

SAN GABRIEL VALLEY TRAFFIC FORUM

DRAFT OPERATION AND MAINTENANCE PLAN (Deliverable 2.7.2)

FINAL

Prepared for:

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August 15th, 2006

TABLE OF CONTENTS		PAGE #
1. INTRODUCTION.....		1-1
1.1 Agency Level Definitions		1-2
1.2 Purpose of Document.....		1-4
1.3 Organization of Document.....		1-4
1.4 Referenced Documents		1-5
2. ANNUAL OPERATIONS AND MAINTENANCE HOURS AND COSTS.....		2-1
2.1 General Assumptions		2-1
2.2 O&M Cost Development Methodology.....		2-2
2.3 Summary and Cost Estimate (by Agency).....		2-3
3. OVERVIEW OF OPERATIONS AND MAINTENANCE TASKS		3-1
4. LIST OF ACRONYMS		4-1

LIST OF TABLES		PAGE #
Exhibit 1.1 – Countywide Information Exchange Network (IEN)		1-2
Exhibit 1.2 – SGVTF Agency/Level Mapping		1-4
Exhibit 2.1 – O&M Employee Category Descriptions and Labor Rates		2-2
Exhibit A.1 – Level 1 Local City Control Site Staffing Cost Estimate		4-1

1. INTRODUCTION

The San Gabriel Valley Traffic Forum (SGVTF) Project is one of the planned Intelligent Transportation Systems (ITS) improvement projects that the Los Angeles County Department of Public Works (County) is developing as part of the Traffic System Management (TSM) program in order to improve traffic flow and enhance arterial capacity in a cost-effective way where roadway widening is not possible. The purpose of the SGVTF Project is to design, develop, and deploy an Advanced Transportation Management System (ATMS) that can be tailored to each Agency's operational needs so that traffic signals can be synchronized and ITS systems integrated across jurisdictional boundaries. The SGVTF Project focuses on the specific needs of each Agency to manage their ATMS and recommends improvements to field infrastructure (e.g., controllers, detection systems, communications, etc.) and centralized Traffic Control Systems (TCSs) and/or Traffic Management Centers (TMCs) to meet those requirements. When the SGVTF is successfully completed, each of the Agencies responsible for traffic signal operations will have full access to an ATMS that monitors and controls the traffic signals within their jurisdiction. In addition, Agencies will be able to synchronize their signals and exchange traffic information in real-time with neighboring Agencies through the Countywide Information Exchange Network (IEN). This will allow the Agencies to respond to recurrent and non-recurrent congestion in a coordinated fashion across jurisdictional boundaries.

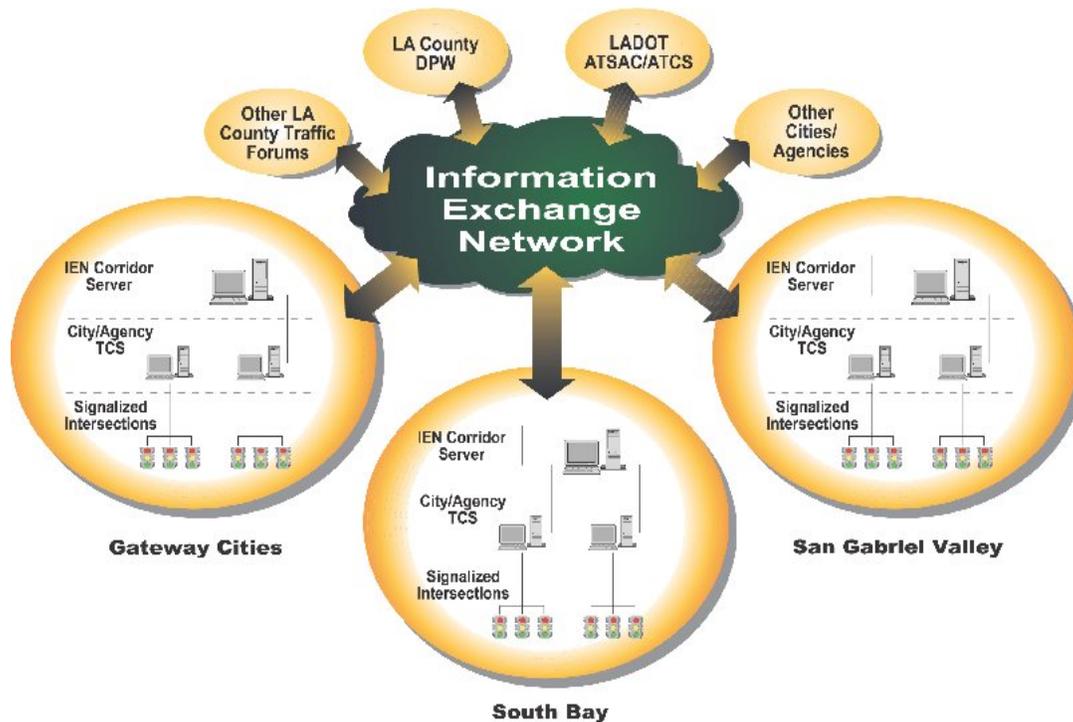
The SGVTF Project area ranges from Cities bordering the California State Route (CA SR) 110 and I-710 freeways to the west, I-210 freeway to the north, CA SR 57 freeway to the east, and the CA SR 60 freeway to the south. It encompasses 24 municipalities as well as unincorporated portions of Los Angeles County. The traffic signals in this Region are operated by many of the individual Agencies, County, and Caltrans District 7.

Developed by the County, the Countywide Information Exchange Network (IEN) is the integrated system framework that connects participating Agency ATMSs into a Regional network to support the operational goals identified above. The Countywide IEN supports traffic signal operations at the Local level, Corridor level, and Regional level. The SGVTF Project assumes the availability of the Countywide IEN at the Corridor and Regional levels. Therefore, the SGVTF Project is focused on the selection of TCSs and the integration of those systems to the Countywide IEN at the Local level. The eventual ATMS design for the SGVTF will take into account the interface to the IEN and its requirements at the Local level and will encompass the following six (6) core components:

- ATMS and/or TCS (Individual Agency)
- Detection and Surveillance
- TMC and/or Workstation Layouts (ATMS and/or IEN)
- Communications Network
- SGVTF Participation/Coordination (City-specific and/or SGVTF-Regional integration)
- Operations and Maintenance (O&M)

As depicted in Exhibit 1.1, the Countywide IEN comprises a series of computer servers, communication networks, and software applications that integrates these components for the collection and transfer of data to support Corridor and Regional functions throughout Los Angeles County.

Exhibit 1.1 – Countywide Information Exchange Network (IEN)



1.1 AGENCY LEVEL DEFINITIONS

Four (4) Agency roles or “Levels” have been defined as well as a planning-related Level (Region Coordinator) for the implementation of the LCCS based upon the level of interaction an Agency will have in managing its traffic operations:

Level 1

- Agency does NOT operate its traffic signals
 - Agency wants to be “Agency B” on another Agency’s ATMS
 - Another Agency operates its traffic signals (e.g., LA County DPW)
- Provided with an IEN W/S to monitor traffic signals & incident management activities
- No separate ATMS W/S provided

Level 2A

- Agency passively manages its traffic signals
 - Establish initial signal timings, monitor system status daily, etc.
 - May operate on an exception/as-needed basis
 - Monitor mainly for alarms & malfunctions

- Agency wants to be “Agency B” on another Agency’s ATMS
- Provided with an IEN W/S to monitor traffic signals & incident management activities [Regional view]
- Maintains a separate ATMS W/S connected to “host” Agency’s ATMS [Local view]

Level 2B

- Agency actively manages & operates its own ATMS
 - Actively manages ATMS during exceptions
 - Passively manages ATMS during AM & PM peak periods
- Agency may operate some other ITS devices (small amount)
- Agency may operate other Agencies’ traffic signals (Level 1)
- Agency may “host” other Agencies’ traffic signals (Level 2A)
- Maintains an LCCS facility to manage traffic signals & incident management activities
 - IEN W/S [Regional view]
 - ATMS W/S [Local view]
 - Interface between the ATMS & IEN

Level 3

- Agency actively manages its own ATMS & other ITS devices (large amount)
 - Typically AM & PM peak period traffic operations & incidents
 - May support 24/7 operations
- Agency may operate other Agencies’ traffic signals (Level 1)
- Agency may “host” other Agencies’ traffic signals (Level 2A)
- Agency has a TMC from which to operate its ATMS, the IEN, & other ITS devices
- Maintains an TMC/LCCS facility to manage ATMS & incident management activities
 - IEN W/S (Regional view)
 - ATMS W/S (Local view)
 - Interface between the ATMS & IEN

Each Agency has been mapped to one of these Levels based upon the types of traffic and incident management functions and operations the Agency is proposed to be performing following the ATMS implementation and not what is being done today. Exhibit 1.2 presents the Agency/Level mapping for the SGVTF.

Exhibit 1.2 – SGVTF Agency/Level Mapping

Level 1	Level 2A	Level 2B	Level 3
La Puente*	Azusa	Alhambra	Caltrans*
San Marino	Baldwin Park	Arcadia	LA County DPW
South El Monte*	Duarte	Covina	Pasadena*
South Pasadena	El Monte	Glendora	
Temple City	Monrovia	Irwindale	
	Montebello*	Rosemead	
	Monterey Park	San Dimas*	
	San Gabriel	West Covina	

*Will not be receiving funding at this stage of SGVTF Project

1.2 PURPOSE OF DOCUMENT

The Operations and Maintenance (O&M) Plan is one of the several deliverables for Phase 1: Preliminary / Conceptual Design of the San Gabriel Valley Traffic Signal Forum (SGVTF) Advanced Traffic Management System (ATMS) Improvement Project.

The intent of this Deliverable 2.7.1 – Draft Operations and Maintenance (O&M) Plan is to describe roles and responsibilities and O&M cost estimates for participating Agencies within the SGVTF. It will ensure that the participating Agencies have been informed of, and have considered the long-term responsibilities and cost of managing their arterial ITS field devices and operation of Local City Control Site (LCCS) system(s).

1.3 ORGANIZATION OF DOCUMENT

This document is organized into the following sections:

- Section 1: Introduction
 - Presents the project overview and background, and introduces the document. It also presents a brief history of the project highlighting past deliverables and the role and relationship of the IEN for this project. In addition, it explains the different levels of the Countywide IEN and how it supports Agency traffic signal operations.
- Section 2: Annual Operations and Maintenance Hours and Costs
 - Presents a set of general assumptions used in the development of annual labor hour and cost estimates for O&M of the SGVTF ITS field elements and systems. It then takes those assumptions and explains the methodology and rationale for developing the annual labor hour and cost estimates. Finally, it presents an Agency by Agency summary of the O&M labor hour and cost estimates.
- Section 3: Overview of Operations and Maintenance Tasks
 - Provides a summary of O&M activities that are assumed in the labor cost estimate.
- Section 4: List of Acronyms

1.4 REFERENCED DOCUMENTS

The following documents have been used as reference material in the preparation of this report:

- San Gabriel Valley Traffic Forum Project
- Deliverable 2.1.2: Operational Objectives
- Deliverable 2.2.2: System Needs
- Deliverable 2.3.1: Concept-of-Operations
- Deliverable 2.6.5: Draft Conceptual Design
- Conceptual Design Workshop (November 10, 2005)

2. ANNUAL OPERATIONS AND MAINTENANCE HOURS AND COSTS

This section will cover the topic of staff time and associated labor costs for the operations and maintenance (O&M) of the ITS field elements, Field-to-Center (F2C) communications and the Advanced Transportation Management System (ATMS) deployed as part of the San Gabriel Valley Traffic Forum ATMS Improvement Project. This O&M Plan is based upon, and applies only to, the field devices, communications links and transportation management systems deployed as part of the currently approved \$8.1 million SGVTF budget. More specifically it only covers the O&M activities of the ITS deployed as part of this project. For example, where traffic signal controllers will be deployed that replace existing traffic signal controllers, O&M of the newly deployed traffic signal controllers is not accounted for in this document. The theory being that the current owner-operator Agency is currently bearing an O&M cost (directly, or indirectly) for the existing traffic signal controllers, and it would be misleading to imply that there is a “new” O&M cost associated with the newly deployed traffic signal controllers.

A summary of the O&M activities taken from the Concept-of-Operations (ConOps) document, Deliverable 2.3.1. will be included in this section. The ConOps document describes how the various ITS components deployed throughout the Corridor will be utilized, both by other systems and more importantly, by people and organizations. The SGVTF ConOps focused on tasks that need to be done, and by whom, to support collaborative traffic management in the San Gabriel Valley.

2.1 GENERAL ASSUMPTIONS

For the purposes of developing the O&M Plan a set of assumptions was established to give the SGVTF Agencies insight into how the O&M labor hours and labor costs were derived. The following bulleted items outline the general assumptions:

- The hours outlined in the ConOps document for various operations and maintenance tasks are used to establish the baseline level of activity for each SGVTF Agency. Those numbers are as follows:
 - Level 1 – 1 hour per week (52 hours per year)
 - Level 2A – 10 hours per week (520 hours per year)
 - Level 2B – 15 hours per week (780 hours per year)
 - Level 3 – 15 hours per week (780 hours per year)
- The hours outlined above do not include any time for closed circuit television (CCTV) camera and system O&M. Additional hours are assumed at a rate of 6 hours per year per camera for system and camera maintenance activities.
- A minimal level of staff training is included in the hours outlined above and allocated in the labor cost estimate.
- Agency Coordination activities are above and beyond the hours outlined above. The participating Agencies can assume a future level of Agency Coordination similar to what is occurring presently. It is possible that the focus may shift somewhat, but the level of effort should assume to remain the same.

- Each Agency will continue to be responsible for upkeep and maintenance of their own equipment, whether upgraded by this program or not and no additional maintenance expenses are anticipated for these upgrades.
- Agency coordination during implementation (coordination of equipment installation, etc.) is above and beyond the hours outlined above, as implementation coordination will presumably be a “one time, up-front” task of the deployment, and will not be a recurrent activity.
- A group of Agency employees or contractors, with different skill sets and labor rates, will be responsible for O&M activities, rather than a single individual, at a single labor rate.
- The members of the group of Agency employees, with their varying skill sets, will be referred to, and described as Employee Categories in Exhibit 2.1 below. The Employee Categories and their respective labor rates should be viewed as “composites” where, in an individual Agency, an Employee Category may actually be a combination of employees that share common or complementary duties, rather than an individual person. It may not necessarily be possible for each SGVTF Agency to specifically identify an individual person, but rather a set of employees that would carryout the duties of each of the identified Employee Categories.

2.2 O&M COST DEVELOPMENT METHODOLOGY

The O&M hours for each Agency were allocated among the three (3) different Employee Categories for each Agency, as described below. The allocation of time across the three employee categories is an inexact science, but is based on a combination of experience with operations and maintenance of traffic management systems and discussions with SGVTF project stakeholders. The assumed number of hours for each Employee Category is then multiplied by the respective labor rate and added together to derive total Annual Labor Costs. A description of each of the three Employee Categories and their assumed labor rates are contained in Exhibit 2.1.

Exhibit 2.1 – O&M Employee Category Descriptions and Labor Rates

Employee Category	Description	Assumed Hourly Labor Rate*
Operations Engineer	The Operations Engineer is assumed to be a traffic engineer, most likely employed by the Agency directly, but may be a contract employee. The Operations Engineer shall be skilled in traffic operations in general and likely has an expertise with traffic signal control systems and traffic signal controllers. Whether this person develops signal timing plans or not, he or she shall be familiar with their development and implementation. Typical Operations Engineer tasks would be to monitor and / or control traffic signals and field devices using the IEN and / or ATMS Workstations.	\$60

Employee Category	Description	Assumed Hourly Labor Rate*
System Administrator	The System Administrator is assumed to be a person (or persons) that may work in the Information Technologies (IT) or Information Systems (IS) department of the Agency. Network administration and /or desktop computer support may be this person's expertise in the overall Agency. Troubleshooting network and communications issues would be typical day-to-day duties. Alternatively, some of the duties of the System Administrator could be handled by or supplemented by personnel from a Traffic Engineering function within the Agency. Typical System Administrator tasks would include configuring and troubleshooting system servers and workstations, managing the local area network and providing assistance with management of Field-to-Center (F2C) and Center-to-Center (C2C) communication links.	\$40
Maintenance Technician	The Maintenance Technician is assumed to be a person (or persons) that performs maintenance and troubleshooting of field equipment and the communications links that connect the field equipment to the central system(s). Typical Maintenance Technician tasks would include monitoring field device malfunctions, generating maintenance reports, generating work orders and coordinating efforts to fix malfunctioning equipment and communication links.	\$30

* These rates assume staff that is directly employed by the Agency. Contracted labor rates may be higher.

2.3 SUMMARY AND COST ESTIMATE (BY AGENCY)

Using the General Assumptions outlined in Section 2.1 and the Methodology and labor rates in Section 2.2, an estimate of hours and labor costs for O&M of the SGVTF ITS project has been developed. A summary of the results, on an Agency-by-Agency basis, is contained in Exhibit A.1 and Exhibit 2.3. Exhibit 2.2 is a summary of the estimated Annual O&M Hours for each agency. Exhibit 2.3 is a summary of the estimated Annual O&M Cost for each agency. Both Tables break down the O&M activities into the following high-level activities: Central System Maintenance, Central System Operations, Field Maintenance and Training.

The Annual Labor Rates derived in Exhibit A.1 should be treated as an estimate, based on the assumptions outlined in Sections 2.1 and 2.2. Actual labor rates and the actual allocation of hours may vary somewhat from Agency to Agency. However, the figures developed for this O&M Plan are a good starting point to give the SGVTF Agencies the information they need to understand the level of commitment that will be required to properly operate and maintain the SGVTF ATMS deployments.

Some of the exceptions or deviations to the General Assumptions are noted here:

- The following agencies will not receive funding under the SGVTF project and therefore show zero hours and zero annual labor costs in Exhibit A.1 and Exhibit 2.3 respectively.
 - La Puente
 - South El Monte
 - Montebello

- San Dimas
- Pasadena
- Six (6) SGVTF Agencies will be deploying CCTV cameras as part of the SGVTF project. As noted in the General Assumptions, the ConOps document did not take into account the deployment of CCTV cameras. Therefore the O&M hours for CCTV are above and beyond the estimated O&M hours taken from the Con Ops document.
- Six (6) hours per camera per year for system-level and camera O&M activities has been added to the overall total hours for those Agencies deploying CCTV cameras as part of the SGVTF project. Agencies deploying CCTV cameras, the quantity of cameras and the number of hours added to their respective annual O&M hours are summarized as follows:

Level 2A

- El Monte – 1 CCTV Camera – six (6) additional hours of O&M per year
- Monrovia – 1 CCTV Camera – six (6) additional hours of O&M per year
- Monterey Park – 1 CCTV Camera – six (6) additional hours of O&M per year
- San Gabriel – 2 CCTV Cameras – twelve (12) additional hours of O&M per year

Level 2B

- Alhambra – 2 CCTV Cameras – twelve (12) additional hours of O&M per year
- Covina – 1 CCTV Camera – six (6) additional hours of O&M per year

An overview of the various O&M activities to be performed by the SGVTF partner agencies – the activities that are associated with this O&M Plan – is given in Section 3 of this document. The activities are arranged by Agency Level.

Exhibit 2.2 – Annual O&M Hours Per Agency

O&M Activities	Annual Staff Time Commitment																						
	Level 1					Level 2A								Level 2B								Level 3	Regional Coordinator
	La Puente	San Marino	South El Monte	South Pasadena	Temple City	Azusa	Baldwin Park	Duarte	El Monte*	Monrovia*	Montebello	Monterey Park*	San Gabriel*	Alhambra**	Arcadia	Covina**	Glendora	Irwindale	Rosemead	San Dimas	West Covina	Pasadena	LA County**
1) IEN Workstation	0	56	0	56	56	170	170	170	170	170	0	170	170	212	212	212	212	212	212	0	212	0	560
2) C2C Communications	0	12	0	12	12	48	48	48	48	48	0	48	48	72	72	72	72	72	72	0	72	0	160
3a) TCS or Connection to KITS	0	12	0	12	12	152	152	152	152	152	0	152	152	274	274	274	274	274	274	0	274	0	860
3b) Controller/Cabinet Upgrades	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4) F2C Communications	0	12	0	12	12	48	48	48	48	48	0	48	48	72	72	72	72	72	72	0	72	0	160
5a) CCTV Cameras (Field)	0	0	0	0	0	6	0	0	6	6	0	6	12	18	0	12	0	0	0	0	0	0	0
5b) Video Control System (VCS)	0	0	0	0	0	36	0	0	36	36	0	36	36	72	0	72	0	0	0	0	0	0	0
6) Staff Training	0	12	0	12	12	60	60	60	60	60	0	60	60	72	72	72	72	72	72	0	72	0	180
Total Hours Per Year	0	104	0	104	104	520	478	478	520	520	0	520	526	792	702	786	702	702	702	0	702	0	2080
Average Hours Per Week	0	2	0	2	2	10	9	9	10	10	0	10	10	15	14	15	14	14	14	0	14	0	40

Note:

1) The O&M activity hours are estimated annual hours per year

Legend

* Additional hours are added per year per CCTV camera maintenance

** Additional hours are added per year for CCTV camera maintenance & O&M for Video Control System (VCS)

Exhibit 2.3 – Annual O&M Costs Per Agency

O&M Activities	Annual Staff Cost Commitment																							
	Level 1					Level 2A								Level 2B								Level 3	Regional Coordinator	
	La Puente	San Marino	South El Monte	South Pasadena	Temple City	Azusa	Baldwin Park	Duarte	El Monte*	Monrovia*	Montebello	Monterey Park*	San Gabriel*	Alhambra**	Arcadia	Covina**	Glendora	Irwindale	Rosemead	San Dimas	West Covina	Pasadena	LA County**	
1) IEN Workstation	\$ -	\$2,760	\$ -	\$2,760	\$2,760	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ -	\$ 9,000	\$ 9,000	\$10,920	\$10,920	\$10,920	\$10,920	\$10,920	\$10,920	\$10,920	\$ -	\$10,920	\$ -	\$ 29,600
2) C2C Communications	\$ -	\$ 420	\$ -	\$ 420	\$ 420	\$ 1,680	\$ 1,680	\$ 1,680	\$ 1,680	\$ 1,680	\$ -	\$ 1,680	\$ 1,680	\$ 2,520	\$ 2,520	\$ 2,520	\$ 2,520	\$ 2,520	\$ 2,520	\$ 2,520	\$ -	\$ 2,520	\$ -	\$ 5,600
3a) TCS or Connection to KITS	\$ -	\$ 720	\$ -	\$ 720	\$ 720	\$ 8,120	\$ 8,120	\$ 8,120	\$ 8,120	\$ 8,120	\$ -	\$ 8,120	\$ 8,120	\$14,640	\$14,640	\$14,640	\$14,640	\$14,640	\$14,640	\$14,640	\$ -	\$14,640	\$ -	\$ 46,600
3b) Controller/Cabinet Upgrades	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
4) F2C Communications	\$ -	\$ 420	\$ -	\$ 420	\$ 420	\$ 1,680	\$ 1,680	\$ 1,680	\$ 1,680	\$ 1,680	\$ -	\$ 1,680	\$ 1,680	\$ 2,520	\$ 2,520	\$ 2,520	\$ 2,520	\$ 2,520	\$ 2,520	\$ 2,520	\$ -	\$ 2,520	\$ -	\$ 5,600
5a) CCTV Cameras (Field)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 180	\$ -	\$ -	\$ 180	\$ 180	\$ -	\$ 180	\$ 360	\$ 180	\$ -	\$ 180	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
5b) Video Control System (VCS)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,760	\$ -	\$ -	\$ 1,760	\$ 1,760	\$ -	\$ 1,760	\$ 1,760	\$ 3,520	\$ -	\$ 3,520	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 7,600
6) Staff Training	\$ -	\$ 520	\$ -	\$ 520	\$ 520	\$ 2,600	\$ 2,600	\$ 2,600	\$ 2,600	\$ 2,600	\$ -	\$ 2,600	\$ 2,600	\$ 3,120	\$ 3,120	\$ 3,120	\$ 3,120	\$ 3,120	\$ 3,120	\$ 3,120	\$ -	\$ 3,120	\$ -	\$ 7,800
Total Cost Per Year	\$ -	\$4,840	\$ -	\$4,840	\$4,840	\$25,020	\$23,080	\$23,080	\$25,020	\$25,020	\$ -	\$25,020	\$25,200	\$37,420	\$33,720	\$37,420	\$33,720	\$33,720	\$33,720	\$33,720	\$ -	\$33,720	\$ -	\$ 102,800
Average Cost Per Week	\$ -	\$ 93	\$ -	\$ 93	\$ 93	\$ 481	\$ 444	\$ 444	\$ 481	\$ 481	\$ -	\$ 481	\$ 485	\$ 720	\$ 648	\$ 720	\$ 648	\$ 648	\$ 648	\$ 648	\$ -	\$ 648	\$ -	\$ 1,977

Note:

1) The O&M activity hours are estimated annual hours per year

Legend

* Additional hours are added per year per CCTV camera maintenance

** Additional hours are added per year for CCTV camera maintenance & O&M for Video Control System (VCS)

3. OVERVIEW OF OPERATIONS AND MAINTENANCE TASKS

In general, many of the O&M Tasks will be performed by each Agency (Level 1, Level 2A, etc.), with the difference being the quantity of hours dedicated and the level of depth committed to each of the activities. The O&M Tasks listed below range from more basic activities to the more complex. The Level 1 and Level 2A Agencies will typically perform only the most basic activities, such as monitoring the IEN workstation performance and checking to make sure that signal system components are connected communicating with the IEN, though there may be some variation from Agency to Agency. The Level 2B and Level 3 Agencies will perform the more advanced and complex activities, such as monitoring TCS performance and taking corrective actions as needed and performing incident management.

Typical O&M Tasks to be performed by **Level 1** Agencies are summarized from the ConOps document as follows:

- Coordinate the implementation and maintenance of the IEN.
- Attend IEN training as needed.
- Ensure LCCS systems / equipment are secure.
- Monitor IEN workstation performance (e.g., workstation operating and presenting live data, etc.), contacting the Regional Coordinator (RC) if problems are noted.
- Monitor traffic operations as needed / desired using the IEN workstation. In general, Level 1 Agencies will refer issues to their ATMS hosting Agency.
- Check that signal system components are communicating with the IEN and are functioning properly, taking corrective actions as needed. For Level 1 Agencies, this task will be performed infrequently and issues will be referred to the ATMS hosting Agency.
- Ensure that the IEN is updated to reflect changes to the ITS inventory.
- Check that communications system components are connected to the IEN and functioning properly, taking corrective actions as needed. For Level 1 Agencies, this task will be performed infrequently and issues will be referred to the ATMS hosting Agency.
- Check that signal system components are communicating with the TCS and IEN and are functioning properly, taking corrective actions as needed. For Level 1 Agencies, this task will be performed infrequently and issues will be referred to the ATMS hosting Agency.
- Check that detection and surveillance system components are communicating with the IEN and functioning properly, taking corrective actions as needed. For Level 1 Agencies, this task will be performed infrequently and issues will be referred to the ATMS hosting Agency.
- Check that communications system components are connected to the IEN and functioning properly, taking corrective actions as needed. For Level 1 Agencies, this task will be performed infrequently and issues will be referred to the ATMS hosting Agency.

Typical O&M Tasks to be performed by **Level 2A** Agencies are summarized from the ConOps document as follows:

- Coordinate the implementation and maintenance of the IEN.
- Attend IEN training as needed.
- Ensure LCCS systems / equipment are secure.
- Coordinate the implementation and maintenance of the TCS.
- Attend TCS training as needed.
- Coordinate the development of scenario response plans for the TCS with the hosting Agency.
- Monitor IEN workstation performance (e.g., workstation operating and presenting live data, etc.), contacting the Regional Coordinator (RC) if problems are noted.
- Monitor local traffic operations and perform local incident management (e.g., implement scenarios, change signal timing plan, etc.) as needed. Level 2A Agencies will normally refer issues to their ATMS hosting Agency.
- Ensure that the IEN is updated to reflect changes to the ITS inventory.
- Ensure that the TCS is updated to reflect changes to the ITS inventory.
- Monitor TCS performance taking corrective actions, as needed (e.g., workstation working and presenting live data, etc.). In general L2A Agencies will contact their ATMS hosting Agency.
- Check that signal system components are communicating with the TCS and IEN and are functioning properly, taking corrective actions as needed. For Level 2A Agencies, this task will be performed as needed and issues will normally be referred to the ATMS hosting Agency.
- Check that detection and surveillance system components are communicating with the TCS and IEN and functioning properly, taking corrective actions as needed. For Level 2A Agencies, this task will be performed as needed and issues will normally be referred to the ATMS hosting Agency.
- Check that communications system components are connected to the TCS and IEN and functioning properly, taking corrective actions as needed. For Level 2A Agencies, this task will be performed as needed and issues will normally be referred to the ATMS hosting Agency.

Typical O&M Tasks to be performed by **Level 2B** Agencies are summarized from the ConOps document as follows:

- Coordinate the implementation and maintenance of the IEN.
- Attend IEN training as needed.
- Ensure LCCS systems / equipment are secure.

- Coordinate the implementation and maintenance of the TCS with the vendor. This is a baseline task for Agencies that already have a TCS. This may include support of ATMS hosted Agencies.
- Coordinate the training of existing and new staff on the TCS with the vendor. This is a baseline task for Agencies that already have a TCS. This may include support of ATMS hosted Agencies.
- Develop automated scenario response plans. This is a baseline task for Agencies that already have a TCS. This may also include support of ATMS hosted Agencies.
- Develop and maintain geo-data (e.g., Agency boundaries, locations of ITS equipment, etc.). This is a baseline task for Agencies that already have a TCS. This task may also include data for ATMS hosted Agencies.
- Monitor IEN workstation performance (e.g., workstation operating and presenting live data, etc.), contacting the Regional Coordinator (RC) if problems are noted.
- Monitor local traffic operations and perform local incident management during peak periods and as needed.
- Update the IEN to reflect changes to the ITS inventory. This may also include support of ATMS hosted Agencies.
- Update the TCS to reflect changes to the ITS inventory. This is a baseline task for Agencies that already have a TCS. This may also include support of ATMS hosted Agencies.
- Monitor TCS performance taking corrective actions, as needed (e.g., workstation working and presenting live data, etc.).
- Perform “Agency B” TCS and IEN activities per applicable Agency operations and maintenance agreements (i.e. perform tasks described herein for ATMS hosted Agencies).
- Perform traffic operations and incident management for “Agency B” per applicable Agency operations and maintenance agreements.
- Develop, maintain and perform periodic reviews of local signal timing plans for hosted Agencies.
- Develop construction plans for new traffic signal or controller installations or repairs for ATMS hosted Agencies.
- Check that signal system components are communicating with the TCS and IEN and are functioning properly, taking corrective actions as needed. For Level 2B Agencies, this task will be performed during peak periods and as needed. This is a baseline task for Agencies that already have a TCS.
- Check that “Agency B” signal components are communicating with the TCS and IEN and are functioning properly, as applicable, taking corrective actions as needed.
- Implement “Agency B” signal timing plans.
- Check that detection and surveillance system components are communicating with the IEN and TCS, and functioning properly, taking corrective actions as needed. For Level

2B Agencies this task will be performed during peak periods and as needed. This is a baseline task for Agencies that already have a TCS.

- Check that “Agency B” detection components are communicating with the IEN and TCS, and are functioning properly, as applicable, taking corrective actions as needed.
- Check that communications system components are communicating with the IEN and TCS and functioning properly, as applicable, taking corrective actions as needed. For Level 2B Agencies this task will be performed during peak periods and as needed. This is a baseline task for Agencies that already have a TCS.
- Check that “Agency B” communications components are communicating with the IEN and TCS, and are functioning properly, as applicable, taking corrective actions as needed.

Typical O&M Tasks to be performed by **Level 3** Agencies are summarized from the ConOps document as follows:

- Coordinate the implementation and maintenance of the IEN.
- Attend IEN training as needed.
- Ensure LCCS systems / equipment are secure.
- Coordinate the implementation and maintenance of the TCS with the vendor. This is a baseline task for Agencies that already have a TCS. This may include support of ATMS hosted Agencies.
- Coordinate the training of existing and new staff on the TCS with the vendor. This is a baseline task for Agencies that already have a TCS. This may include support of ATMS hosted Agencies.
- Develop automated scenario response plans. This is a baseline task for Agencies that already have a TCS. This may also include support of ATMS hosted Agencies.
- Develop and maintain geo-data (e.g., Agency boundaries, locations of ITS equipment, etc.). This is a baseline task for Agencies that already have a TCS. This task may also include data for ATMS hosted Agencies.
- Monitor IEN workstation performance (e.g., workstation operating and presenting live data, etc.), contacting the Regional Coordinator (RC) if problems are noted.
- Monitor traffic operations and perform incident management during operating hours and as needed.
- Update the IEN to reflect changes to the ITS inventory. This may also include support of ATMS hosted Agencies.
- Update the TCS to reflect changes to the ITS inventory. This is a baseline task for Agencies that already have a TCS. This may also include support of ATMS hosted Agencies.
- Monitor TCS performance taking corrective actions, as needed (e.g., workstation working and presenting live data, etc.).

- Perform “Agency B” TCS and IEN activities per applicable Agency operations and maintenance agreements (i.e. perform tasks described herein for ATMS hosted Agencies).
- Perform traffic operations and incident management for “Agency B” per applicable Agency operations and maintenance agreements.
- Develop, maintain and perform periodic reviews of local signal timing plans for hosted Agencies.
- Develop construction plans for new traffic signal or controller installations or repairs for ATMS hosted Agencies.
- Check that signal system components are communicating with the TCS and IEN and are functioning properly, taking corrective actions as needed. For Level 3 Agencies, this task will be performed during operating hours and as needed. This is a baseline task for Agencies that already have a TCS.
- Implement local signal timing plans.
- Check that “Agency B” detection components are communicating with the IEN and TCS, and are functioning properly, as applicable, taking corrective actions as needed.
- Implement “Agency B” signal timing plans.
- Check that detection and surveillance system components are communicating with the IEN and TCS, and functioning properly, taking corrective actions as needed. For Level 3 Agencies this task will be performed during operating hours and as needed. This is a baseline task for Agencies that already have a TCS.
- Check that “Agency B” detection components are communicating with the IEN and TCS, and are functioning properly, as applicable, taking corrective actions as needed.
- Check that communications system components are communicating to the IEN and TCS and functioning properly, taking corrective actions as needed. For Level 3 Agencies this task will be performed during operating hours and as needed. This is a baseline task for Agencies that already have a TCS.
- Check that “Agency B” communications components are communicating with the IEN and TCS, and are functioning properly, as applicable, taking corrective actions as needed.

A series of tables that correlate the activities delineated above with labor hours and labor costs is included in **Appendix A**. This correlation provides a practical view of anticipated O&M activities and costs, based on the ConOps and the Conceptual Design document (and workshop).

4. LIST OF ACRONYMS

ATMS	Advanced Transportation (Traffic) Management System or Advanced Traffic Management System
C2C	Center to Center
CA	California
CCTV	Closed Circuit Television
CDI	Command/Data Interface
DPW	Department of Public Works
F2C	Field to Center
IEN	Information Exchange Network
IS	Information Systems
IT	Information Technologies
ITS	Intelligent Transportation Systems
LCCS	Local City Control Site
O&M	Operations and Maintenance
RC	Regional Coordinator
SGVTF	San Gabriel Valley Traffic Forum
SR	State Route
TCS	Traffic Control Systems
TMC	Transportation Management Center or Traffic Management Center
TSM	Transportation System Management or Traffic System Management
W/S	Workstation

Appendix A

Level 1 - Local City Control Site Staffing Cost Estimate

Assumes 104 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
1) IEN Workstation				54%
Operations Engineer --> Monitor IEN workstation performance (e.g., workstation operating and presenting live data, etc.), contacting the RC if problems are noted --> Check that signal system components are communicating with the IEN and are functioning properly, taking corrective actions as needed (infrequent & refer to ATMS Hosting Agency) --> Monitor traffic operations as needed/desired using the IEN workstation (infrequent) --> Coordinate the development of scenario response plans for the TCS with RC --> Ensure that the IEN is updated to reflect changes to the ITS inventory --> Check that detection and surveillance system components are communicating with the IEN and functioning properly, taking corrective actions as needed (infrequent) --> Notify other Agencies and/or RC of any upcoming planned events --> Work w/ other SGVTF Agencies to develop Standard Operating Procedures --> Assist in developing intersection graphics	32	\$ 60	\$ 1,920	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Check that signal system components are communicating with the IEN and are functioning properly, taking corrective actions as needed (infrequent & refer to ATMS Hosting Agency) --> Check that detection and surveillance system components are communicating with the IEN and functioning properly, taking corrective actions as needed (infrequent)	12	\$ 40	\$ 480	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Check that IEN H/W, communications, & networking equipment are functioning properly	12	\$ 30	\$ 360	YES...Labor hours added per SGVTF O&M Plan NONE...IEN S/W covered by IEN Consultant
Subtotal	56		\$ 2,760	

Level 1 - Local City Control Site Staffing Cost Estimate

Assumes 104 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
2) C2C Communications				12%
Operations Engineer		\$ 60	\$ -	NONE...Covered by Service Provider for 10-years & already included w/in SGVTF implementation budget/cost
System/Network Administrator --> Check that C2C communications & networking equipment are functioning properly	6	\$ 40	\$ 240	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Check that C2C communications are functioning properly & coordinate w/ C2C Service Provider	6	\$ 30	\$ 180	YES...Labor hours added per SGVTF O&M Plan
Subtotal	12		\$ 420	
3a) Connection to KITS				12%
Operations Engineer --> Implement local signal timing plans (as needed) --> Ensure that the TCS is updated to reflect changes to the ITS inventory --> Develop, maintain, and perform periodic reviews of local signal timing plans --> Develop construction plans for new traffic signal or controller installations or repairs --> Develop & update operating agreements w/ ATMS "host" Agency (LA County) --> Assist in bringing signalized intersections "on-line" --> Assist in developing intersection graphics	12	\$ 60	\$ 720	YES...Labor hours from SGVTF Concept-of-Operations YES...Additional cost to Agency to pay LA County to operate signals
System/Network Administrator		\$ 40	\$ -	NONE...Covered by C2C Communications (SGVTF ITS Project #2) & F2C Communications (SGVTF ITS Project #4)
Maintenance Technician		\$ 30	\$ -	NONE...Covered by LA County TCS Vendor
Subtotal	12		\$ 720	
3b) Controller/Cabinet Upgrades				0%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator		\$ 40	\$ -	NONE
Maintenance Technician		\$ 30	\$ -	NONE... Assumed to be covered w/in City's existing maintenance services contract (in-house, LA County, Private Sector)
Subtotal	0		\$ -	

Level 1 - Local City Control Site Staffing Cost Estimate

Assumes 104 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
4) F2C Communications				12%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator --> Check that F2C communications & networking equipment are functioning properly	6	\$ 40	\$ 240	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Check that F2C equipment is functioning properly, swap-out RF equipment, & coordinate w/ LA County Wireless Contractor	6	\$ 30	\$ 180	YES...Labor hours added per SGVTF O&M Plan
Subtotal	12		\$ 420	
5a) CCTV Cameras (Field)				0%
Operations Engineer		\$ 60	\$ -	NONE....No CCTV cameras deployed by Level 1 Agencies
System/Network Administrator		\$ 40	\$ -	NONE....No CCTV cameras deployed by Level 1 Agencies
Maintenance Technician		\$ 30	\$ -	NONE....No CCTV cameras deployed by Level 1 Agencies
Subtotal	0		\$ -	
5b) Video Control System (VCS)				0%
Operations Engineer		\$ 60	\$ -	NONE...Operated by LA County
System/Network Administrator		\$ 40	\$ -	NONE...Operated by LA County
Maintenance Technician		\$ 30	\$ -	NONE...Maintained by LA County
Subtotal	0		\$ -	
Staff Training				12%
Operations Engineer --> Attend IEN training (as needed)	4	\$ 60	\$ 240	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Attend IEN training (as needed)	4	\$ 40	\$ 160	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Attend RF/wireless comm. training (as needed)	4	\$ 30	\$ 120	YES...Labor hours added per SGVTF O&M Plan
Subtotal	12		\$ 520	
Total Annual	104		\$ 4,840	100%
Operations Engineer	48	\$ 60	\$ 2,880	
System/Network Administrator	28	\$ 40	\$ 1,120	
Maintenance Technician	28	\$ 30	\$ 840	
Average Monthly	9		\$ 403	
Average Weekly	2		\$ 93	

Level 2A - Local City Control Site Staffing Cost Estimate*

Assumes 520 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
1) IEN Workstation				33%
Operations Engineer --> Same as Level 1 --> Check that signal system components are communicating with the IEN and are functioning properly, taking corrective actions as needed (as needed & refer to ATMS Hosting Agency) --> Monitor traffic operations as needed/desired using the IEN workstation (as needed) --> Check that detection and surveillance system components are communicating with the IEN and functioning properly, taking corrective actions as needed (as needed) --> Notify other SGVTF Agencies and/or RC of any infrastructure changes	122	\$ 60	\$ 7,320	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 1	24	\$ 40	\$ 960	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Same as Level 1	24	\$ 30	\$ 720	YES...Labor hours added per SGVTF O&M Plan NONE...IEN S/W covered by IEN Consultant
Subtotal	170		\$ 9,000	
2) C2C Communications				9%
Operations Engineer --> Same as Level 1		\$ 60	\$ -	NONE...Covered by Service Provider for 10-years & already included w/in SGVTF implementation budget/cost
System/Network Administrator --> Same as Level 1	24	\$ 40	\$ 960	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Same as Level 1	24	\$ 30	\$ 720	YES...Labor hours added per SGVTF O&M Plan
Subtotal	48		\$ 1,680	

Level 2A - Local City Control Site Staffing Cost Estimate*

Assumes 520 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
3a) Connection to KITS				29%
Operations Engineer --> Same as Level 1 --> Check that signal system components are communicating with the TCS and are functioning properly, taking corrective actions as needed (as needed) --> Monitor TCS performance taking corrective actions, as needed (e.g., workstation operating and presenting live data, etc.) (as needed) --> Check that detection and surveillance system components are communicating with the TCS and functioning properly, taking corrective actions as needed (as needed) --> Coordinate the implementation and maintenance of the TCS workstation with the Vendor	112	\$ 60	\$ 6,720	YES...Labor hours from SGVTF Concept-of-Operations YES...Additional cost to Agency to pay LA County to operate signals
System/Network Administrator --> Coordinate the implementation and maintenance of the TCS workstation with the Vendor	20	\$ 40	\$ 800	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Coordinate the implementation and maintenance of the TCS workstation with the Vendor	20	\$ 30	\$ 600	YES...Labor hours from SGVTF Concept-of-Operations NONE...ATMS S/W covered by LA County TCS Vendor
Subtotal	152		\$ 8,120	
3b) Controller/Cabinet Upgrades				0%
Operations Engineer		\$ 60	\$ -	NONE
System Network Administrator		\$ 40	\$ -	NONE
Maintenance Technician		\$ 30	\$ -	NONE... Assumed to be covered w/in City's existing maintenance services contract (in-house, LA County, Private Sector)
Subtotal	0		\$ -	
4) F2C Communincations				9%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator --> Same as Level 1	24	\$ 40	\$ 960	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Same as Level 1	24	\$ 30	\$ 720	YES...Labor hours added per SGVTF O&M Plan
Subtotal	48		\$ 1,680	
5a) CCTV Cameras (Field)				1%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator		\$ 40	\$ -	NONE
Maintenance Technician* --> Check that CCTV cameras are functioning properly, clean lenses, & coordinate w/ CCTV Supplier	6	\$ 30	\$ 180	YES...6-hours for El Monte, Monrovia, & Monterey Park & 12-hours for San Gabriel NONE...All other Level 2 Agencies
Subtotal	6		\$ 180	

Level 2A - Local City Control Site Staffing Cost Estimate*

Assumes 520 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
5b) Video Control System (VCS)				7%
Operations Engineer* --> Monitor CCTV cameras for display/depiction of real-time traffic conditions in the field/streets --> Check that signal system components are communicating with the TCS and are functioning properly, taking corrective actions as needed (peak periods) --> Check that detection and surveillance system components are communicating with the TCS and functioning properly, taking corrective actions as needed (peak periods)	20	\$ 60	\$ 1,200	YES...Labor hours from SGVTF Concept-of-Operations YES...Labor hours for El Monte, Monrovia, Monterey Park, & San Gabriel
System/Network Administrator* --> Coordinate the implementation and maintenance of the VCS w/ the Vendor	8	\$ 40	\$ 320	YES...Labor hours from SGVTF Concept-of-Operations YES...Labor hours for El Monte, Monrovia, Monterey Park, & San Gabriel
Maintenance Technician* --> Coordinate the implementation and maintenance of the VCS w/ the Vendor	8	\$ 30	\$ 240	YES...Labor hours from SGVTF Concept-of-Operations YES...Labor hours for El Monte, Monrovia, & Monterey Park & 12-hours for San Gabriel NONE...S/W covered by City's VCS Vendor (Separate cost TBD)
Subtotal	36		\$ 1,760	
Staff Training				12%
Operations Engineer --> Same as Level 1 --> Attend TCS training (as needed)	20	\$ 60	\$ 1,200	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 1 --> Attend TCS training (as needed)	20	\$ 40	\$ 800	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Same as Level 1	20	\$ 30	\$ 600	YES...Labor hours added per SGVTF O&M Plan
Subtotal	60		\$ 2,600	
Total Annual	520		\$25,020	100%
Operations Engineer	274	\$ 60	\$ 16,440	
System/Network Administrator	120	\$ 40	\$ 4,800	
Maintenance Technician	126	\$ 30	\$ 3,780	
Average Monthly	43		\$ 2,085	
Average Weekly	10		\$ 481	

* Includes CCTV camera deployment

Level 2B - Local City Control Site Staffing Cost Estimate*

Assumes 780 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
1) IEN Workstation				27%
Operations Engineer --> Same as Level 2A --> Check that signal system components are communicating with the IEN and are functioning properly, taking corrective actions as needed (peak periods) --> Monitor traffic operations as needed/desired using the IEN workstation (peak periods) --> Develop automated scenario response plans --> Check that detection and surveillance system components are communicating with the IEN and functioning properly, taking corrective actions as needed (peak periods)	140	\$ 60	\$ 8,400	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 2A	36	\$ 40	\$ 1,440	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Same as Level 2A	36	\$ 30	\$ 1,080	YES...Labor hours added per SGVTF O&M Plan NONE...IEN S/W covered by IEN Consultant
Subtotal	212		\$ 10,920	
2) C2C Communications				9%
Operations Engineer		\$ 60	\$ -	NONE...Covered by Service Provider for 10-years & already included w/in SGVTF implementation budget/cost
System/Network Administrator --> Same as Level 2A	36	\$ 40	\$ 1,440	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Same as Level 2A	36	\$ 30	\$ 1,080	YES...Labor hours added per SGVTF O&M Plan
Subtotal	72		\$ 2,520	

Level 2B - Local City Control Site Staffing Cost Estimate*

Assumes 780 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
3a) TCS				35%
Operations Engineer --> Same as Level 2A --> Check that signal system components are communicating with the TCS and are functioning properly, taking corrective actions as needed (peak periods) --> Monitor traffic operations and perform incident management during peak periods and as needed --> Monitor TCS performance taking corrective actions, as needed (e.g., workstation operating and presenting live data, etc.) (peak periods) --> Check that detection and surveillance system components are communicating with the TCS and functioning properly, taking corrective actions as needed (peak periods) --> Develop and maintain geo-data (e.g., Agency boundaries, locations of ITS equipment, etc.)	202	\$ 60	\$ 12,120	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 2A	36	\$ 40	\$ 1,440	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Same as Level 2A	36	\$ 30	\$ 1,080	YES...Labor hours from SGVTF Concept-of-Operations NONE...ATMS S/W covered by City's TCS Vendor (Separate cost TBD)
Subtotal	274		\$ 14,640	
3b) Controller/Cabinet Upgrades				0%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator		\$ 40	\$ -	NONE
Maintenance Technician		\$ 30	\$ -	NONE... Assumed to be covered w/in City's existing maintenance services contract (in-house, LA County, Private Sector)
Subtotal	0		\$ -	
4) F2C Communications				9%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator --> Same as Level 2A	36	\$ 40	\$ 1,440	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Same as Level 2A	36	\$ 30	\$ 1,080	YES...Labor hours added per SGVTF O&M Plan
Subtotal	72		\$ 2,520	

Level 2B - Local City Control Site Staffing Cost Estimate*

Assumes 780 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
5a) CCTV Cameras (Field)				1%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator		\$ 40	\$ -	NONE
Maintenance Technician* --> Same as Level 2A	6	\$ 30	\$ 180	YES....12-hours for Alhambra & 6-hours for Covina
Subtotal	6		\$ 180	
5b) Video Control System (VCS)				9%
Operations Engineer* --> Same as Level 2A	40	\$ 60	\$ 2,400	YES...Labor hours from SGVTF Concept-of-Operations YES....Labor hours for Alhambra & Covina
System/Network Administrator* --> Same as Level 2A	16	\$ 40	\$ 640	YES...Labor hours from SGVTF Concept-of-Operations YES....Labor hours for Alhambra & Covina
Maintenance Technician* --> Same as Level 2A	16	\$ 30	\$ 480	YES...Labor hours from SGVTF Concept-of-Operations YES....Labor hours for Alhambra & Covina NONE...S/W covered by City's VCS Vendor (Separate cost TBD)
Subtotal	72		\$ 3,520	
Staff Training				9%
Operations Engineer --> Same as Level 2A	24	\$ 60	\$ 1,440	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 2A	24	\$ 40	\$ 960	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Same as Level 2A	24	\$ 30	\$ 720	YES...Labor hours added per SGVTF O&M Plan
Subtotal	72		\$ 3,120	
Total Annual	780		\$37,420	100%
Operations Engineer	406	\$ 60	\$ 24,360	
System/Network Administrator	184	\$ 40	\$ 7,360	
Maintenance Technician	190	\$ 30	\$ 5,700	
Average Monthly	65		\$ 3,118	
Average Weekly	15		\$ 720	

* Includes CCTV camera deployment

Level 3 - Local City Control Site Staffing Cost Estimate

Assumes 2,080 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
1) IEN Workstation				29%
Operations Engineer --> Same as Level 2B --> Check that signal system components are communicating with the IEN and are functioning properly, taking corrective actions as needed (operating hours) --> Monitor traffic operations as needed/desired using the IEN workstation (operating hours) --> Ensure that the IEN is updated to reflect changes to the ITS inventory (includes support of "Agency B") --> Check that detection and surveillance system components are communicating with the IEN and functioning properly, taking corrective actions as needed (operating hours)	400	\$ 60	\$ 24,000	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 2B	80	\$ 40	\$ 3,200	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Same as Level 2B	80	\$ 30	\$ 2,400	YES...Labor hours added per SGVTF O&M Plan NONE...IEN S/W covered by IEN Consultant
Subtotal	560		\$ 29,600	
2) C2C Communications				8%
Operations Engineer		\$ 60	\$ -	NONE...Covered by Service Provider for 10-years & already included w/in SGVTF implementation budget/cost
System/Network Administrator --> Same as Level 2B	80	\$ 40	\$ 3,200	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Same as Level 2B	80	\$ 30	\$ 2,400	YES...Labor hours added per SGVTF O&M Plan
Subtotal	160		\$ 5,600	

Level 3 - Local City Control Site Staffing Cost Estimate

Assumes 2,080 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
3a) TCS				45%
Operations Engineer --> Same as Level 2B --> All tasks include support of "Agency B" --> Check that signal system components are communicating with the TCS and are functioning properly, taking corrective actions as needed (operating hours) --> Monitor TCS performance, perform traffic operations, perform incident management, and take corrective actions (e.g., workstation operating and presenting live data, etc.) (operating hours) --> Implement signal timing plans --> Ensure that the TCS is updated to reflect changes to the ITS inventory --> Check that detection and surveillance system components are communicating with the TCS and functioning properly, taking corrective actions as needed (operating hours) --> Develop and maintain geo-data (e.g., Agency boundaries, locations of ITS equipment, etc.) --> Develop, maintain, and perform periodic reviews of local signal timing plans --> Develop construction plans for new traffic signal or controller installations or repairs	660	\$ 60	\$ 39,600	YES...Labor hours from SGVTF Concept-of-Operations
System Administrator --> Same as Level 2B	100	\$ 40	\$ 4,000	YES...Labor hours from SGVTF Concept-of-Operations)
Maintenance Technician --> Same as Level 2B	100	\$ 30	\$ 3,000	YES...Labor hours from SGVTF Concept-of-Operations NONE...ATMS S/W covered by City's TCS Vendor (Separate cost TBD)
Subtotal	860		\$ 46,600	
3b) Controller/Cabinet Upgrades				0%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator		\$ 40	\$ -	NONE
Maintenance Technician		\$ 30	\$ -	NONE... Assumed to be covered w/in City's existing maintenance services contract (in-house, LA County, Private Sector)
Subtotal	0		\$ -	

Level 3 - Local City Control Site Staffing Cost Estimate

Assumes 2,080 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
4) F2C Communications				8%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator --> Same as Level 2B	80	\$ 40	\$ 3,200	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Same as Level 2B	80	\$ 30	\$ 2,400	YES...Labor hours added per SGVTF O&M Plan
Subtotal	160		\$ 5,600	
5a) CCTV Cameras (Field)				0%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator		\$ 40	\$ -	NONE
Maintenance Technician		\$ 30	\$ -	NONE....No CCTV cameras deployed w/in SGVTF by Level 3 Agencies
Subtotal	0		\$ -	
5b) Video Control System (VCS)				0%
Operations Engineer		\$ 60	\$ -	NONE...No CCTV cameras deployed w/in SGVTF by Level 3 Agencies (~80 hours)
System/Network Administrator		\$ 40	\$ -	NONE...No CCTV cameras deployed w/in SGVTF by Level 3 Agencies (~40 hours)
Maintenance Technician		\$ 30	\$ -	NONE...No CCTV cameras deployed w/in SGVTF by Level 3 Agencies (~40 hours)
Subtotal	0		\$ -	
Staff Training				9%
Operations Engineer --> Same as Level 2B	60	\$ 60	\$ 3,600	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 2B	60	\$ 40	\$ 2,400	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Same as Level 2B	60	\$ 30	\$ 1,800	YES...Labor hours added per SGVTF O&M Plan
Subtotal	180		\$ 7,800	
Total Annual	1920		\$95,200	100%
Operations Engineer	1120	\$ 60	\$ 67,200	
System/Network Administrator	400	\$ 40	\$ 16,000	
Maintenance Technician	400	\$ 30	\$ 12,000	
Average Monthly	160		\$ 7,933	
Average Weekly	37		\$ 1,831	

Regional Coordinator - Local City Control Site Staffing Cost Estimate*

Assumes 2,080 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
1) IEN Workstation				27%
Operations Engineer --> Same as Level 3 --> Perform traffic operations and incident management for other SGVTF Agencies per applicable Agency operations and maintenance agreements --> Coordinate SGVTF traffic & incident management collaboration between SGVTF Agencies (Sub-Regionally) --> Coordinate SGVTF traffic & incident management collaboration between TrafficForums (Regionally)	400	\$ 60	\$ 24,000	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 3	80	\$ 40	\$ 3,200	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Same as Level 3	80	\$ 30	\$ 2,400	YES...Labor hours added per SGVTF O&M Plan NONE...IEN S/W covered by IEN Consultant
Subtotal	560		\$ 29,600	
2) C2C Communications				8%
Operations Engineer --> Same as Level 3	0	\$ 60	\$ -	NONE...Covered by Service Provider for 10-years & already included w/in SGVTF implementation budget/cost
System/Network Administrator --> Same as Level 3	80	\$ 40	\$ 3,200	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Same as Level 3	80	\$ 30	\$ 2,400	YES...Labor hours added per SGVTF O&M Plan
Subtotal	160		\$ 5,600	
3a) TCS				41%
Operations Engineer --> Same as Level 3	660	\$ 60	\$ 39,600	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 3	100	\$ 40	\$ 4,000	YES...Labor hours from SGVTF Concept-of-Operations)
Maintenance Technician --> Same as Level 3	100	\$ 30	\$ 3,000	YES...Labor hours from SGVTF Concept-of-Operations NONE...ATMS S/W covered by City's TCS Vendor (Separate cost TBD)
Subtotal	860		\$ 46,600	
3b) Controller/Cabinet Upgrades				0%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator		\$ 40	\$ -	NONE
Maintenance Technician		\$ 30	\$ -	NONE... Assumed to be covered w/in City's existing maintenance services contract (in-house, LA County, Private Sector)
Subtotal	0		\$ -	

Regional Coordinator - Local City Control Site Staffing Cost Estimate*

Assumes 2,080 hours per year

O&M Activities	Labor Hours (Hrs/Year)	Hourly Labor Rate	Annual Labor Cost	Comments
4) F2C Communications				8%
Operations Engineer	0	\$ 60	\$ -	NONE
System/Network Administrator --> Same as Level 3	80	\$ 40	\$ 3,200	YES...Labor hours added per SGVTF O&M Plan
Maintenance Technician --> Same as Level 3	80	\$ 30	\$ 2,400	YES...Labor hours added per SGVTF O&M Plan
Subtotal	160		\$ 5,600	
5a) CCTV Cameras (Field)				0%
Operations Engineer		\$ 60	\$ -	NONE
System/Network Administrator		\$ 40	\$ -	NONE
Maintenance Technician		\$ 30	\$ -	NONE....No CCTV cameras deployed w/in SGVTF by LA County
Subtotal	0		\$ -	
5b) Video Control System (VCS)				8%
Operations Engineer* --> Same as Level 2A	80	\$ 60	\$ 4,800	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator* --> Same as Level 2A	40	\$ 40	\$ 1,600	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician* --> Same as Level 2A	40	\$ 30	\$ 1,200	YES...Labor hours from SGVTF Concept-of-Operations NONE...S/W covered by LA County's VCS Vendor (Separate cost TBD)
Subtotal	160		\$ 7,600	
Staff Training				9%
Operations Engineer --> Same as Level 3	60	\$ 60	\$ 3,600	YES...Labor hours from SGVTF Concept-of-Operations
System/Network Administrator --> Same as Level 3	60	\$ 40	\$ 2,400	YES...Labor hours from SGVTF Concept-of-Operations
Maintenance Technician --> Same as Level 3	60	\$ 30	\$ 1,800	YES...Labor hours added per SGVTF O&M Plan
Subtotal	180		\$ 7,800	
Total Annual	2080		\$102,800	100%
Operations Engineer	1200	\$ 60	\$ 72,000	
System/Network Administrator	440	\$ 40	\$ 17,600	
Maintenance Technician	440	\$ 30	\$ 13,200	
Average Monthly	173		\$ 8,567	
Average Weekly	40		\$ 1,977	

* Includes CCTV camera deployment

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