEAM Econolite maintains a copy of the monthly activity report indefinitely. The monthly activity report includes:

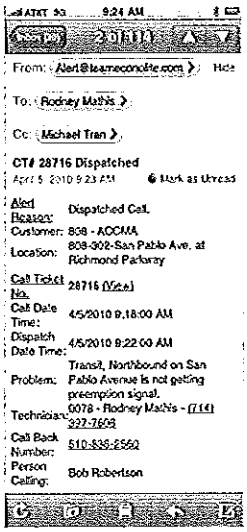
a. The time any emergency/service calls are received by TEAM Econolite, time at which the emergency/service call was dispatched to the technician, the arrival time of the technician at the requested location, the length of time spent repairing or diagnosing the problem, and the departure time.
b. A complete record of any and all work performed on the traffic signal equipment during the period covered by the monthly activity report, including the make, model, and serial number of any replacement or newly installed equipment at each intersection. The report also details the make, model and serial number of any equipment replaced.
c. The date and time that any preventive maintenance work is performed.
d. Any and all pending repair work needed at each intersection along with Repair Order number.

Alarms

teamEpro provides alarms to notify the technician assigned to a call and or his/her supervisor when a user-defined response time has not been met. This reminder allows the supervisor to make decisions based on current information as to whether an additional technician should be dispatched or if staying with the current assignments is the best course of action.

teamEpro monitors calls and sends notifications to the technician assigned to the current call, as well as the technician's supervisor, when a call comes in for a location that has had a previous call within a user-defined timeframe. This multiple call alert provides information about the previous calls to the location to aid in troubleshooting.

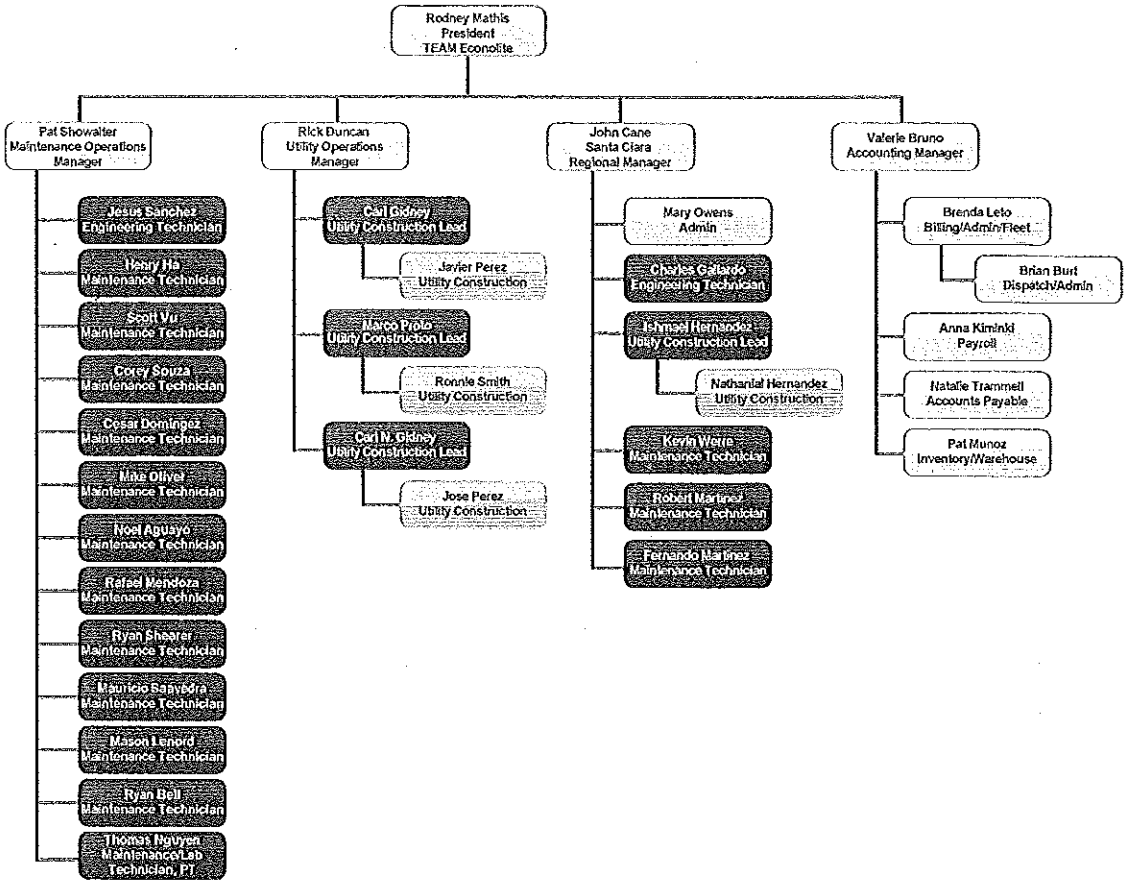
Smartphone displaying Alarm sent to technician via text message



Smartphone displaying Alarm sent to technician via text e-mail

9. Relevant Employees

TEAM Econolite believes our biggest asset is our personnel. With many years of experience and our ability to partner together, TEAM Econolite staff will ensure the City of Sunnyvale receives the best customer service. TEAM Econolite's organization chart is listed below along with roles within the corporate structure.



All Personnel Information is Confidential

Key Staff Members

TEAM Econolite is pleased to present the following key personnel who will be available to the City of Sunnyvale on a 24-hour, seven-days-a-week basis (as the need arises). All the employees listed below work out of our Santa Clara office.

TEAM Econolite will provide a lead technician to the City. This employee will be the main technical contact. This employee will be capable of performing and resolving any issue that arises. We propose Fernando Martinez for the position. His bio is listed below.

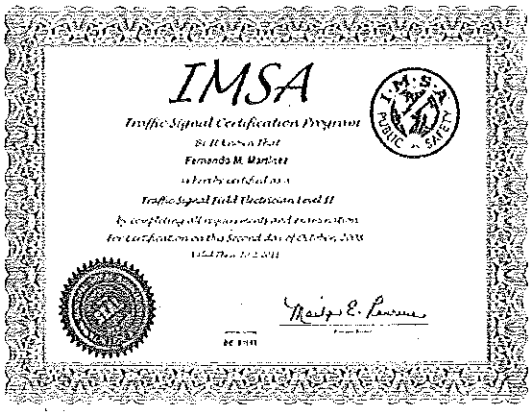
In addition to providing brief résumés, we have enclosed our team members' certifications and credentials necessary to accomplish complete Traffic Signal Maintenance for the City of Sunnyvale.

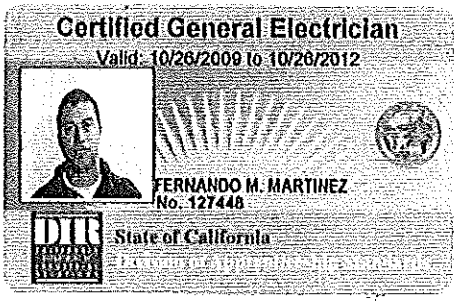
John Cane, P.M.P. – Project Manager

With over 25 years of experience in the underground utility maintenance and construction industry, Mr. Cane will serve as the Project Manager for TEAM Econolite. He began his career as a communications technician for AT&T and worked his way up to serve as the Regional Manager for AT&Ts maintenance division. Prior to joining TEAM Econolite, he worked as a Project Manager for one of the largest underground utility contractors in the state. Mr. Cane is a certified Project Management Professional (P.M.P.) and certified IMSA Level II.

Fernando Martinez –Lead City of Sunnyvale Technician

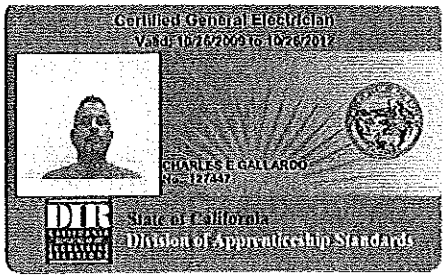
TEAM Econolite proposes Fernando Martinez to assume the role of lead technician for the City. Mr. Martinez has over six years experience working in traffic signal and lighting maintenance and repair and is very familiar with the equipment in the City of Sunnyvale. He worked for the City of Campbell and the City of Oxnard before coming to TEAM Econolite. He has extensive experience working with traffic signal equipment including communications for Intelligent Transportation Systems (ITS). Mr. Martinez is IMSA Level II certified and an NEC certified electrician. He plans to obtain Level III status in Sept. of this year.





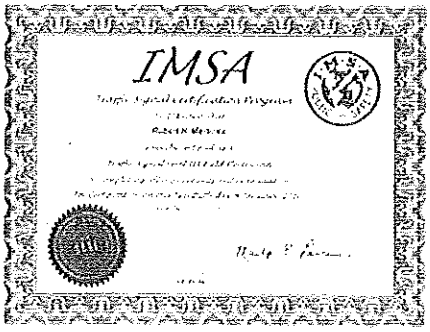
Charles Gallardo – Senior Engineering Technician

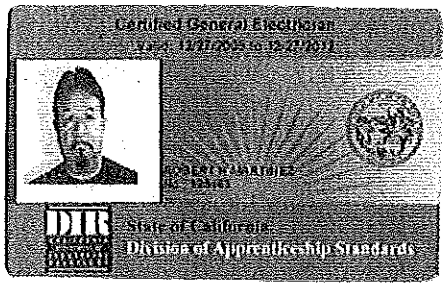
Mr. Gallardo has over 30 years of experience working in the traffic signal and ATMS industry. He worked for the City of Campbell and the City of San Ramon before coming to TEAM Econolite. His expertise includes traffic signals, street and roadway lighting, video detection and cabinet electronics, testing and Intelligent Transportation system troubleshooting. Mr. Gallardo is IMSA Level III certified and an NEC certified electrician.



Robert Martinez - Maintenance Technician

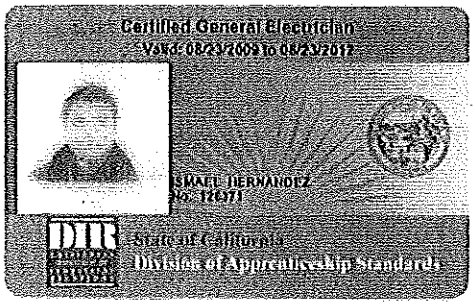
Mr. Martinez has over seven years of experience working with traffic signal and lighting maintenance and repair. He has extensive knowledge in all types of traffic signal controllers including NEMA, 170, and 2070. Mr. Martinez is IMSA Level III certified and an NEC certified electrician.





Ismael Hernandez – Maintenance Electrician

Mr. Hernandez, better known as "Smiley," began working in the signal maintenance industry in 1993 as a utility technician for Signal Maintenance, Inc. Smiley has undergone extensive training in maintenance and repair of traffic control devices, both at Signal Maintenance and TEAM Econolite. His experience includes CCTV, street lighting, signal installation, video detection, cabinet installation, and battery backup installation and repair. Smiley is an IMSA certified Traffic Signal Inspector and an NEC certified electrician.



Anthony L. Mori, P.E., Transportation Analyst- Anthony Mori & Company

Mr. Mori established Anthony Mori & Company specializing in all traffic engineering and transportation planning.

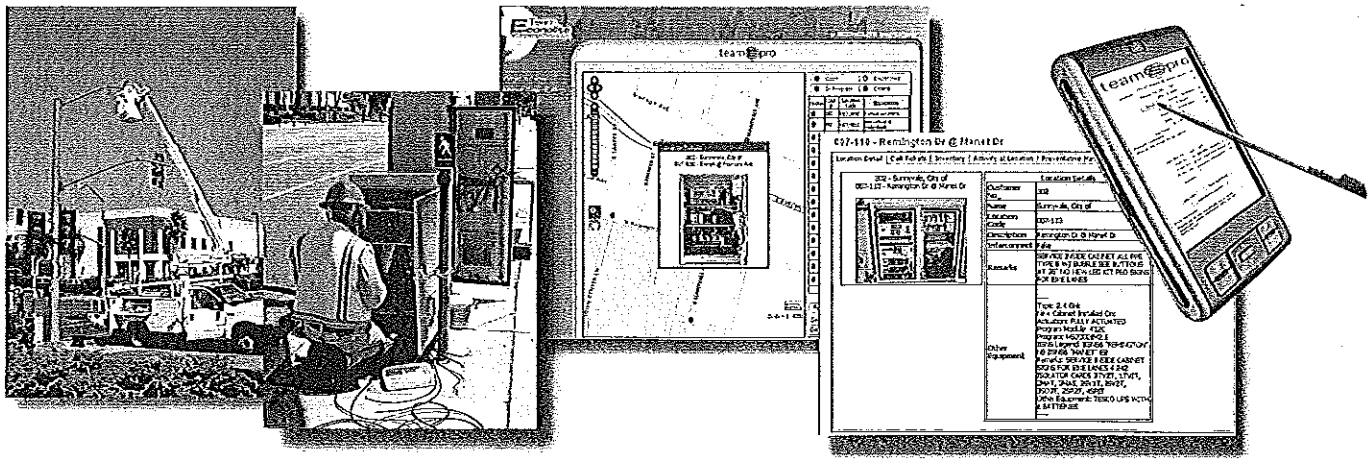
Mr. Mori has prepared traffic signal improvement plans at over 150 intersections in Northern California over the past fifteen years. He provides hands-on design of difficult signal systems which require high levels of field review and coordination with proposed civil improvements. Nearly all of these projects included street lighting and signing/striping improvements. Mr. Mori has also prepared numerous traffic signal interconnect plans for various municipalities.

With his traffic engineering background, Mr. Mori provides on-call traffic engineering services for the City of San Mateo. The activities he performs include: signing & striping and intersection control (i.e., signal, all-way and one way stop control) review and recommendations, preparation of traffic signal and flashing beacon plans, sight distance review, and preparation of federal and state funding applications.

Mr. Mori holds a B.S. degree in civil engineering and an M.S. degree in transportation engineering both form San Jose State University.

Team Econolite
Traffic Engineering and Maintenance, Inc.

Setting Standards for the Maintenance Industry



About Team Econolite

At Team Econolite, we believe in the value of preventative maintenance, quick response, and 24-hour-a-day on-call availability. Our company was founded on the idea of "Service," and it is our mission to keep your agency's streets running as smoothly as possible, increasing public safety while reducing congestion, thus resulting in fewer emissions and contributing to a safer, "greener" world.

With our state-of-the-art equipment, highly trained technicians, in-house repair facility, in-house NEMA and Caltrans testing, and all-around committment to delivering the best maintenance services available, Team Econolite is ready to give your agency (and your equipment) the care it deserves.

Our Services

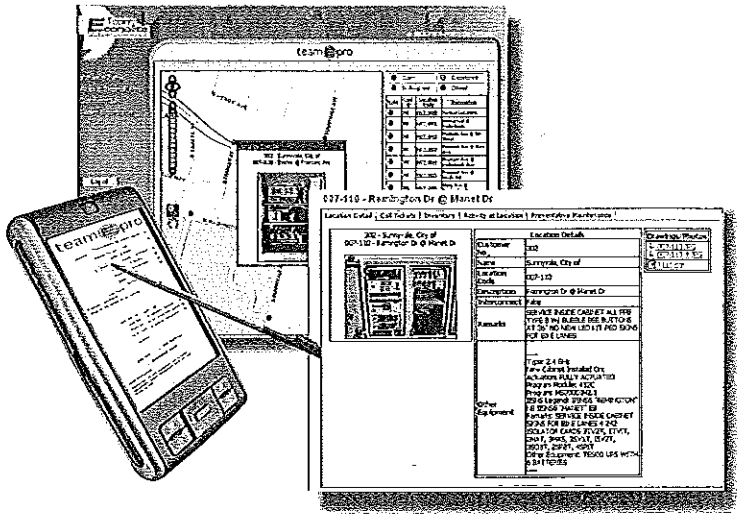
- Complete Preventative Maintenance programs tailored to your needs, servicing all types of equipment (Intelligent Transportation Systems [ITS], street lighting, etc.) from all manufacturers in the industry
- International Municipal Signal Association (IMSA)-trained and certified technicians available on a 24/7 basis
- In-house repair facility with trained experts who can repair all makes and models of traffic signal equipment for both contract and non-contract agencies
- In-house controller/cabinet testing that meets both NEMA and Caltrans specifications
- A complete inventory of all types of replacement parts for existing signal displays
- Available engineering technicians to tackle and solve the most complex traffic control system problems
- Vehicles equipped with all necessary parts and equipment to ensure repairs and/or replacements are performed in the most expedient manner, keeping intersection downtime to a minimum
- Service and maintenance for the latest in ITS equipment, such as video detection, changeable message signs, CCTV, fiber optic interconnect, and traffic management centers
- Technicians utilize *teamEpro*™, a web-based PDA interface, to update the agency's maintenance status
- With *teamEpro,* traffic engineers or other customer-specified users can view maintenance activity and other collected data in real-time via a web-based GUI, accessible from the Team Econolite website

3360 E. La Palma Ave., Anaheim, California 92806-2856
Phone: (714) 666-2295 Fax: (714) 666-1123
www.teameconolite.com

Team Econolite
Traffic Engineering and Maintenance, Inc.

Setting Standards for the Maintenance Industry

teamEpro™



Data Collection

teamEpro™ Field Data Collection service provides real-time data entry and tracking of all field activities with a simple click of a button. The person responsible for the specific "activity" (typically field technician) enters the information, minimizing the chance of data misinterpretation. *teamEpro* increases accuracy of logging and tracking activities, while eliminating the added cost of having a dedicated data-entry team. The use of *teamEpro*, a fully web-based solution, mitigates the hassle of having to collect, sort, and file massive amounts of paper from the field. Not only can this be a tremendous cost savings, it is also an added advantage for those agencies looking for an environmentally friendly (green) process.

Communication

The *teamEpro* Graphical User Interface (GUI) allows for quick and easy access to all field information while creating a visual indicator of field operation status. From the GUI, the user will be able to:

- Get a snapshot of field operations
- Run reports
- View cabinet and intersection photos
- Check assets at locations
- View documents such as Intersection Drawings and Cabinet Prints

Reporting Services - Utilizing parameters chosen by the user allows the ability to quickly obtain reports based on the criteria selected. Reports can be targeted to specific information by selecting any combination of the following:

- Location
- Employee
- Date
- Work Type

The use of *teamEpro* Reporting Services reduces the time spent locating information from multiple areas and then having to consolidate this information.

Asset Management

teamEpro, as an asset management tool, allows the user to keep track of all field assets and track the assets from location-to-location (intersection, service truck, warehouse, repair facility). This promotes accountability for field operations and provides improved forecasting.

Document Management

teamEpro provides a centralized location to store updated documents. This allows the User the ability to quickly access and reference documents. Utilizing the *teamEpro* Document Management system promotes proactive research that ultimately increases the speed and accuracy of field repairs.

Customer Service

Maintaining and measuring customer service levels becomes tangible and measurable with the use of *teamEpro*. The user will be able to quantify responses and ensure stated objectives are met.

3360 E. La Palma Ave., Anaheim, California 92806-2856
Phone: (714) 666-2295 Fax: (714) 666-1123
www.teameconolite.com
TE010209-1

Annual Preventive Maintenance

Loop Test Log

Completed By:____________________

Intersection:____________________ Number: __________

Page _____ of _____

Date: __________

Circle One: Ø1 Ø2 Ø3 Ø4 Ø5 Ø6 Ø7 Ø8 OverLap A OverLap B OverLap C OverLap D

	Lane 1			Lane 2			Lane 3			Lane 4		
	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω
Advance												
Stop bar												
Sampling												

Circle One: Ø1 Ø2 Ø3 Ø4 Ø5 Ø6 Ø7 Ø8 OverLap A OverLap B OverLap C OverLap D

	Lane 1			Lane 2			Lane 3			Lane 4		
	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω
Advance												
Stop bar												
Sampling												

Circle One: Ø1 Ø2 Ø3 Ø4 Ø5 Ø6 Ø7 Ø8 OverLap A OverLap B OverLap C OverLap D

	Lane 1			Lane 2			Lane 3			Lane 4		
	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω
Advance												
Stop bar												
Sampling												

Circle One: Ø1 Ø2 Ø3 Ø4 Ø5 Ø6 Ø7 Ø8 OverLap A OverLap B OverLap C OverLap D

	Lane 1			Lane 2			Lane 3			Lane 4		
	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω
Advance												
Stop bar												
Sampling												

Circle One: Ø1 Ø2 Ø3 Ø4 Ø5 Ø6 Ø7 Ø8 OverLap A OverLap B OverLap C OverLap D

	Lane 1			Lane 2			Lane 3			Lane 4		
	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω	Hz	Ω	M-Ω
Advance												
Stop bar												

8. Wage and Benefit Structure

The employees working on the Sunnyvale contract are offered standard benefits and wages. TEAM Econolite has not priced this proposal at the prevailing wage, but if the City would like to pay at the prevailing wage, TEAM Econolite would be open to discuss this structure. It is understood that the City of Sunnyvale will use only local funds in the payment of the maintenance function, and if outside funds are to be used and TEAM Econolite is notified of this, then the contractor must pay the prevailing wage for the classification used in the performance of that specific project. In the event that this happens, adjusted rates will be discussed.

The employees of TEAM Econolite are offered the following benefits:

- Two (2) weeks paid vacation after one (1) year of service
- Five (5) days sick leave per year
- The choice between two (2) HMO plans & (1) PPO plan
- The choice between dental HMO and dental PPO plans
- Vision plan
- One and one-half times the employee's annual income in term life insurance
- Eleven (11) company paid holidays
- Company profit sharing
- 401(k) plan
- Long term disability plan

TEAM Econolite also adheres to all local, State and Federal wage and overtime regulations, and will continue to do so in the performance of the Sunnyvale contract. \You will note that there is another line item for double time included on the page for the Labor for Extra Work category, and this rate will be charged when the employee has worked the number of hours on the Sunnyvale project to elevate him to the double time status.

EXHIBIT "D"

INSURANCE REQUIREMENTS

CONSULTANT shall obtain, at its own expense and from an admitted insurer authorized to operate in California, the insurance coverage detailed below and shall submit Certificate(s) of Insurance to the City of Sunnyvale, Purchasing Division, 650 West Olive Ave, PO Box 3707, Sunnyvale, CA 94088-3707; fax (408) 730-7710.

CONSULTANT shall take out and maintain during the life of the contract **Workers' Compensation and Employer's Liability Insurance** for its employees. The amount of insurance shall not be less than $1,000,000 per accident for bodily injury or disease.

CONSULTANT shall take out and maintain during the life of the contract such **Commercial General Liability Insurance** as shall protect CONSULTANT, CITY, its officials, officers, directors, employees and agents from claims to the extent caused by the professional services performed under the contract, whether such services are performed by CONSULTANT or employees, by CITY, its officials, officers, directors, employees or agents or by anyone directly or indirectly employed by either. The amount of insurance shall not be less than the following: Single Limit Coverage Applying to Bodily and Personal Injury Liability and Property Damage: $1,000,000.

The Commercial General Liability insurance shall include, but shall not be limited to:

- Protection against claims arising from bodily and personal injury and damage to property, resulting from CONSULTANT's operations and use of owned or non-owned vehicles.
- Coverage on an "occurrence" basis.
- Broad form property damage liability. Deductible shall not exceed $5000 without prior written approval of CITY.
- Notice of cancellation to CITY's Purchasing Division at least thirty (30) days prior to the cancellation effective date.

The following endorsements shall be attached to the liability insurance policy, and copies shall be submitted with the Certificate(s) of Insurance:

- The policy shall include contractual liability. Exclusions of contractual liability as to bodily injuries, personal injuries and property damage must be eliminated.
- CITY must be named as additional named insured with respect to the services being performed under the contract. *Simply indicating on the certificate that the certificate holder is named as additional insured is not acceptable; an endorsement must be provided.*
- The coverage shall be primary insurance so that no other insurance effected by CITY will be called upon to contribute to a loss under this coverage.