

REQUEST FOR PROPOSALS (RFP) 0-2020

**CONSULTANT SERVICES FOR  
TRAFFIC AND INTELLIGENT  
TRANSPORTATION SYSTEMS  
ENGINEERING SERVICES FOR  
WARNER AVENUE**



**ORANGE COUNTY TRANSPORTATION AUTHORITY  
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**RFP TO BE RELEASED ON MAY 11, 2020**

**SCOPE OF WORK  
WARNER AVENUE  
REGIONAL TRAFFIC SIGNAL SYNCHRONIZATION PROGRAM PROJECT**

As part of the Regional Traffic Signal Synchronization Program (RTSSP) and the Solutions for Congested Corridors Program (SCCP), the Orange County Transportation Authority (Authority or OCTA) desires to provide the components necessary to improve and enhance signal timing, synchronization, and coordinated operations for signalized intersections on the Warner Avenue Corridor (PROJECT), from Pacific Coast Highway in the City of Huntington Beach to Pullman Street in the City of Santa Ana. OCTA is serving as lead agency for PROJECT for the three participating local agencies: Fountain Valley, Huntington Beach, and Santa Ana (Participating Agencies hereinafter PARTIES and individually as PARTY) and Caltrans. Caltrans is not a participant in the Cooperative Agreement for PROJECT. They are considered a line item expense for implementation purposes. This SOW includes tables and maps for showing locations for construction for PROJECT. This project is partially funded by Senate Bill 1 under the Solutions for Congested Corridors Program (SCCP). Thus, all state requirements must be fulfilled, including but not limited to all forms and payroll documentation for all personnel required by Caltrans and OCTA Internal Audit. All Consultants and their subcontractors must agree to provide the required documents in a timely manner after notice of award.

**I. DESCRIPTION – GENERAL PROVISIONS - PROJECT**

PROJECT shall be completed in two distinct sequential phases; Primary Implementation (PI) followed by On-going Operations and Maintenance (O&M), respectively.

The CONSULTANT assigned the Contract for this PROJECT shall complete the PI phase within one year of Notice to Proceed. For the purposes of this SOW, the words Contractor, Consultant, and CONSULTANT are interchangeable. Upon acceptance of the PI phase by OCTA and a Notice to Proceed into O&M phase, CONSULTANT shall then and only then commence the O&M phase. O&M phase shall have a duration of 24 months. PROJECT Closeout of the PROJECT length shall occur upon payment of retention, receipt of Final Report, and acceptance by all PARTIES.

**PROJECT SPECIFICS**

- Project Traffic Forum (PTF) shall refer to all PARTIES, Caltrans, and OCTA.
- OCTA is designated as the LEAD or IMPLEMENTING AGENCY.
  - Primary Authority Project Manager (APM) for this PROJECT is the Program Manager of the Regional Traffic Signal Synchronization Program (RTSSP) for OCTA (Project Manager III of the Regional Modeling – Traffic Operations Section).
  - Secondary Authority Project Manager (APM) for this PROJECT is the Principal Transportation Analyst of the Regional Modeling – Traffic Operations Section.
- A PARTY shall not directly contact or direct CONSULTANT in any endeavor on this PROJECT unless approved by the APM or designee.
- CONSULTANT shall not suggest or modify any part of this Scope of Work to a PARTY or Caltrans for any endeavor, purpose, and/or enhancements on PROJECT unless approved by the APM or designee. Non-approved changes to SOW and appendices may be out of



scope and any and all related expenses are 100% the responsibility of the CONSULTANT and the receiving PARTY.

## **II. PARTICIPANT AGENCY INTERSECTIONS**

Traffic signals to be synchronized along the corridor are controlled by the individual PARTY owners. The PARTIES along the corridor utilize several different types of controller assemblies. Controller Unit types employed within the assemblies may include various proprietary pre-Advanced Transportation Controllers (ATC) each having their own respective firmware/operating systems and characteristics; and, some of the newer ATC which is now a requirement of the Comprehensive Transportation Funding Program (CTFP) Guidelines. The respective PARTIES also interface these controllers utilizing unique Advanced Transportation Management Systems (ATMS) or Master Central Systems. Per CTFP Guidelines, all ATMS to be installed or modified must comply with all applicable NTCIP standards for communications.

The main goals and objectives of this project are:

- Perform an operations and timing analysis to develop and implement optimized traffic signal synchronization timing, including the development and implementation of timing plans at all signalized intersections;
- Determine and make recommendations for new or modifications to existing traffic signal equipment and infrastructure related solely to improve and/or enhance synchronization and overall corridor operational efficiencies; and
- Upon approval by the owning PARTY and OCTA, procure, furnish and install all approved infrastructure improvements for PROJECT.

The implementation of the new optimized timing and infrastructure improvements will:

- Provide signal synchronization timing for prevailing traffic patterns and common zones of operations;
- Maximize the number of successive intersections traversed on a green indication vs. those stopped by a red indication (Greens per Red);
- Reduce stops, travel times, and overall delay;
- Reduce emissions and Green House Gases (GHG); and
- Provide a continuing foundation for interjurisdictional cooperation in coordination of interactive but autonomous local PARTY traffic signal systems.

The following specific tasks are required to be performed in the course of providing service for the traffic signal coordination project. Tasks are listed in sequential order for clarity. However, some tasks may run concurrently or commence prior to the order listed.

## **III. PRIMARY IMPLEMENTATION PHASE**

The Primary Implementation (PI) Phase is the initial phase lasting approximately one year to design, engineer, procure, and install the infrastructure; and, analyze existing traffic conditions to provide and implement new optimized traffic signal coordination timing. This shall be followed by a fine-tuning period, and all other aspects related to the new optimized traffic signal synchronization/coordinated operations along the Warner Avenue RTSSP corridor. The PI Phase begins upon execution of the contract and Notice of Award from OCTA's CAMM Division. The PI Phase ends at the payment of the retention for the phase. Only work performed and hours charged associated with the PI Phase may occur within this time period.



### Task 1: Project Management – PI Phase

Project Management is ongoing throughout the duration of the PROJECT. This task includes day-to-day project management, such as meetings, progress reports, tracking of schedules, invoicing, and overall administration of the PROJECT. The project management team, comprised of OCTA personnel including internal consulting support firms, and the Traffic and ITS Engineering Consultant (CONSULTANT), acts as an extension of OCTA staff and will act in that capacity at meetings with the respective corridor PARTIES. The following list is a minimum of what is required of this task:

1. The selected CONSULTANT for PROJECT shall prepare a detailed Project Management Plan (PMP) that includes budget and schedule estimates for all tasks described in the SOW, providing specific project milestones for review and approval by the APMs, or designated representative. These items shall be detailed and include expected meetings, activities (by work task, whether performed by CONSULTANT team or by others), start dates, activity durations, product submittal dates, relationships among work tasks (including critical path items), and a detailed GANT flow chart for the project tasks, and float time. The PMP shall also define the roles of the Project Manager, Project Assistant(s), and Project Manager's Reporting Contact Person, as well as their corresponding contact information. CONSULTANT shall finalize the report based on comments received from the project sponsor, other involved PARTIES, and APM and/or OCTA staff.
2. Consultant shall lead two distinct Project Kick-Off Meetings; one with the APM and internal staff and the second with all PARTIES.
  - a. The first meeting will be to kick-off the project with the APM; establish communication channels and protocols; discuss the Scope of Work, project schedule, and project budget; gather available information; and obtain a thorough understanding of the goals for the project. Specific topics to discuss include data collection needs, specific Traffic Signal Timing Optimization software programs specified herein, and specific construction items and procurement methodologies; intent of the original application and allowances or variants in design engineering, installation, and implementation; and PROJECT schedule. Administrative items to be discussed will include contact persons and secondary contacts for different functions of the project. Invoicing and reporting requirements on invoices with templates will be provided to consultant with explanations on how to provide monthly information on prime, sub-consultant, and vendor expenses on the invoice submittal.
  - b. The second stage of the meeting will be the first PROJECT Traffic Forum (PTF), a monthly meeting with CONSULTANT, APM, and PARTY representatives that have signalized intersections along the PROJECT. Data collection needs and requirements shall be outlined to the involved PARTIES. CONSULTANT shall notify each AGENCY of the type of work, and when the work is to be performed within that AGENCY. CONSULTANT shall notify each participating AGENCY any and all documents that need to be produced pertaining to the construction of the facilities and the coordination, including but not limited to: as-built drawings, Plans, Specifications, and Estimates (PS&E) for new construction to be built as part of this project, intersection Timing Charts, existing Synchro models, aerial photos, Average Daily Traffic (ADT) and intersection turning movement counts data, etc. The APM and staff will assist in this endeavor to facilitate time constraints. If available, OCTA will provide existing base models for SYNCHRO Version 10.



It is the sole responsibility of the CONSULTANT to create and calibrate the model to existing conditions.

3. CONSULTANT shall lead project meetings as directed by OCTA to include the CONSULTANT staff, APM, and other project related participants. The purpose of these meetings will be to ensure that proper input is being received and included in the work effort by CONSULTANT and OCTA.
  - a. CONSULTANT shall prepare agendas, provide status updates, discuss the progress and direction of the work, and provide notes of these meetings as directed by OCTA to all PARTIES. These meetings will also serve to provide feedback between the PTF and CONSULTANT regarding specific issues of the effort, including facilitating the development of measures of effectiveness, construction alternatives and mitigations, and as specified in later tasks. With prior approval of the PTF, these meetings can occur in person, through a conference call or email, as necessary each month.
  - b. CONSULTANT shall attend and be an active presenter at the OCTA-led Traffic Forum, updating the group on PROJECT status, effort, issues, mitigations, and other items as determined with and agreed to by APM. The Traffic Forum is envisioned to further communication and information exchange between OCTA and the local PARTIES regarding signal coordination and Intelligent Transportation Systems (ITS). The Traffic Forum Meetings are held within the first two weeks of February and late September/early October, respectively. Special Traffic Forum meetings may also be scheduled in between the regular meetings due to circumstance or by request of the Board.
  - c. At a minimum, a total of 12 meetings (this may be adjusted upon agreement of the PTF), 11 PTF and one Traffic Forum meetings shall be used for scheduling and budgeting purposes.
4. Consultant shall keep a running record of project cost broken down by PARTY. This information will be used by OCTA to bill PARTIES for their respective project match. This information may be requested by OCTA at any time.
5. CONSULTANT shall also keep a running record of all scope changes and/or any deviations from awarded contract. This information will be used by OCTA to request for Scope Changes at the Semi-Annual Review (SAR). This information may be requested by OCTA at any time.
6. CONSULTANT shall submit monthly invoices in the provided format. Each invoice shall include a detailed progress report for the reporting month, all third-party invoices, schedule, and other backup documentation as requested by APM.

Deliverables – Task 1:

1. Lead a 2 Stage Project Kick-off Meeting(s) and prepare agendas and meeting materials.
2. Draft and Final Detailed Project Management Plan – one copy for each participating agency.
3. Monthly progress reports, including detailed status of the work effort, outlook, issues/solutions, and updated schedule shall be e-mailed to PTF.
4. Attend Monthly PTF meetings and prepare meeting materials, including agenda, action items, graphics, presentation aides, and notes/minutes.
5. Electronic versions of all data files as directed by OCTA.
6. Graphics and presentation aides required for all meetings.

7. All documents provided in electronic form should be those currently used by OCTA: MS Office Professional format, and Adobe Acrobat portable document format (pdf) files.
8. All electronic data produced for this project shall be provided on Flash Media or similar hardware non-volatile memory device.
9. Monthly invoices shall include all third-party invoices and other supporting documentation as requested by OCTA.
  - a. Monthly invoices that include third-party invoices shall also include an equipment breakdown sheet in the format provided by APM.
  - b. Monthly invoices shall include a detailed progress report, outlook, issues/solutions, and updated schedule.

The OCTA Microsoft Teams portal that will be created and shared by the APM shall be used for all PROJECT correspondence, file transfer, and schedule management. All email correspondence shall include [TrafficOps@octa.net](mailto:TrafficOps@octa.net) as a recipient. In addition, during the course of the project, online resources, such as DropBox, OneDrive, or Consultant's own file transfer system may also be employed for file transfer, etc.

## **Task 2: Data Collection**

Data, such as counts, field conditions, and travel time studies, collected along the PROJECT will provide the necessary insight to develop appropriate design construction documents and optimal time-of-day traffic signal coordination plans. This data will also be used to measure the effectiveness of the PROJECT.

### ***Sub-Task 2.1: Counts and Field Review***

CONSULTANT shall collect, at a minimum, the following count data and field review necessary to thoroughly understand existing traffic conditions in the study area.

1. From the involved PARTIES and/or OCTA, CONSULTANT shall collect existing timing charts/sheets, existing coordination plans, traffic as-built drawings, aerial photos, maps, traffic collision data as available, and collision diagrams for the study intersections, if available. CONSULTANT shall also collect any of the shelf plans for construction and all traffic signal coordination/synchronization related Plans, Specifications, and Estimates (PS&E) for the corridor. CONSULTANT, if requested by the involved PARTY, will provide their own staff to review available records/plans and request copies of needed records/plans with minimal disruption to the involved PARTY.
2. From the involved PARTIES, CONSULTANT shall collect signal timing and signal priority preferences, including, but not limited to, those related to pedestrian and bicycle timing, phase sequence modifications and preferences, and special operations such as conditional service, coordination preferred phase re-service, and ring-barrier logic, as well as the timing optimization software preference.
3. CONSULTANT shall conduct seven-day 24-hour machine counts along each 1-mile segment of the PROJECT. Additionally, CONSULTANT shall collect 24-hour vehicle classification counts at up to 75% of the ADT locations on the PROJECT to determine heavy vehicle (Buses and Trucks) percentage information. The vehicle classification categories shall correspond to the latest Federal Highway Administration (FHWA) vehicle class categories. All count locations will be approved by the PTF prior to collection.



4. CONSULTANT shall conduct weekday and weekend peak period intersection turning movement (ITM) counts at each and every one of the PROJECT signalized intersections (see List of Intersections and Project Map with Construction Notes for specific project), including pedestrian and bicycle counts. ITM counts shall be conducted, with approval of PTF, for two hours of each weekday peak period (AM, mid-day, and PM) and a single four-hour Saturday mid-day peak period.
  - a. Any and all modes of vehicles and/or pedestrians that do not clear the intersection for counting purposes during the count time period shall also be counted as part of the quarter hour period in which they occur. *(This means that if a queue develops that is not served in one cycle and the counting period is ending, the number of vehicles remaining in the queue shall be included in that 15-minute period. They shall not be included in the succeeding 15-minute period).* CONSULTANT shall acknowledge and enforce this requirement and shall inform all vendors utilized of same.
  - b. ITMs that were collected within 2 years of the planned data collection period and supplied by an alternate viable source for an intersection may be used in lieu of a manual count if approved by the involved PARTIES. Per the Comprehensive Transportation Funding Programs (CTFP) Guidelines, ITM's supplied by a PARTY cannot be used as a credit against match funding requirements.
5. All counts shall be summarized in Microsoft Excel format. Counts shall also be summarized in a Comma Separated Values (CSV) file in the Universal Traffic Data Format (UTDF) for direct volume import into Synchro 10 by peak period. Copies of the raw data count sheets shall also be provided to each involved PARTY and APM. (See CTFP Guidelines for ROADS requirements).
6. CONSULTANT shall review the geometric layout, existing traffic signal equipment, and signal synchronization related infrastructure to identify any deficiencies for each intersection and along the whole corridor/route. The review shall include an assessment of the existing intersection geometry, traffic conditions, traffic signal control equipment, and telemetry/interconnect facilities along the corridor and of each intersection using observation, available as-built plans, consultation with the local PARTIES, and PARTY-supplied aerial photos. CONSULTANT shall use a standard field form developed by CONSULTANT for this review that accounts for each piece of intersection data required. With permission of the PARTIES, CONSULTANT shall inspect the interior of each traffic control cabinet, inspect the telemetry systems and determine their respective condition and make recommendations for equipment upgrades. Photos of each cabinet shall be included with the field review inventory. If existing, as part of the PROJECT APPLICATION, before photos may be requested from OCTA/PARTIES.
7. CONSULTANT shall also include an identification of all planned and programmed improvements (widening projects, intersection improvements, etc.) on the study corridor or on intersecting corridors or streets that might affect the PROJECT. The identification of these projects should be at minimum a list summarizing all improvements.
8. Key components of the corridor review shall include, at minimum, the following:
  - Corridor lane configurations;

- Existing street and lane geometries, curbs, bus turnouts, and medians;
  - Upcoming improvements to the corridor;
  - Existing signal operation characteristics – signal phasing, cycle lengths, phase sequence alteration, protective-permissive, etc.;
  - Crossing arterial coordination operations;
  - Crossing arterial or street with adjacent intersections within 2,700 feet of PROJECT unless specifically made not part of the PROJECT by PARTIES and APM;
  - All traffic control devices related to traffic signal operations at all PROJECT intersections, approaches to cross streets, and along PROJECT corridor;
  - Traffic signal control device information, such as type of device, brand and make, and condition of equipment. Open each controller cabinet and take digital photos of all equipment inside before the installation of new equipment. Intersection photographic documentation log of existing equipment condition shall be required;
  - Necessary configuration and parameters, such as advanced loop distances and detector channel assignments, for Automated Traffic Signal Performance Measures (ATSPM);
  - Existing controller and telemetry/interconnect equipment, if any. Note if to be reused;
  - Existing time-referencing setup, if any;
  - Existing Central Master Equipment, if any. Note if to be reused and modified, salvaged and/or new;
  - Existing Field Master equipment or peer-to-peer operation, if any. Note if to be reused and modified, salvaged and/or new;
  - Note any deficiencies of traffic control equipment at each intersection; and
  - Note the maintenance condition or existence of the traffic signal equipment, controllers and synchronization related infrastructure.
9. CONSULTANT shall also investigate factors that are expected to affect signal progression including, but not limited to: intersections with high pedestrian or bicyclist volumes; over-saturated intersections; uneven lane distribution; high volumes of trucks and buses; high-volume un-signalized intersections, including interchanges; parking maneuvers; presence and location of bus stops; differing signal timing patterns among PARTIES; etc.

With the view of assisting, enhancing, and improving the traffic operations along this corridor, CONSULTANT shall identify any deficiencies of the existing traffic signal control and telemetry infrastructure and geometric layout, and provide recommendations towards simple solutions that may be implemented to correct such deficiencies.

CONSULTANT shall prepare a report summarizing the findings of the data collection and field review completed as part of this task. This report will be incorporated into the Project Report (Task 5).

#### ***Sub-Task 2.2: 'Before' Travel Time Studies***

Travel time studies will be used to measure the effectiveness of the PROJECT improvements and timing plans. At a minimum, CONSULTANT shall conduct the following travel time studies to measure the traffic conditions prior to the development and implementation of new timing plans.

1. Project travel-time data shall be collected using the floating car method, a laptop computer, a GPS receiver unit, and Tru-Traffic, only. The following modules shall be downloaded and installed as part of Tru-Traffic for the 'Before' runs:



- OCTA CSPI.urc
- Emissions using CMEM for Vehicle Category 4 rev2.urc
- FuelConsumption&Emissions\_mph.urc
- CumulativeAvgSpeedLOS\_mph.urc

CONSULTANT shall perform due diligence regarding the parameters in the modules to ensure values and formulas are current and accurate for the purpose of this PROJECT.

2. CONSULTANT shall complete, at least, five (5) runs in each direction for each of the three weekday timing plans (AM, mid-day, and PM) and one Saturday mid-day plan. Number of runs shall be consistent for both directions and time periods. Based on engineering judgment and in conjunction with APM approval, CONSULTANT should subdivide the corridor into contiguous segments for the 'Before' and 'After' runs. CONSULTANT shall notify and receive approval from PTF on number of runs and contiguous segments to be accomplished.
3. CONSULTANT shall conduct a 'Before' field study representative of the times and days for which synchronization plans will be developed.
4. Measures of Effectiveness (MOE) to evaluate shall include, at a minimum, traffic flow, travel time, average speed, number of stops per mile, number of intersections traversed on green vs. stopped by red (Greens per Red) (*note: Average Speed, Stops per Mile, and Greens per Red are the OCTA MOE, Corridor Synchronization Performance Index (CSPI)*), fuel consumption reduction, pollution reduction, and other pertinent items.
5. CONSULTANT shall prepare a memorandum and present the findings to the PTF outlining the findings of the 'Before' field study.
  - a. The report shall identify MOE to evaluate the effects of the synchronization plans. The identified MOE's shall be compiled for the corridor using the floating car method and from Synchro 10 and from Tru-Traffic Version 10.
  - b. The report shall address likely optimization strategies for signal synchronization, specifically focusing on how to consider PROJECT optimization: end-to-end vs. coordinated zones.
  - c. Ideally, the analysis should include the floating car data and data collected as part of Task 2. However draft versions of the report can include previously collected traffic, travel time, or other data, if considered relevant and available, until the full set of data collected by CONSULTANT as part of Task 2 is available.
  - d. The memorandum shall provide a very good understanding of traffic patterns on PROJECT throughout the weekdays and throughout the weekend. The CONSULTANT shall perform due diligence with regard to existing and proposed timing operations on arterials that intersect with the PROJECT.
  - e. Tru-Traffic Version 10 has the OCTA CSPI calculation formulas available for use, as well as the calculations for the latest emissions for GHG and other MOE's.
  - f. CONSULTANT shall finalize the memorandum based on comments received from APM and other involved PARTIES.

6. CONSULTANT shall present to the PTF the traffic patterns on PROJECT scope and possible synchronization strategies to address the traffic patterns (optimizing the fill corridor versus optimizing segments identified with natural traffic breaks) to provide direction on the preferred signal timing strategy. Any requested presentation shall include as much of the turning movement, 24-hour machine counts, travel time, earlier city counts, etc. as available.

***Sub-Task 2.3: 'After' Travel Time Studies***

Following the implementation of all system and timing enhancements, and per PARTY and APM approval, CONSULTANT shall schedule 'After' travel time studies to measure the effectiveness of the PROJECT.

1. The CONSULTANT shall conduct an 'After' field study representative of the times and days for which synchronization plans were developed. The 'After' study must be conducted in the same manner and contain the same MOE's as the 'Before' study in order to evaluate the improvements of the synchronization plans.
2. At least five (5) runs will be completed in each direction for each of the three weekday timing plans (AM, mid-day, and PM), and at least five (5) runs will be completed in each direction during the Saturday midday plan.
3. Project travel-time data shall be collected using the floating car method, a laptop computer, a GPS receiver unit, and the methodologies and software to match the 'Before' study, exactly. MOE's should be compiled for the optimized corridor using the floating car method output in Tru-Traffic and then from Synchro/SimTraffic 10.
4. CONSULTANT shall prepare a memorandum comparing the results of the 'Before' and 'After' field study with reference to the specific MOE's. The report shall specifically give data on total project cost for the PI along with a one-year and three-year projection on benefit to cost. CONSULTANT shall present the findings to the Board.
5. CONSULTANT shall finalize the memorandum based on comments from other PARTIES and the APM. GHG calculations shall be performed by the APM and incorporated into the memorandum and Final Report.

OCTA may request a presentation on the comparison of the 'Before' and 'After' conditions along the PROJECT. Any requested presentation shall include visuals and short summaries of overall project achievements that can be quickly understood by staff of all levels.

**Deliverables – Task 2:**

1. Report summarizing data collection and field review efforts, including intersection turning counts, traffic collision analysis, current traffic signal timing patterns, drawings and photos of intersection features, and recommended mitigations to perceived problems.
2. Deliverable of drawings, photos, and counts to PARTIES shall be limited to political boundaries.
3. Draft and Final Memorandum documenting the results of the 'Before' study is to be distributed to the APM and PARTIES as a discussion item.
4. Draft and Final Memorandum comparing the results of the 'Before' and 'After' studies, including benefit-to-cost ratio, to be distributed to APM and PARTIES as a discussion item.
5. Electronic versions of all data files and memorandum to all PTF members.



6. Presentation to the APM and PARTIES of the 'Before' and 'After' study comparison.

**Task 3: System Design and Construction**

If deemed necessary by the APM or through request of a PARTY through the APM, CONSULTANT shall prepare any design construction documents in the form of sketches to full-fledged Plans, Specifications, and Estimates (PS&E). CONSULTANT shall prepare such plans for use in the construction of the PROJECT per each respective PARTY'S standards. CONSULTANT shall supply such documentation to the APM and the PARTY owning the affected facility for approval prior to commencing any construction.

***Sub-Task 3.1: Design Plans and Standards***

CONSULTANT will be required to design, procure, install, construct, and implement all desired components of the PROJECT as described in this document. At a minimum, CONSULTANT shall generate design plans as follows to ensure appropriate construction documents are developed to capture all improvements desired by the PARTIES.

1. CONSULTANT will work directly with APM and PARTIES at the outset of conceptual design to affect the most cost effective and time sensitive approach to design plans.
2. CONSULTANT shall coordinate with each PARTY of the PROJECT to assess special construction requirements, needs and desires, either known and proposed or previously unforeseen or unknown but necessary to complete the project.
3. CONSULTANT shall provide design services for interconnect plans along the PROJECT route. The interconnect plans may be submitted as high quality detailed aerial plans at 1" = 40' scale. The plans shall include, but not be limited to, all utilities, locations of control and communications cabinets, conduit runs, pull boxes, R/W and roadway centerlines, North Arrow, etc. The interconnect plans shall also provide terminations details at each signalized intersection and show the communication path from each intersection to a communications hub (if any) and to the appropriate PARTY Traffic Management Center (TMC). All connections and terminations shall be indicated.
4. CONSULTANT shall provide design services for traffic signal modification plans at intersections where minor phasing or other electrical changes require an "as-built" drawing record change for the intersection. Plans shall be drawn at 1"= 20' scale and include all details described in (2) above.
5. Consultant shall prepare maintenance related memoranda listing field conditions, maintenance, and design recommendations at the 50% submittal stage. CONSULTANT shall also prepare an updated engineer's cost estimate to achieve desired and intended operation. CONSULTANT shall negotiate with OCTA and PARTIES to determine what shall be installed and implemented to maintain budgetary control.
  - a. All work and equipment supplied and/or necessary for PROJECT, including all labor and material and insurances, to make PROJECT operate as designed and intended shall be included in the lump sum price for PROJECT. All work and equipment including labor, material, and insurances for maintaining and operating existing electrical facilities including communications equipment shall be included in the lump sum price for PROJECT.

- b. All work and equipment including labor, material, and insurances for utility location including potholing shall be included in the lump sum price for PROJECT.
  - c. CONSULTANT shall contact each appropriate PARTY's inspection services division to determine inspection costs that might impact PROJECT budget.
  - d. Electrical energy service costs and regular maintenance costs for PROJECT facilities under construction shall be borne by the owning PARTY. Replacement and/or maintenance costs for PROJECT facilities caused by or from damage or negligence from public or PARTY shall be borne by the owning PARTY. Replacement and/or maintenance costs caused by or from damage or negligence on the part of CONSULTANT or sub – consultants, and/or vendors shall be borne by CONSULTANT.
6. CONSULTANT, at the 100% submittal stage, shall provide all construction documents, including ITS design plans and a list of associated equipment, interconnect design plans and fiber strand splicing/termination diagrams to achieve desired and intended operation.

Individual PARTY design blocks (if available), preferences, standard plans and specifications will be provided to the awarded CONSULTANT.

***Sub-Task 3.2: System Construction and Integration***

All work and equipment supplied for PROJECT shall comply and be done in accordance with the latest standards and provisions of each PARTY or latest approved California Department of Transportation (Caltrans) Standard Plans and Standard Specifications, as directed by PARTY. Individual PARTY standards for construction of infrastructure will be provided to CONSULTANT.

1. Only when PARTY and APM approves final design plans or provide written approval to proceed with system construction and integration, shall CONSULTANT begin the procurement and mobilization of system improvements on PROJECT.
2. CONSULTANT shall work directly with APM and affected PARTIES to schedule, construct, and inspect the improvements implemented for this PROJECT.
  - a. Traffic Signal shutdown shall be limited to four-hour periods between the hours of 9:00 a.m. and 3:00 p.m. on weekdays (Monday through Thursday), except as authorized by owning PARTY.
  - b. Turn-on of new or rewired traffic signals, or those with a new controller cabinet shall only be scheduled for hours between 9 a.m. and 12 p.m. and shall not begin the functional test on a Friday, weekend, holiday or any day preceding a holiday, except as authorized by owning PARTY.
  - c. The Contractor may perform sub-surface work consisting of the installation of conduit, and foundations, prior to receipt of all electrical materials and equipment.



- d. Above-ground signal work shall not commence until such time that the CONTRACTOR notifies the APM, in writing, of the date that all electrical materials and equipment are received and said work shall start within 15 days after said date.
  - e. Existing street lighting shall remain in operation.
  - f. All striping, pavement markings, and signing shall be in place prior to signal turn-on and/or opening of street to public travel.
3. CONSULTANT shall be responsible for performing or scheduling necessary testing, as specified by the Caltrans Standard Specifications, of all equipment procured for PROJECT.
- a. All performance testing relative to tasks performed on this PROJECT shall be performed by an inspector determined by the owning PARTY of the equipment being delivered or installed.
  - b. Testing of any traffic controller assemblies or traffic controller units shall be done per the policy at the direction of the owning PARTY. All costs involved with testing shall be borne by the CONSULTANT.
4. Unless noted by owning PARTY or APM, CONSULTANT shall be responsible for the configuration and integration of all devices implemented on PROJECT.
5. CONSULTANT shall provide PARTIES with construction management support throughout the system implementation stage of PROJECT.

***Sub-Task 3.3: Construction Documentation***

- 1. CONSULTANT shall note any modifications, additions, or repair of missing or damaged signal synchronization infrastructure and other assets to be determined. Any changes desired during construction shall be documented and presented to the PARTY and APM for approval.
- 2. CONSULTANT shall provide the appropriate warranties and guaranties for all procurement items. Manufacturers' warranties and guaranties furnished for materials used in the work and instruction sheets and parts lists supplied with materials shall be delivered to the owning PARTY prior to acceptance of the project. CONSULTANT, sub-consultant and vendors of equipment and material on PROJECT shall provide to the owning PARTY the following Warranties and Guaranties:
  - a. ONE (1) YEAR GUARANTEE on LABOR and MATERIAL for all equipment furnished, installed, and/or modified.
  - b. THREE (3) YEAR GUARANTEE on Firmware and Software Patches, Fixes, Updates, and Upgrades for all central and local control and communications systems supplied. Note that for all ATMS, this price shall be included in the lump sum price for installation. Continuity testing for existing ATMS shall be limited to 10 percent of the construction cost and included in the cost of the ATMS installation. No special hardware license or maintenance package shall be allowed. Maintenance Contracts or extra fees for these specific tasks and deliverables shall not be allowed, shown as such on any document, nor charged to any PARTY or APM by either the CONSULTANT, his/her sub-consultants, and/or vendors/suppliers, either jointly or severally, of the specified systems and related components for this service or task. (THIS MEANS SPECIFIC VENDOR MANDATED

MAINTENANCE CONTRACTS SHALL NOT BE ALLOWED DURING THE ENTIRE 3 THREE YEAR CONTRACT PERIOD). If an agency wishes to enter into a Software and/or Hardware Maintenance Contract or Agreement with a specific vendor, they may do so at their sole expense.

Enforcement of Standard Warranties or Guaranties for hardware and software or firmware specified heretofore shall be the sole responsibility of the PARTY receiving the equipment.

3. Upon completion of construction and acceptance by owning PARTY, CONSULTANT shall schedule a field visit to document final improvements and photograph final conditions of all devices implemented as part of PROJECT.
4. CONSULTANT shall prepare as-built plans for any and all improvements that required design plans for PROJECT in Sub-Task 3.1.

**Deliverables – Task 3:**

1. Interconnect and ITS Design Plans at 50, 90, and 100% submittal stages, per this Scope of Work and Attachments or Appendices
2. Maintenance Memorandum during 50% submittal stage
3. Updated Cost Estimate for any additional improvements not included in this document
4. Procure and install any and all equipment as specified, and/or necessary, to make the proposed systems operate as originally intended, per this Scope of Work and Attachments or Appendices.
5. Negotiate with APM and PARTY representatives on alternative procurements or substitutions as deemed necessary during the course of the PROJECT.
6. All WARRANTIES and GUARANTIES as specified.
7. As-built plans and photo log of all field implementations. Photo log should be divided by PARTY.
8. All documentation shall be supplied to APM and PARTIES in two hard copies and electronic copies.

**Task 4: Signal Timing Optimization and Implementation**

The PROJECT aims to improve efficient traffic operations along the regional corridor for all modes of transportation. As part of this task, CONSULTANT will evaluate existing timing conditions, generate, implement and fine-tune recommended optimized signal timing plans based on available data and improvements planned in the PROJECT. Guidelines and standards for signal synchronization continue to evolve with the innovations in technology. OCTA encourages CONSULTANT to present progressive and forward-thinking optimization solutions for more efficient operations on this PROJECT.

***Sub-Task 4.1: Base Network***

1. CONSULTANT shall work with the APM and PARTIES to develop a model of the study area and calibrate the model based on field observations of existing conditions.
2. Signal synchronization existing and optimized networks shall be conducted in Synchro 10. The CONSULTANT must be cognizant of the version of Synchro that the receiving PARTY is using and provide any files in that version.



3. The corridor model must be consistent with all aspects and seamlessly interface with the Countywide Synchro Network as administered by the GIS/ROADS database. The PROJECT shall be developed with Synchro 10 and shall be easily imported and/or exported to and from those programs' respective database.
4. Node or intersection numbering scheme must remain consistent with the OCTA identification numbers. Any modifications, additions, or removal of intersections or roadway segments (nodes or links) must be approved by the Section Manager III – Planning/GIS, Planning and Analysis for OCTA. CONSULTANT shall calibrate the model based on travel time, delay studies, field observations of queue lengths, and saturation flows for heavy movements at key intersections.

*The CONSULTANT may use their own numbering scheme for use in Synchro analysis if the volume balancing and other factors becomes an issue with node numbering in regard to OCTA GIS Database. If the CONSULTANT chooses to use this methodology, the requirement for submittal of the database with the OCTA identification numbers format is still required. The extra node numbering used for volume balancing nodes and other factors must be removed upon final submittal of the Synchro document that will be incorporated into the GIS database. These operations will be closely monitored and controlled through the APM and the Section Manager of the GIS department of Planning.*

It is recommended that the CONSULTANT utilize a GIS shapefile layer as the background from Synchro 10 in the development of the base layout files. Tru-Traffic Software version 10 or latest release should be used, subsequent to initial optimization, to augment and enhance green band throughput (offset, splits, phase rotation); and, to incorporate specific off band coordinated traffic platoons into the corridor operation as required by data analysis and field observations.

#### **Sub-Task 4.2: Basic Timing Review**

1. The CONSULTANT shall gather AGENCY standards, guidelines, and preferences for basic timing parameters, including walk, pedestrian clearance, yellow, all red, and bicycle clearance.
2. CONSULTANT should note that proposed new pedestrian timing standards have been approved at the Federal and State level. Additionally, new State standards have been adopted for yellow change intervals using the 85<sup>th</sup> percentile of a newly completed speed survey for a corridor rounded up to the nearest 5-mile an hour increment or the posted speed limit plus an additional 7 miles per hour (MPH) if over 30 MPH or an additional 10 MPH if posted 25 MPH or less. An inclusive table is provided in the latest edition of the California Manual on Uniform Traffic Control Devices (CA MUTCD). PARTIES must be contacted and provide policy and guidance to the CONSULTANT for calculations regarding these timing intervals.
3. CONSULTANT shall prepare excel tables for each intersection on the corridor for each PARTY showing both existing and proposed pedestrian walk, pedestrian clearance, yellow change, and all red clearance intervals based on PARTY preference and guidance. Timings will be used in optimized timings analysis and set on control systems in the field during implementation, if not already set.
4. CONSULTANT shall receive written approval of final recommended basic timing parameters from all PARTIES prior to proceeding with optimization of the corridor.

***Sub-Task 4.3: Concept of Operations***

1. The CONSULTANT shall, in concert with all PTF members, develop a Concept of Operations (CONOPS) for all time periods including AM, MD, PM, Weekend, and FREE operational patterns or plans. CONOPS shall provide operational procedures, plans, and strategies on how the traffic should flow optimally for all directions providing as many successive greens as possible to the motorist whether on the primary coordinated band or traversing from a primary coordinated band to another coordinated band or vice versa. Planned Stops will be allowed only as a last resort and must be approved by the PTF prior to implementation.
2. CONOPS shall consider all special generators and known congestion points/areas such as freeway interchanges, schools, or shopping centers and analyze them for specific circulation flows and conditions that may require special plans or queue mitigation (flush) operations. For Diamond Interchanges, when possible, off ramp phase single entry operations coupled with coordinated phase through band with offset off ramp band flows should be employed for both directions. Dependent on spacing between off ramp intersections, dual entry operations may be appropriate.
3. CONSULTANT may utilize video and/or Bluetooth or combination of technologies to perform an origin and destination (O-D) analysis during peak periods to determine actual flow patterns. However, the objective to determine actual traffic flow patterns for band width and both coordinated street and cross street entry band offset requirements analysis shall be met. Analysis time periods shall be determined from the 24-hour ADT count data from Task 2.
4. CONSULTANT shall present from 2 to 3 timing plan operational scenarios dependent on coordinated and crossing arterial traffic conditions for timing plan implementation and the “when”, “who”, and “how”. These scenarios will be part of the initial presentation of the corridor existing conditions, proposed groupings and cycle lengths report.

***Sub-Task 4.4: Coordinated Optimized Traffic Signal Timing***

1. Based on a consensus developed from discussions of the scenarios presented and then approved by the PTF, the CONSULTANT shall prepare Coordinated Optimized Traffic Signal Timing Plans for all corridor intersections using:
  - NEMA Coordinated phase gap-out style coordination shall be employed where possible using on street coordinated phase detection to allow the coordinated phase to gap out once the primary platoon has passed and the resulting straggler vehicles are out of the dilemma zone
  - Logic Sensor operations to enhance Time Clock Timing Plan/Pattern Selection
  - Flow Interconnect using peer to peer communications and logic internal to the ATC
    - Free Operations only
  - Modified Phase Sequence Rotation
  - Lead/Lead
  - Lead/Lag
  - Lag/Lag
  - Any combination of two concurrent left turn phases where a single phase is serviced twice in one cycle by either leading or lagging



- Protected/Permissive operations
    - Phasing will be lead/lead only; or,
    - Flashing Yellow Arrow technique may be employed for lead/lag
      - Owning/Operating PARTY policy permits its use
  - Harmonic cycling – double, half, third or other harmonic multiple,
  - Other innovative techniques upon approval of the owning PARTY and APM
  - Mitigate minor or non – coordinated phase delay
  - Preferred Phase re-service any Phase/any Ring
    - By Pattern
    - By Phase Rotation/Sequence #
    - By Cycle Length
    - Ped Y/N
2. CONSULTANT will measure the saturation flow rates at key project intersections during one peak hour where the overall intersection volume-to-capacity ratio is greater than or equal to 0.8 as a calibration for the Synchro model. Timing parameters shall provide adequate crossing time to accommodate pedestrians within the phase split. CONSULTANT shall take into consideration the pedestrian timing parameters used by the local PARTY on a case by case basis.
3. CONSULTANT shall endeavor to keep Crossing Arterial Operations intact when analyzing PROJECT intersections and shall use these intersections as anchor points for offset control. In the event that the cycle length must change, CONSULTANT shall coordinate such change with PARTIES and APM and shall incorporate cycle length and offset and possible split modifications to 1 to 3 intersections on either side of the PROJECT Crossing Arterial corridor intersections as agreed upon by the PTF and within budget. CONSULTANT shall endeavor to have this type of operation:
- a. CONSULTANT shall endeavor to find a method of providing for crossing arterial coordination wherever they occur along PROJECT corridor. Crossing Arterial phases shall have HOLD placed on them until the calculated offset for the crossing arterial should occur in the cycle.
4. CONSULTANT shall develop an operational model within SimTraffic Version 10. The operational analysis will be used to micro-simulate and analyze specific roadway segments with queuing, spill back, starvation, storage blocking, and other queuing interactions, and to analyze and mitigate the conditions discovered by CONSULTANT and/or APM and PARTIES in field reviews.
5. CONSULTANT shall develop optimized signal timings using the results from Synchro/SimTraffic 10.0, in conjunction with Tru-Traffic version 10.0 or latest released version and recommend any changes to the signal phasing at each signalized intersection that may improve the efficiency of operations. Output of the modeling software shall not be utilized without proper QA/QC. Engineering judgment shall be utilized to determine final operational parameters. The recommended signal timing plans shall be reviewed by the APM and local PARTY staff.
- a. CONSULTANT shall prepare, at minimum, three (3) timing plans for a typical weekday which consider the following peak periods: AM PEAK, MID-DAY PEAK, PM PEAK and

one (1) timing plan for a typical Saturday/Sunday MID-DAY PEAK. Timing plans should be in Synchro, Tru-Traffic, and the preferred timing chart format of each local PARTY.

- b. CONSULTANT shall prepare, special plans for congestion mitigation based on scenarios approved by the PTF.
6. CONSULTANT shall prepare a memorandum detailing the proposed signal timing optimization and implementation plans for PARTIES and APM to review and approve prior to generating timing charts for implementation and fine-tuning.

***Sub-Task 4.5: Signal Timing Implementation and Fine-Tuning***

Upon approval of the optimized signal timings by OCTA and PARTIES, CONSULTANT, at a minimum, shall prepare for new timing implementation and fine-tuning as follows.

1. CONSULTANT shall prepare timing charts for each intersection on the corridor for each PARTY showing the implementation-ready timing parameters based on PARTY preference and guidance. These parameters may include, but is not limited to, approved basic timing, sequence, coordination pattern, action plan, day plan, schedule plan, and time of day function.
2. CONSULTANT shall implement or assist local PARTIES staff in the implementation of new signal timings either through the central traffic signal system (if available) or direct implementation at the intersection controller units. CONSULTANT shall use existing traffic signal interconnection systems, where they exist, and, as a result of the inter-jurisdictional nature of the project, shall implement time-based signal coordination techniques across signals controlled by different PARTIES. Updated timing sheets containing the most current controller timing shall immediately be placed within the controller assembly and time/date stamped and signed by the City designate.
3. As the project will be using time-based signal coordination, the CONSULTANT shall evaluate the current time-referencing of all traffic signal controllers and recommend a corridor-wide strategy to ensure that all traffic signal controllers are on synchronized time clocks linked to a master time source. CONSULTANT shall verify that all Central Master or Local Field Master, and/or Local Controller unit clocks are:
  - Operating properly and are synchronized;
  - Referencing Coordinated Universal Time (UTC) and the reference for all cycle length calculation shall be 12:00 AM (midnight).
4. CONSULTANT shall fine-tune, or assist local PARTY staff in the fine-tuning of, the new settings and timings. CONSULTANT shall fine-tune timings in the field and record all changes. Fine-tuning shall be conducted during times and days that are representative of the times and days for which coordination plans were developed.
5. CONSULTANT shall use ATSPM data and metrics, where available, to supplement the fine-tuning efforts on PROJECT. Any changes to the ATSPM signal configuration due to field upgrades, such as new detection systems, on PROJECT shall be properly documented.



6. CONSULTANT shall collect detailed notes of any and all implementation and fine-tuning activities by PARTY to include in the Project Report.
7. CONSULTANT shall utilize Tru-Traffic Version 10 or later software on a laptop with appropriate GPS device and use the floating car method utilized in the PROJECT 'Before' Study to fine-tune the corridor operation and verify integrity of system intersection clocks. Synchronized Video shall be used to compare actual conditions to anticipated conditions dictated by the Tru-Traffic time-space diagram so that any anomalies may be corrected prior to the 'After' studies task.

**Deliverables – Task 4:**

1. Excel Files of pedestrian and vehicle clearance intervals.
2. Concept of Operations Report including Scenarios Report.
3. Memorandum documenting the signal timing optimization and implementation.
4. All optimized and synchronized traffic signal timing plans, including existing corridor conditions and improved corridor conditions customized per participating PARTY.
5. Field implementation of optimized traffic signal plans for existing corridor conditions, including all required fine-tuning.
6. Electronic versions of files from all Traffic Signal Modeling Software programs used in PROJECT.
7. Electronic versions of all other data files and memorandums.
8. Deliverables of final plans of other participating neighbor PARTY to each participating PARTY for timing shall only be the coordinated timing intervals and time of day plans. And, they shall be limited to one to three signalized intersections on each side of their respective political boundaries or as approved by participating neighbor PARTY.

**Task 5: Project Report**

1. CONSULTANT shall prepare a Project Report with an executive summary. The report shall provide complete documentation of the project, including, but not limited to:
  - Project scope, objectives, locations, findings, and recommendations
  - Data collected: counts, travel time studies, and project benefits achieved in terms of fuel savings, travel time, and other measurable parameters
  - For each intersection: lane configurations, signal phasing, turning movement data, and cycle lengths for existing and proposed timings for all peak periods
  - All work performed for system construction and signal timing optimization
  - Implementation schedule and improvements accomplished, including dates
  - Procedures for continuing maintenance, surveillance, and evaluation of the coordinated signal system

The report shall document all planned and programmed improvements on the study corridor as well as recommendations based on PI tasks for further infrastructure improvements that would likely improve the corridor signal coordination project results. CONSULTANT shall present the final report and results of the project to the Traffic Forum if requested by APM. The report shall be completed in accordance with the current CTFP Guidelines.

Finally, the report shall provide recommendations with cost and benefit estimates for future improvements to traffic signal infrastructure (signal controllers, vehicle detection, communications, etc.), intersection capacity (appropriate signal phasing, lane geometrics, and alleviation of physical bottlenecks that curtail arterial capacity), and traffic management

strategies. These proposed improvements should be useful in determining future enhancements to the corridor.

2. CONSULTANT shall update the Project Report per PARTY comments and submit a final version with all appendices in electronic and hard copies. Full appendices shall be provided to OCTA and PARTY submittals shall be within PARTY boundaries, unless approved by PARTIES to include for all participants.
3. CONSULTANT shall prepare a Project Summary Sheet, one sheet front and back, that describes the PROJECT and improvements gained. This sheet will be used by OCTA and PARTIES to present to the Board and elected officials.
4. CONSULTANT shall complete the Primary Implementation Phase by obtaining approval from all PARTIES and have paid all third-party vendors and sub-consultants/contractors.
5. CONSULTANT shall request in writing release of retention of funds for Primary Implementation Phase.

**Deliverables – Task 5:**

1. Draft and Final Project Report (one electronic master, two hardcopies to OCTA, and one hardcopy per PARTY) at the end of the one (1) year Implementation Phase.
2. Draft and Final Project Summary Sheet
3. Follow directions on closing out Primary Implementation Phase and release of retention funds.
4. Electronic versions of all data files as directed by OCTA.

#### **IV. ONGOING OPERATIONS AND MAINTENANCE PHASE**

Prior to beginning the Ongoing Operations and Maintenance (O&M) Phase of the PROJECT, CONSULTANT shall have completed all PI tasks and received official written approval from the PARTIES on completion of their respective PROJECT segments of the PI Phase, and;

1. Invoiced and paid all third-party sub-consultants and vendors
2. Invoiced OCTA for the final invoice
3. Received payment for final invoice
4. Invoiced OCTA with Request Letter for Release of Final Retention on PI Phase
5. Received payment of Final Retention

Once these five items are complete, an NTP will be issued by the APM to CONSULTANT to advance to the O&M Phase. Until the NTP is issued, no work or hours may be charged against the PI phase for the PROJECT.

#### **Task 6: Project Management – O&M Phase**

Project Management Costs associated with Task 9 are all inclusive and are not part of Task 1: Project Management (PI). Project Management is ongoing throughout the duration of the O&M Phase of the PROJECT. This task includes day-to-day project management, such as meetings, progress reports, tracking of schedules, invoicing, and overall administration of the PROJECT. The Project Management shall continue in full force as specified in the Primary Implementation Phase.



CONSULTANT shall invoice monthly for all O&M tasks and shall include with the invoice a filled-out form of work performed based on one- or two-page template provided by APM at Kick-Off Meeting Number 1.

Deliverables – Task 6:

1. Electronic versions of all data files as directed by OCTA.
2. Graphics and presentation aides required for all meetings.
3. Monthly invoicing including filled out Report Template of work performed.

**Task 7: Continuing Support**

CONSULTANT shall provide “on-call” signal system and timing support services for a period of two years or 24 months following the submittal of the Final Project Report and NTP from the APM, to address any future adjustments that may be needed during this period. At a minimum, CONSULTANT, shall provide the following continued support during this period.

1. During this 24-month period, CONSULTANT shall be prepared to review any project intersection requested by the PTF within (24) hours of written notice, including observing and fine-tuning the signal timing. Depending on the nature of the adjustment, CONSULTANT may accomplish the fine-tuning adjustments remotely from the office through the traffic management systems.
2. During this 24-month period, CONSULTANT shall be prepared to review any request by the PTF for system improvement, such as detection and communication, implemented as part of the PROJECT within (48) hours of written notice, including conducting a field visit. CONSULTANT shall be responsible for identifying the appropriate response and coordinating with vendors and contractors for systems under warranty.
3. CONSULTANT shall drive the length of the project arterial during all designated corridor synchronization timing plan hours of operation on a monthly basis in order to verify that the synchronization timing is working as designed and complete any necessary adjustments. The number of runs and hours shall be approved by all PARTIES.
4. CONSULTANT shall notify APM and respective corridor PARTIES 24 hours prior to commencement of driving periods. All drives shall be documented and sent to APM as part of the monthly invoice. A copy, limited to political boundaries, shall also be sent to each PARTY.
5. CONSULTANT shall configure ATSPM systems to forward alerts to CONSULTANT team. Any timing modifications desired based on these alerts shall be documented and presented to the PARTY and APM for approval prior to implementation. An analysis of improvement achieved once the timing has been implemented shall also be provided to PARTY and APM during the monthly reporting.
6. CONSULTANT shall determine the level of effort required to address any other signal system or signal timing requests during this period of support. These requests may include, but is not limited to, the following:
  - a. Update basic timing parameters due to change in PARTY guidelines or speed surveys;
  - b. Evaluate new cycle lengths due to PARTY crossing corridor or network update;
  - c. Configure communication switches due to change in IP schemes; and

- d. Evaluate potential issues with signal system outside of PROJECT, such as an existing ATMS or Field Master, that significantly impacts the efficiency of the corridor.

CONSULTANT shall present level of effort and potential effect on monthly drive of the corridor to APM and PARTY. Note that any additional requests specific to one PARTY should not impact the remaining PARTIES on PROJECT.

7. CONSULTANT shall provide a monthly memorandum summarizing the status and trends of the corridor based on the runs conducted. Trip logs for the month from Tru-Traffic shall be provided to the PARTIES. The memorandum shall include all additional tasks requested and completed during that month. Performance metrics comparisons from ATSPM, where available, shall also be included in the memorandum.

Deliverables – Task 7:

1. 24 months of on-call support and revised signal timing plans and memorandum documenting CONSULTANT recommendations and PARTY actions.
2. Monthly memorandum with comparisons from field and ATSPM.
3. Electronic versions of all data files and memorandums.

**Task 8: Final Technical Memorandum**

At the end of the three (3) year contract period, CONSULTANT shall prepare a Technical Memorandum documenting the Ongoing Operations and Maintenance efforts and procedures for continuing maintenance. The memorandum shall document all planned and programmed improvements on the study corridor as well as recommendations for further infrastructure improvements that would likely improve the corridor signal coordination project results. The memorandum shall be completed in accordance with the current CTFP Guidelines.

CONSULTANT shall provide information to APM for the OCTA FINAL REPORT as required by the M2 Ordinance and Chapter 9 of the 2020 CTFP Guidelines. This report is a fill in the form type of report.

Deliverables – Task 8:

1. O&M Technical Memorandum
2. Information required for OCTA FINAL REPORT and project closure

**V. OPTIONAL**

This PROJECT follows the CTFP Guidelines and scope; however, OCTA understands that innovative and advanced technologies are present in the industry to more efficiently achieve the goals of the PROJECT and guide the future of the region. Any improvement or task not identified in the previous sections shall be added as an optional task for OCTA and PARTY review and consideration.

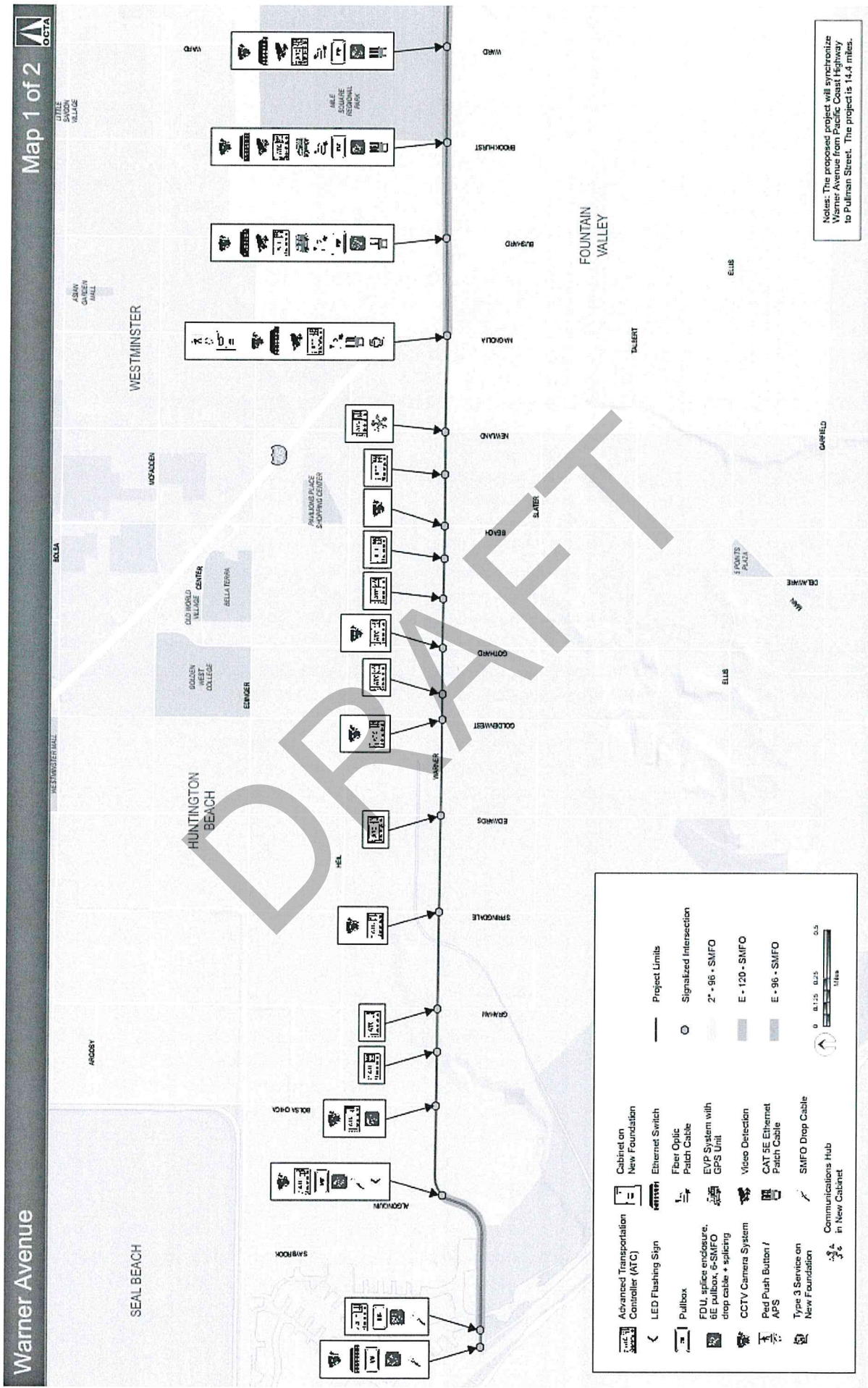
Based on the PROJECT understanding and goals of OCTA, CONSULTANT shall provide optional tasks that will enhance the performance of the PROJECT. Optional tasks presented by CONSULTANT shall be cognizant of overall project schedule and budget. These tasks may include, but is not limited to, implementation of the following:



- Real-time traffic signal responsive operation
- Peer-to-peer signal operation
- Adaptive signal operation
- Third-party origin-destination platform
- Third-party travel time and delay platform
- Connected vehicle technology
- Dilemma zone technology
- Bicycle extension strategy or technology
- Passive pedestrian detection technology

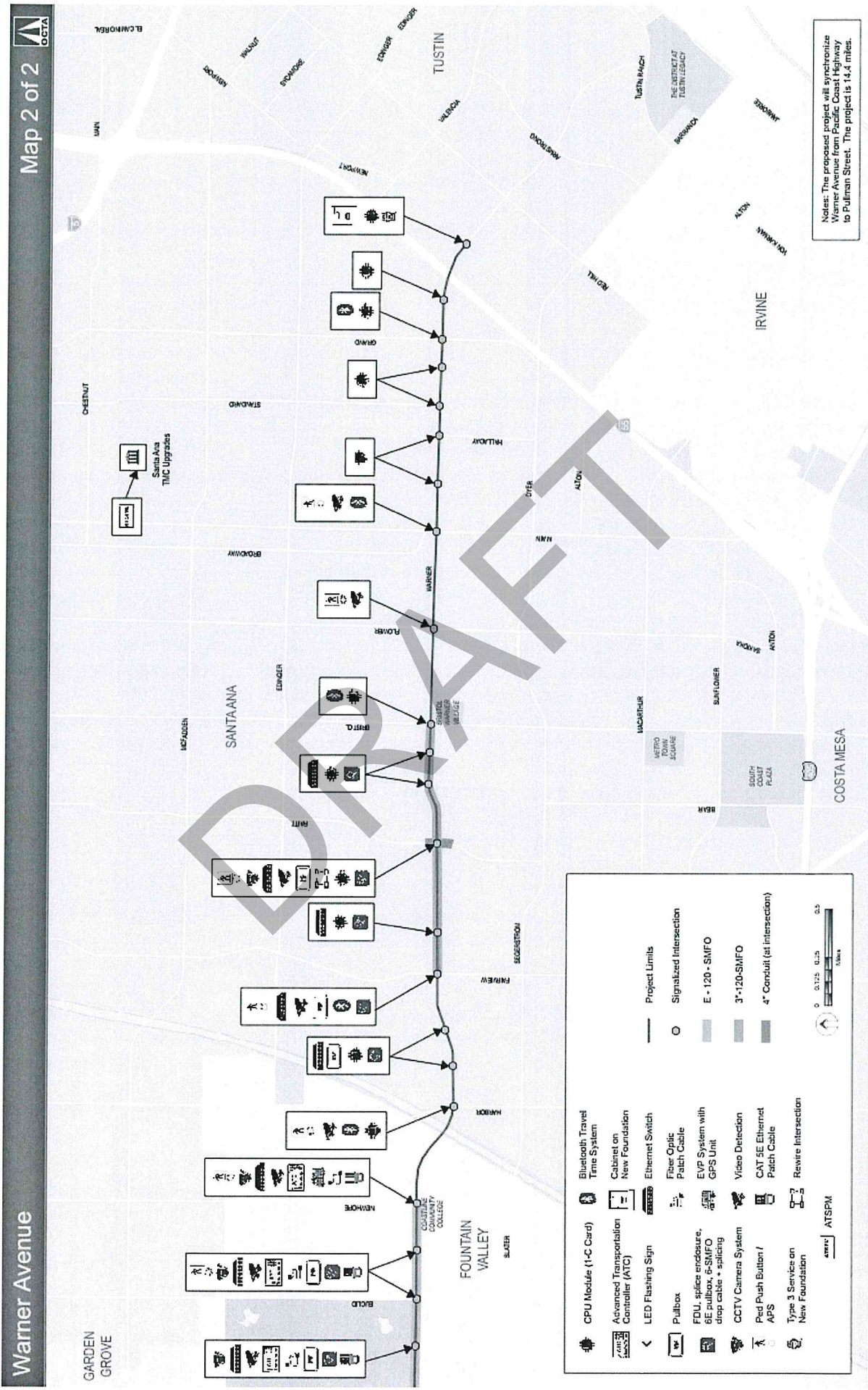
For every optional task, CONSULTANT shall provide an explanation of additional enhancement to the PROJECT along with a detailed scope of work, preliminary timeline, estimated lump sum cost, deliverables, and location(s) of each implementation. One-page samples of each optional task submittals shall be included in CONSULTANT proposal.

WARNER AVENUE PROJECT MAP WITH SUMMARY OF IMPROVEMENTS (PAGE 1)





WARNER AVENUE PROJECT MAP WITH SUMMARY OF IMPROVEMENTS (PAGE 2)





Intersection Improvements

Item No.	Agency / Contractor / Vendor	WARNER Avenue @	Item Description	Unit	Qty
1	Huntington Beach	Pacific Coast Highway	Furnish and install new Cohu Rise CCTV Camera + appurtenances (latest model)	EA	1
2	Huntington Beach	Pacific Coast Highway	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
3	Huntington Beach	Pacific Coast Highway	Furnish and install new #6E Pullbox + conduit sweeps	EA	1
4	Huntington Beach	Pacific Coast Highway	Furnish and install new Ruggedcom Ethernet Switch	EA	1
5	Huntington Beach	Fire Station 7	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
6	Huntington Beach	Fire Station 7	Furnish and install new Fiber Distribution Unit, Ruggedcom Ethernet Switch, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
7	Huntington Beach	Fire Station 7	Furnish and install new 2" Schedule 80 conduit (PCH to Fire Station 7), pullboxes, potholes, and concrete repair	LF	500
8	Huntington Beach	Fire Station 7	Furnish and install new 96-SMFO cable (PCH to Fire Station 7) in new conduit, fiber splicing, and terminations	LF	540
9	Huntington Beach	Fire Station 7	Furnish and install new #6E Pullbox + conduit sweeps	EA	1
10	Huntington Beach	Fire Station 7	Furnish and install new #6 Pullbox	EA	1
11	Huntington Beach	Algonquin Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
12	Huntington Beach	Algonquin Street	Furnish and install new Cohu Rise CCTV Camera + appurtenances (latest model)	EA	1
13	Huntington Beach	Algonquin Street	Furnish and install new LED Flashing Chevron Signs at curves w/o Algonquin	EA	2
14	Huntington Beach	Algonquin Street	Furnish and install new Fiber Distribution Unit, Ruggedcom Ethernet Switch, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
15	Huntington Beach	Algonquin Street	Furnish and install new 96-SMFO cable (Fire Station 7 to Algonquin), fiber splicing, terminations, and conduit repair	LF	5200
16	Huntington Beach	Algonquin Street	Furnish and install new #6E Pullbox + conduit sweeps	EA	1
17	Huntington Beach	Algonquin Street	Furnish and install new #6 Pullbox (Fire Station 7 to Algonquin)	EA	10
18	Huntington Beach	Algonquin Street	Furnish and install new 2" Schedule 80 Conduit (Bridge Crossing e/o Fire Station 7), pullboxes, potholes, and concrete repair	LF	500
19	Huntington Beach	Bolsa Chica Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1



Item No.	Agency / Contractor / Vendor	WARNER Avenue @	Item Description	Unit	Qty
20	Huntington Beach	Bolsa Chica Street	Furnish and install new Cohu Rise CCTV Camera + appurtenances (latest model)	EA	1
21	Huntington Beach	Bolsa Chica Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
22	Huntington Beach	Plaza Lane	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
23	Huntington Beach	Graham Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
24	Huntington Beach	Springdale Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
25	Huntington Beach	Springdale Street	Furnish and install new Cohu Rise CCTV Camera + appurtenances (latest model)	EA	1
26	Huntington Beach	Edwards Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
27	Huntington Beach	Goldenwest Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
28	Huntington Beach	Goldenwest Street	Furnish and install new Cohu Rise CCTV Camera + appurtenances (latest model)	EA	1
29	Huntington Beach	Home Depot	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
30	Huntington Beach	Gothard Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
31	Huntington Beach	Gothard Street	Furnish and install new Cohu Rise CCTV Camera + appurtenances (latest model)	EA	1
32	Huntington Beach	Nichols Lane	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
33	Huntington Beach	Ash Lane	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
34	Huntington Beach	Beach Boulevard	Timing Analysis Only	0	
35	Huntington Beach	Beach Boulevard	Furnish and install new Cohu Rise CCTV Camera + appurtenances (latest model)	EA	1
36	Huntington Beach	Rotterdam Lane	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
37	Huntington Beach	Newland Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
38	Huntington Beach	Newland Street	Furnish and install new Communications Hub in new 332 Cabinet	EA	1
39	Fountain Valley	Magnolia Street	Replace existing cabinet w/new Type 332L Cabinet on new Foundation	EA	1
40	Fountain Valley	Magnolia Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
41	Fountain Valley	Magnolia Street	Furnish and install new Type III Service cabinet and foundation, including an estimate for SCE conduit and fees	EA	1

Item No.	Agency / Contractor / Vendor	WARNER Avenue @	Item Description	Unit	Qty
42	Fountain Valley	Magnolia Street	Replace existing CCTV camera w/new Bosch MIC CCTV Camera (latest model)	EA	1
43	Fountain Valley	Magnolia Street	Furnish and install new Polara Accessible Pedestrian Push Button Modules + System (Polara iNavigator 2-Wire System)	EA	1
44	Fountain Valley	Magnolia Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
45	Fountain Valley	Magnolia Street	Furnish and install new Fiber Optic Patch Cable (SC-SC, 2 Meter)	EA	2
46	Fountain Valley	Magnolia Street	Furnish and install CAT5E Ethernet Patch Cable (3 feet)	EA	2
47	Fountain Valley	Magnolia Street	Furnish and install new Video Detection System and Cameras (Econolite Autoscope Encore or Iteris Vantage Edge w/EdgeConnect module)	EA	1
48	Fountain Valley	Bushard Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
49	Fountain Valley	Bushard Street	Replace existing CCTV camera w/new Bosch MIC CCTV Camera (latest model)	EA	1
50	Fountain Valley	Bushard Street	Furnish and install new GTT GPS 764 Phase Selector Complete EVP Preemption, including GPS unit	EA	1
51	Fountain Valley	Bushard Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
52	Fountain Valley	Bushard Street	Furnish and install new Fiber Optic Patch Cable (SC-SC, 2 Meter)	EA	2
53	Fountain Valley	Bushard Street	Furnish and install new CAT5E Ethernet Patch Cable (3 feet)	EA	2
54	Fountain Valley	Bushard Street	Furnish and install new 120-SMFO cable in existing conduit (Bushard to Magnolia), fiber splicing, terminations, and conduit repair	EA	3000
55	Fountain Valley	Bushard Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
56	Fountain Valley	Bushard Street	Furnish and install new #6E Pullbox + conduit sweeps	EA	1
57	Fountain Valley	Bushard Street	Furnish and install new Video Detection System and Cameras (Econolite Autoscope Encore or Iteris Vantage Edge w/EdgeConnect module)	EA	1
58	Fountain Valley	Brookhurst Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
59	Fountain Valley	Brookhurst Street	Replace existing CCTV camera w/new Bosch MIC CCTV Camera (latest model)	EA	1



Item No.	Agency / Contractor / Vendor	WARNER Avenue @	Item Description	Unit	Qty
60	Fountain Valley	Brookhurst Street	Furnish and install new GTT GPS 764 Phase Selector Complete EVP Preemption, including GPS unit	EA	1
61	Fountain Valley	Brookhurst Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
62	Fountain Valley	Brookhurst Street	Furnish and install new Fiber Optic Patch Cable (SC-SC, 2 Meter)	EA	2
63	Fountain Valley	Brookhurst Street	Furnish and install new CAT5E Ethernet Patch Cable (3 feet)	EA	2
64	Fountain Valley	Brookhurst Street	Furnish and install new 120-SMFO cable in existing conduit (Bushard to Brookhurst), fiber splicing, terminations, and conduit repair	EA	3000
65	Fountain Valley	Brookhurst Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
66	Fountain Valley	Brookhurst Street	Furnish and install new #6E Pullbox + conduit sweeps	EA	1
67	Fountain Valley	Brookhurst Street	Furnish and install new Video Detection System and Cameras (Econolite Autoscope Encore or Iteris Vantage Edge w/EdgeConnect module)	EA	1
68	Fountain Valley	Ward Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
69	Fountain Valley	Ward Street	Replace existing CCTV camera w/new Bosch MIC CCTV Camera (latest model)	EA	1
70	Fountain Valley	Ward Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
71	Fountain Valley	Ward Street	Furnish and install new Fiber Optic Patch Cable (SC-SC, 2 Meter)	EA	2
72	Fountain Valley	Ward Street	Furnish and install new CAT5E Ethernet Patch Cable (3 feet)	EA	2
73	Fountain Valley	Ward Street	Furnish and install new 120-SMFO cable in existing conduit (Ward to Brookhurst), fiber splicing, terminations, and conduit repair	EA	3000
74	Fountain Valley	Ward Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
75	Fountain Valley	Ward Street	Furnish and install new #6E Pullbox + conduit sweeps	EA	1
76	Fountain Valley	Ward Street	Furnish and install new Video Detection System and Cameras (Econolite Autoscope Encore or Iteris Vantage Edge w/EdgeConnect module)	EA	1
77	Fountain Valley	Los Jardines West	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
78	Fountain Valley	Los Jardines West	Replace existing CCTV camera w/new Bosch MIC CCTV Camera (latest model)	EA	1

Item No.	Agency / Contractor / Vendor	WARNER Avenue @	Item Description	Unit	Qty
79	Fountain Valley	Los Jardines West	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
80	Fountain Valley	Los Jardines West	Furnish and install new Fiber Optic Patch Cable (SC-SC, 2 Meter)	EA	2
81	Fountain Valley	Los Jardines West	Furnish and install new CAT5E Ethernet Patch Cable (3 feet)	EA	2
82	Fountain Valley	Los Jardines West	Furnish and install new 120-SMFO cable in existing conduit (Los Jardines West to Ward), fiber splicing, terminations, and conduit repair	EA	1600
83	Fountain Valley	Los Jardines West	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
84	Fountain Valley	Los Jardines West	Furnish and install new #6E Pullbox + conduit sweeps	EA	1
85	Fountain Valley	Los Jardines West	Furnish and install new Video Detection System and Cameras (Econolite Autoscope Encore or Iteris Vantage Edge w/EdgeConnect module)	EA	1
86	Fountain Valley	Euclid Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
87	Fountain Valley	Euclid Street	Furnish and install new Polara Accessible Pedestrian Push Button Modules + System (Polara iNavigator 2-Wire System)	EA	1
88	Fountain Valley	Euclid Street	Replace existing CCTV camera w/new Bosch MIC CCTV Camera (latest model)	EA	1
89	Fountain Valley	Euclid Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
90	Fountain Valley	Euclid Street	Furnish and install new Fiber Optic Patch Cable (SC-SC, 2 Meter)	EA	2
91	Fountain Valley	Euclid Street	Furnish and install new CAT5E Ethernet Patch Cable (3 feet)	EA	2
92	Fountain Valley	Euclid Street	Furnish and install new 120-SMFO cable in existing conduit (Euclid to Los Jardines West), fiber splicing, terminations, and conduit repair	EA	1500
93	Fountain Valley	Euclid Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
94	Fountain Valley	Euclid Street	Furnish and install new #6E Pullbox + conduit sweeps	EA	1
95	Fountain Valley	Euclid Street	Furnish and install new Video Detection System and Cameras (Econolite Autoscope Encore or Iteris Vantage Edge w/EdgeConnect module)	EA	1
96	Fountain Valley	Mount Hope	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
97	Fountain Valley	Mount Hope	Furnish and install new Polara Accessible Pedestrian Push Button Modules + System (Polara iNavigator 2-Wire System)	EA	1



Item No.	Agency / Contractor / Vendor	WARNER Avenue @	Item Description	Unit	Qty
98	Fountain Valley	Mount Hope	Replace existing CCTV camera w/new Bosch MIC CCTV Camera (latest model)	EA	1
99	Fountain Valley	Mount Hope	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
100	Fountain Valley	Mount Hope	Furnish and install new Fiber Optic Patch Cable (SC-SC, 2 Meter)	EA	2
101	Fountain Valley	Mount Hope	Furnish and install new CAT5E Ethernet Patch Cable (3 feet)	EA	2
102	Fountain Valley	Mount Hope	Furnish and install new 120-SMFO cable in existing conduit (Mt Hope to Euclid), fiber splicing, terminations, and conduit repair	EA	1600
103	Fountain Valley	Mount Hope	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
104	Fountain Valley	Mount Hope	Furnish and install new #6E Pullbox + conduit sweeps	EA	1
105	Fountain Valley	Mount Hope	Furnish and install new Video Detection System and Cameras (Econolite Autoscope Encore or Iteris Vantage Edge w/EdgeConnect module)	EA	1
106	Fountain Valley	Newhope Street	Furnish and install new McCain 2070 ATC Controller w/latest Omni software	EA	1
107	Fountain Valley	Newhope Street	Furnish and install new Polara Accessible Pedestrian Push Button Modules + System (Polara iNavigator 2-Wire System)	EA	1
108	Fountain Valley	Newhope Street	Replace existing CCTV camera w/new Bosch MIC CCTV Camera (latest model)	EA	1
109	Fountain Valley	Newhope Street	Furnish and install new GTT GPS 764 Phase Selector Complete EVP Preemption, including GPS unit	EA	1
110	Fountain Valley	Newhope Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
111	Fountain Valley	Newhope Street	Furnish and install new Fiber Optic Patch Cable (SC-SC, 2 Meter)	EA	2
112	Fountain Valley	Newhope Street	Furnish and install new CAT5E Ethernet Patch Cable (3 feet)	EA	2
113	Fountain Valley	Newhope Street	Furnish and install new 120-SMFO cable in existing conduit (Newhope to Mt Hope), fiber splicing, terminations, and conduit repair	EA	1600
114	Fountain Valley	Newhope Street	Furnish and install new Video Detection System and Cameras (Econolite Autoscope Encore or Iteris Vantage Edge w/EdgeConnect module)	EA	1
115	Santa Ana	Harbor Boulevard	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
116	Santa Ana	Harbor Boulevard	Furnish and install new BlueToad Spectra Bluetooth Travel Time System	EA	1

Item No.	Agency / Contractor / Vendor	WARNER Avenue @	Item Description	Unit	Qty
117	Santa Ana	Harbor Boulevard	Furnish and install new Polara Accessible Pedestrian Push Button Modules + System (Polara iNavigator 2-Wire System)	EA	1
118	Santa Ana	Harbor Boulevard	Furnish and install new Econolite AutoScope Vision or Iteris Vantage Next Video Detection System and Cameras	EA	1
119	Santa Ana	Yale Street	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
120	Santa Ana	Yale Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
121	Santa Ana	Yale Street	Furnish and install new #6E pullbox + conduit sweeps	EA	1
122	Santa Ana	Yale Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
123	Santa Ana	Susan Street	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
124	Santa Ana	Susan Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
125	Santa Ana	Susan Street	Furnish and install new #6E pullbox + conduit sweeps	EA	1
126	Santa Ana	Susan Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
127	Santa Ana	Fairview Street	Furnish and install new Blue Toad Spectra Bluetooth Travel Time System	EA	1
128	Santa Ana	Fairview Street	Furnish and install new 3" Schedule 80 Conduit (Fairview to Bristol) + pullboxes, pot holes, video inspection of sewer laterals, and concrete repair	EA	7150
129	Santa Ana	Fairview Street	Furnish and install new 120-SMFO cable in new conduit (Fairview to Bristol), fiber splicing, and terminations	EA	8500
130	Santa Ana	Fairview Street	Furnish and install new #6E pullbox + conduit sweeps (Fairview to Bristol)	EA	6
131	Santa Ana	Fairview Street	Furnish and install new #6 Pullbox + conduit sweeps (Fairview to Bristol)	EA	25
132	Santa Ana	Fairview Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
133	Santa Ana	Fairview Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, SMFO-12 Drop Cable, splicing, and termination	EA	1
134	Santa Ana	Fairview Street	Furnish and install new Polara Accessible Pedestrian Push Button Modules + System (Polara iNavigator 2-Wire System)	EA	1



Item No.	Agency / Contractor / Vendor	WARNER Avenue @	Item Description	Unit	Qty
135	Santa Ana	Fairview Street	Furnish and install new Econolite AutoScope Vision or Iteris Vantage Next Video Detection System and Cameras	EA	1
136	Santa Ana	Greenville Street	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
137	Santa Ana	Greenville Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
138	Santa Ana	Greenville Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
139	Santa Ana	Raitt Street	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
140	Santa Ana	Raitt Street	Furnish and install new Axis Q6155-E CCTV Camera	EA	1
141	Santa Ana	Raitt Street	Furnish and install new 4" Schedule 80 Conduit (at intersection) + pullboxes, pot holes, video inspection of sewer laterals, and concrete repair	EA	400
142	Santa Ana	Raitt Street	Furnish and install new #6 Pullbox + conduit sweeps	EA	8
143	Santa Ana	Raitt Street	Intersection Rewire	EA	1
144	Santa Ana	Raitt Street	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
145	Santa Ana	Raitt Street	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
146	Santa Ana	Raitt Street	Furnish and install new Polara Accessible Pedestrian Push Button Modules + System (Polara iNavigator 2-Wire System)	EA	1
147	Santa Ana	Raitt Street	Furnish and install new Econolite AutoScope Vision or Iteris Vantage Next Video Detection System and Cameras	EA	1
148	Santa Ana	Pedestrian Crossing	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
149	Santa Ana	Pedestrian Crossing	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1
150	Santa Ana	Pedestrian Crossing	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
151	Santa Ana	Pacific Avenue	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
152	Santa Ana	Pacific Avenue	Furnish and install new Fiber Optic Ethernet Switch (Etherwan EX71802-0VB w/Hardened Power Supply) and 4 SFPs (2-Gbps & 2-100Mbps)	EA	1

Item No.	Agency / Contractor / Vendor	WARNER Avenue @	Item Description	Unit	Qty
153	Santa Ana	Pacific Avenue	Furnish and install new Fiber Distribution Unit, Splice enclosure, 12-SMFO Drop Cable, splicing, and termination	EA	1
154	Santa Ana	Bristol Street	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
155	Santa Ana	Bristol Street	Furnish and install new BlueToad Spectra Bluetooth Travel Time System	EA	1
156	Santa Ana	Bristol Street	Furnish and install new Econolite AutoScope Vision or Iteris Vantage Next Video Detection System and Cameras	EA	1
157	Santa Ana	Flower Street	Furnish and install new Polara Accessible Pedestrian Push Button Modules + System (Polara iNavigator 2-Wire System)	EA	1
158	Santa Ana	Flower Street	Furnish and install new Econolite AutoScope Vision or Iteris Vantage Next Video Detection System and Cameras	EA	1
159	Santa Ana	Main Street	Furnish and install new BlueToad Spectra Bluetooth Travel Time System	EA	1
160	Santa Ana	Main Street	Furnish and install new Polara Accessible Pedestrian Push Button Modules + System (Polara iNavigator 2-Wire System)	EA	1
161	Santa Ana	Main Street	Furnish and install new Econolite AutoScope Vision or Iteris Vantage Next Video Detection System and Cameras	EA	1
162	Santa Ana	Maple Bike Trail	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
163	Santa Ana	Halladay Street	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
164	Santa Ana	Standard Avenue	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
165	Santa Ana	Fire Station	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
166	Santa Ana	Grand Avenue	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
167	Santa Ana	Grand Avenue	Furnish and install new BlueToad Spectra Bluetooth Travel Time System	EA	1
168	Santa Ana	Wright Street	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
169	Santa Ana	Pullman Street	Replace existing cabinet w/new Type 332L Cabinet on new foundation	EA	1
170	Santa Ana	Pullman Street	Furnish and install new Econolite 2070-1C CPU w/latest EOS software	EA	1
171	Santa Ana	Pullman Street	Furnish and install new Type III Service Cabinet, Foundation, Conduits and Pullboxes, including an estimate for SCE conduit and fees	EA	1
172	Santa Ana	TMC	Furnish, install, and configure Centrac Signal Performance Measures Module and software support	EA	1