

ATTACHMENT A
Scope of Work

The services to be performed by Consultant will consist of services requested by the MTC Program Manager or a designated representative including, but not limited to, the following:

0. Program Kick-Off

At the beginning of each annual cycle, Consultant shall meet with the MTC Program Manager to discuss the program guidelines, standardization of services, deliverable formats, invoicing and project administration. The deliverables shall be named and formatted as specified by the MTC Program Manager. The project administration guidelines applicable to the particular Cycle of PASS projects shall be reviewed and discussed at this meeting.

1. Project Start-Up

- 1.1. Project Kick-Off Meeting – Consultant shall schedule a meeting with the project sponsor, Caltrans and other stakeholders, and the MTC Program Manager or designated representative to kick-off the project. This meeting helps with establishing communication channels and protocols; discuss in detail the scope of work, schedule, and budget; understand the needs and requirements of all stakeholders; gather available information; and obtain a thorough understanding of the goals of the project.
- 1.2. Workscope, Schedule, and Budget – Consultant shall prepare a detailed Workscope, Schedule, and Budget (WSB) for review and approval by the project sponsor, other involved agencies, and the MTC Program Manager. Consultant shall finalize the WSB based on comments received from the project sponsor, other involved agencies, and the MTC Program Manager. This deliverable is invoiced after the approval of the Final WSB.
- 1.3. Consultant may be asked to assist the local agencies in completing the Caltrans permit application for installation of GPS clocks. Consultant shall also make any edits to the application upon feedback from Caltrans permit staff. This task shall be considered an additional service and the approx. level of effort shall be included in the WSB.
- 1.4. Consultant may be asked to subcontract an electrical contractor or other firms or agencies with required licenses and expertise to install GPS clocks or other communications equipment at Caltrans signals for certain projects. The subcontractor has to be approved by Caltrans and MTC, and shall be required to secure a Caltrans permit. This task shall be considered an additional service and the Consultant shall be reimbursed for actual costs billed by the subcontractor.

Deliverable 1A:	Draft Workscope, Schedule, and Budget
Deliverable 1B:	Final Workscope, Schedule, and Budget

2. Analysis of Existing Conditions

Consultant shall collect and analyze all information necessary to thoroughly understand existing traffic conditions in the study area. This stage of the project includes data collection, field reviews, seeking input from all stakeholders, signal maintenance staff, contractors, vendors, etc. regarding the pertinent issues in the project corridor. This report helps the stakeholders understand the existing conditions on the corridor like traffic patterns, volumes, peak hours, bottlenecks, collision history, etc.

- 2.1. Data Collection – Consultant shall collect existing conditions data including, but not limited to, the following:
 - 2.1.1. From the project sponsor and other involved agencies, Consultant shall collect existing timing sheets, existing coordination plans, traffic signal as-built drawings, aerial photos and maps, collision diagrams for the study intersections, Synchro and other computer models and data, if available.
 - 2.1.2. From the project sponsor and other involved agencies, including transit agencies, if any, Consultant shall collect signal timing and signal priority preferences, including, but not limited to, those related to pedestrian and bicycle timing, leading and lagging left-turn phasing, and conditional service, as well as the timing optimization software preference and version.
 - 2.1.3. Consultant shall conduct peak period turning movement counts at all study intersections, including pedestrian and bicycle counts, and seven-day 24-hour machine counts (ADT Counts) at strategic locations to determine periods of coordination. All counts shall be taken during times and days that are representative of the times and days for which coordination plans shall be developed. No counts shall be taken during the weeks with holidays or school breaks, and on the days that construction activity or major incidents affect the regular traffic patterns.
 - 2.1.4. Consultant shall collect the turning movement counts along with bicycle and pedestrian counts using video data collection technologies. MTC prefers this method as the videos helps with the validation of the data. Consultant shall provide access to the count data and videos, via an FTP site or other web-portals approved by all of the stakeholders. Other data collection methods shall be considered based on the preference of the project sponsor or if video data collection is not feasible. It is preferred that all the counts are provided in PDF, MS Excel and/or Synchro computer models.
 - 2.1.5. Consultant shall also collect the intersection and corridor-wide collision data for at least three years from the local agencies or other available sources. This data shall be summarized and evaluated to identify any signal timing practices that shall help reduce similar potential incidents in the future.

- 2.1.6. Consultant shall include the costs for collecting the seven-day 24-hour machine counts (ADT Counts) as a part of the project at the rate of one ADT count for every four project signals. Any additional counts have to be approved by MTC, and billed at a negotiated rate. Consultant shall include the costs for collecting the turning movement counts with bicycle and pedestrian counts at all project intersections.
 - 2.1.7. Consultant shall provide to the MTC Program Manager electronic files of all turning movement counts, bicycle and pedestrian counts, ADT counts, collision data, all developed Synchro models, controller and cabinet photos, and any other project related data when requested or at the end of the project, whichever is earliest.
 - 2.1.8. Consultant shall conduct a field review of all study intersections and street segments to verify lane geometry, speed limits, storage lengths, signal phasing, distances between intersections, and crosswalk lengths, even if the information is available through other sources such as aerial photos and speed surveys. Consultant shall conduct a extensive field reviews at key intersections to measure queue lengths and saturation flows for heavy movements.
 - 2.1.9. Consultant shall conduct a field review to observe typical traffic patterns during the peak periods for which coordination plans shall be developed. Consultant shall note 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 unsignalized intersections, including interchanges; parking maneuvers; and presence and location of bus stops.
 - 2.1.10. Consultant shall verify signal coordination and transit priority capabilities of existing equipment and communications infrastructure. Consultant shall take digital photos of the controller cabinet and the contents of the controller cabinet, unless waived by the system owner and/or MTC. The digital photos may be taken while collecting traffic counts, conducting field observations or implementing the timing plans, as per directions from the MTC Program Manager.
 - 2.1.11. Consultant shall conduct travel time and delay studies, including the number of stops, during times and days that are representative of the times and days for which coordination plans shall be developed. A minimum of four runs shall be conducted for each direction for each peak period. Travel time and delay studies shall be conducted using the floating car method. The time of performance of the travel time and delay studies shall be defined at the kick-off meeting.
- 2.2. Analysis of Existing Conditions – Consultant shall analyze the data obtained from Task 2.1 as follows:

- 2.2.1. As permitted by the project stakeholders, Consultant shall review initial and actuated settings for each study intersection to identify opportunities to minimize delay during non-coordination periods and enhance pedestrian and bicyclist safety. The analysis shall include, but not be limited to, review of minimum and maximum green settings; yellow and red times; pedestrian timing; and gap, extension, and reduction settings.
- 2.2.2. Consultant shall review collision diagrams for the study intersections, if available, to identify patterns that are susceptible to correction through signal timing.
- 2.2.3. Using software specified by the project sponsor, Consultant shall develop a model of the study area and calibrate the model based on field observations of existing conditions. Signal coordination optimization software may include, but not be limited to, Synchro, TRANSYT 7-F, or PASSER. Transit signal priority modeling software may include, but not be limited to, VISSIM or Paramics. Consultant shall calibrate the model based on travel time and delay studies and field observations of queue lengths and saturation flows for heavy movements at key intersections.
- 2.2.4. Consultant shall summarize the results of the existing conditions analyses in Deliverable 2A: Draft Existing Conditions Report. At a minimum, the report shall include: description of the roadway network and surrounding land uses, including a map showing the study intersections; description of traffic volumes, including day-to-day variability and directionality; description of traffic signal controllers and communication capabilities; identification of factors that are expected to affect progression; results of analysis of initial and actuated settings; description of collision patterns that may be susceptible to correction through signal timing; and model calibration results, including a summary of changes to the optimization software's default values.
- 2.2.5. Consultant shall meet with the project sponsor and other involved agencies to present and discuss the analyses and field observations, if required. Consultant shall finalize the report based on comments received from the project sponsor, other involved agencies, and the MTC Program Manager. Consultant shall submit a Response to Comments report addressing all the comments/concerns received from all stakeholders, while submitting the final Deliverable 2B: Final Existing Conditions Report.

Deliverable 2A:	Draft Existing Conditions Report
Deliverable 2B:	Final Existing Conditions Report, including computer model with existing timings

3. *Development of Recommendations*

- 3.1. Consultant shall develop the optimal time-of-day coordination plans after analyzing the signal grouping; phasing and phase sequence, including conditional service; cycle lengths, splits, offsets; collision diagrams/data and other available data. The Consultant shall meet with the project stakeholders to discuss their preference for signal grouping and cycle lengths before submitting the Draft Recommendations. This shall be done by submitting an interim deliverable on signal groupings and cycle lengths for review by project stakeholders.
- 3.2. Consultant shall develop recommendations of optimal initial and actuated settings; time-of-day coordination plans and hours of coordinated operation; and transit signal priority plans and hours of operation, if applicable.
- 3.3. Consultant shall summarize recommendations in the Deliverable 3A: Draft Recommendations Report. The report shall also include a comparison of existing and proposed timings and a description of expected improvements.
- 3.4. Consultant shall follow the applicable state and federal standards in making these recommendations. Any exceptions need to be discussed in detail with the project sponsors and stakeholders, and the MTC Program Manager.
- 3.5. Consultant shall meet with the project sponsor and other involved agencies to discuss the recommendations, if required. Consultant shall finalize the report after addressing the comments received from all of the project stakeholders. Consultant shall submit to all stakeholders a Response to Comments sheet addressing all the comments/concerns received, while submitting the final Deliverable 3B: Final Recommendations Report.

Deliverable 3A:	Draft Recommendations Report
Deliverable 3B:	Revised Recommendations Report, including computer model with recommended timings

4. *Implementation and Evaluation*

- 4.1. Consultant shall develop the marked-up final timing sheets for implementation in the format of choice of the project sponsor.
- 4.2. Consultant shall prepare for review and approval by the project sponsor and other involved agencies appropriate timing sheets based on the approved timing plans. Consultant shall revise the timing sheets based on comments received from the project sponsor and other involved agencies.
- 4.3. Consultant shall assist with the preparation and approval of the Caltrans permit for projects involving installation of GPS clocks at Caltrans signals if needed. MTC will procure all the GPS clocks required for the project. The GPS clocks shall be installed by

the electrical contractor at Caltrans signals. The Caltrans traffic operations staff will be present during the installation to configure the clocks. MTC will be actively involved to coordinate this task with all stakeholders.

- 4.4. Consultant shall implement, or assist agency staff in the implementation of, the new settings and timings. Implementation may have to be done in the field or from a central location, depending upon communication capabilities and agency preferences.
- 4.5. Consultant shall fine-tune, or assist agency 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. This also requires additional field visits to verify and assess any changes made during the fine-tuning process.
- 4.6. Consultant shall conduct travel time and delay studies, including number of stops, at the key corridors identified under Task 2.1.7. Travel time and delay studies shall be conducted during times and days that are representative of the times and days for which coordination plans were developed. A minimum of four runs shall be conducted for each direction for each peak period. Travel time and delay studies shall be conducted using the floating car method.
- 4.7. Consultant shall calculate measures of effectiveness of the improved system, including delay, number of stops, travel time, fuel consumption, emissions, benefit-cost, and cost effectiveness for emissions reductions. The methodology for calculating fuel consumption, emissions, benefit-cost, and cost effectiveness for emissions reductions will be specified by the MTC Program Manager.
- 4.8. Consultant shall also calculate the measures of effectiveness for transit achieved with the signal coordination for certain projects, as identified in the kick-off meetings. Only travel-time and speed shall be evaluated as a part of this effort since fuel consumption and emissions reduction benefits are almost negligible with many transit agencies using zero-emission or hybrid vehicles. The Benefit-Cost analysis methodology shall be developed by MTC to incorporate these benefits. The level of effort involved for this task is considered as an additional service and shall be finalized with the WSB.
- 4.9. Consultant shall submit the Deliverable 4B: Final Project Report, which shall include but not be limited to: the final periods of coordination; changes between the timings recommended under Task 3 and the final timings that were implemented; the number of locations where changes were made to better accommodate pedestrians and/or bicyclists; and the results of the evaluation of measures of effectiveness.
- 4.10. Consultant shall assist MTC in producing the Fact Sheets for each project by providing the required maps, tables, data or text as requested by the MTC Program Manager.

Deliverable 4A:	Preliminary Implementation and Fine-tuning
Deliverable 4B:	Final Project Report with Benefit-cost Analysis, including the computer models

5. *Additional Services (AS)*

- 5.1. In addition to the basic signal coordination, the scope of the PASS program includes providing additional services like developing incident management flush plans, transit signal priority plans, traffic responsive timing plans, weekend timing plans, additional timing plans, conducting technical studies, feasibility studies, an evaluation of transit benefits, etc. These services shall be requested by the project sponsor in the application and shall be included in the WSB, contingent on approval by MTC. Consultant may also be requested to perform these additional services for any projects retimed in the last two years under the PASS. Such services may increase the scope of the work to include additional meetings, additional data collection, field visits, technical analyses, studies, fine-tuning, conditional diagrams, updating Visio coversheets, etc.
- 5.2. Upon MTC approval, Consultant shall include a detailed description of the scope of the additional service, a staffing plan, and a level of effort estimate in its WSB. The scope and budget of these services shall be negotiated on a case-by-case basis. If these tasks cannot be reasonably negotiated, MTC, at its sole discretion, can withdraw the project assignment to the Consultant and assign a different Consultant to the project. The payment schedule shall be negotiated to compensate for the tasks completed and finalized in the WSB. Additional services may also be requested by Consultant after the WSB has been approved by requesting an amendment to the approved WSB. After MTC approval, any change to the scope or budget must be included in a revised WSB and sent to all project stakeholders.
- 5.3. Consultant may be asked to assist the local agencies in completing the Caltrans permit application for the installation of GPS clocks. Consultant shall also make any edits to the application upon feedback from the Caltrans permit staff. This task shall be considered an additional service and the level of effort shall be included in the WSB.
- 5.4. Consultant may be asked to coordinate the installation of GPS clocks with the electrical contractor.
- 5.5. Consultant may be asked to subcontract an electrical contractor or other firms or agencies with required licenses and expertise to install GPS clocks or other communications equipment at Caltrans signals for certain projects. The subcontractor has to be approved by Caltrans and MTC, and shall be required to secure a Caltrans permit. This task shall be considered an additional service and the Consultant shall be reimbursed for actual costs billed by the subcontractor.
- 5.6. Consultant may be asked to prepare presentation materials and/or make formal presentations on the PASS project to various policy boards and commissions. This task

shall be considered an additional service and the level of effort shall be negotiated and included in the WSB.

- 5.7. Consultant may be asked to assist the MTC Program Manager with developing outlines, identifying project examples and speakers, coordinating with speakers, and preparing or presenting materials at seminars or workshops conducted by MTC in accordance with the Arterial Operations program objectives. The budget and payment schedule for these additional services shall be based on the level of effort required for the tasks and outlined in a separate WSB that shall be negotiated and approved by MTC.

6. Reduced Services

Consultant may be requested to perform only some of the services above in cases where some services are already available, or MTC, Caltrans or Client Jurisdiction staff wishes to perform them themselves. Should reduced services be requested, Consultant shall identify in its WSB which tasks shall be performed by the Consultant and which shall be performed by MTC, Caltrans or Client Jurisdictions. The fee for reduced services shall be a percentage of the base fee per intersection or a negotiated amount, which is commensurate with the proportion of services to be performed by Consultant. Deliverables shall be negotiated on a case-by-case basis.

ATTACHMENT B
Project Schedule

PASS FY13/14

<u>Task</u>	<u>Deliverables (#)</u>	<u>Completion Date</u>
1.	Draft and Final Workscope, Schedule and Budget (#1A and #1B)	August 2013
2.	Draft Existing Conditions Report (#2A) Final Existing Conditions Report (#2B)	October 2013
3.	Draft Recommendations Report (#3A) Revised Recommendations Report (#3B)	February 2014
4.	Preliminary Implementation and Fine-tuning (#4A) Final Project Report with Benefit-cost Analysis (#4B)	June 2014
5.	Additional Services	TBD
6.	Reduced Services	TBD