SAN GABRIEL VALLEY TRAFFIC FORUM

Deliverable 2.3.5.1 – Sub-Regional TMC Requirements (Draft)

DRAFT

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1. INTRODUCTION

1.1 LA County Traffic Forums

The Los Angeles County Department of Public Works (County) Traffic Forum Program has proven successful in creating institutional infrastructure to coordinate the activities of the Agencies responsible for traffic signal operations in LA County. These Traffic Forums allow groups of bordering Agencies to work together to promote inter-Agency cooperation. The Traffic Forums have enabled funding to be targeted at infrastructure improvements along arterial and arterial/freeway corridors in the County's sub-regions. Such projects are a critical part of what will eventually be a network of integrated Intelligent Transportation Systems (ITS) projects in LA County and in Southern California.

1.2 San Gabriel Valley Traffic Forum

The San Gabriel Valley Traffic Forum (SGVTF) is one such project that will result in arterial infrastructure improvements within the project boundaries. The SGVTF project area ranges from Cities bordering the 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 LA County. The traffic signals in the Region are operated by many of the individual Agencies, the County, and Caltrans District 7.

The goal of the SGVTF is to design, develop, and deploy an Advanced Traffic Management System (ATMS) specifically tailored to each Agency's operations in the Corridor 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 Transportation 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. This will allow the Agencies to respond to recurrent and non-recurrent congestion in a coordinated fashion across jurisdictional boundaries.

1.3 Countywide Information Exchange Network (IEN)

Developed by the County, the Countywide Information Exchange Network (IEN) is the integrated system framework that connects all of the individual Agency ATMSs into a Regional network to support the operational goals identified above. As shown in Exhibit 1.1, the Countywide IEN supports traffic signal operations in three (3) levels:

- Local Level
    - Comprises day-to-day traffic signal operations and maintenance (O&M) activities carried out by the individual Agency
    - Includes activities such as signal timings, equipment monitoring, response to local traffic conditions and events, etc.

- Corridor Level
  - Supports inter-Agency coordination and joint signal operations within the particular Traffic Forum (or Sub-Region)
  - Includes activities such as signal coordination across jurisdictional boundaries, monitoring and exchange of local traffic data throughout the Corridor, joint response to traffic conditions, incidents, and events that affect more than one jurisdiction, etc.
- Regional Level
  - Permits arterials of Regional significance to be monitored, managed, and controlled as a single entity
  - Supports multi-Agency, cross-Corridor data exchange permitting a Countywide response to traffic conditions and major events
  - Facilitates communications between systems/Agencies not part of a Traffic Forum (e.g., Caltrans, LADOT, etc.).

Exhibit 1.1 – Countywide IEN
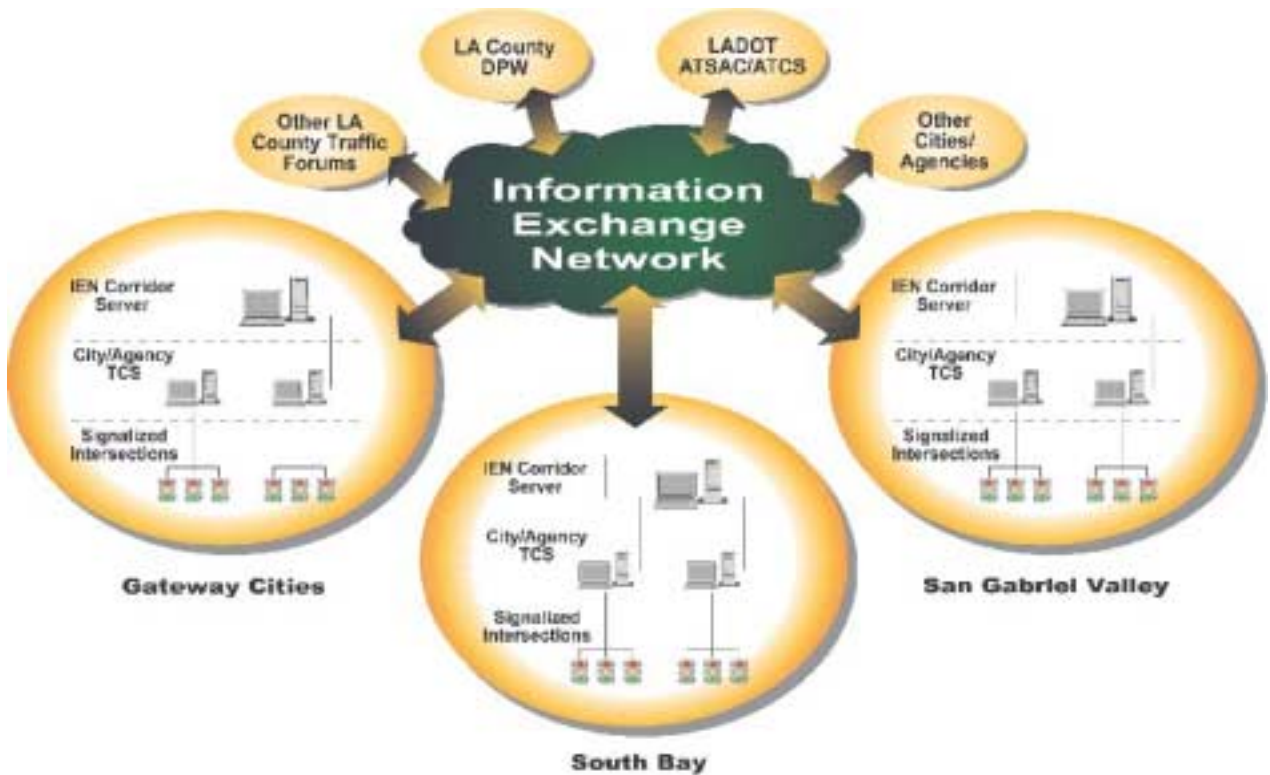
The SGVTF assumes the availability of the Countywide IEN at the Corridor and Regional levels. Therefore, the SGVTF project is focused on the selection of TCSs and the integration of those systems to the Countywide IEN at the local level. The eventual ATMS design for the SGVTF will take into account the interface to the IEN and its requirements at the Local level and encompass the following six (6) core components:

- ATMS and/or TCS (Individual Agency)
- Detection and Surveillance

- TMC and/or W/S Layouts (ATMS and/or IEN)
- Communications Network
- SGVTF Participation/Coordination (City-specific and/or SGVTF-Regional integration)
- Operations & Maintenance (O&M)

The Countywide IEN comprises the series of computer servers, application software, communications, networks, graphical user interface (GUI) displays, etc. that integrates these components for the collection/transfer of data to support Corridor and Regional functions throughout LA County.

1.4 Project Areas & Agencies Involved

The SGVTF Project encompasses several jurisdictions. Furthermore, it will be integrated, or have the ability to integrate with other projects and existing systems in the Region through the Countywide IEN. SGVTF Project Stakeholders include 24 local Agencies, the County, and Caltrans District 7 as identified below:

City of Arcadia	City of Alhambra
City of Azusa	City of Baldwin Park
City of Bradbury	City of Covina
City of Duarte	City of El Monte
City of Glendora	City of Irwindale
City of La Puente	City of Monrovia
City of Montebello	City of Monterey Park
City of Pasadena	City of Rosemead
City of San Dimas	City of San Gabriel
City of San Marino	City of Sierra Madre
City of South El Monte	City of South Pasadena
City of Temple City	City of West Covina
LA County Dept. of Public Works	Caltrans District 7

1.5 Agency Level Definition

Four (4) Agency roles or "Levels" have been defined as well as a planning-related level (Region Coordinator) for the implementation of the ATMS 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.
        - Typically operate on an exception basis & occasionally peak periods
    - 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]
    - Separate ATMS W/S connected to "host" Agency's ATMS [Local view]

- Level 2B
    - Agency actively manages & operates its own ATMS
        - Actively manage ATMS during exceptions & peak periods
        - Passively manage ATMS during off-peak
    - Agency may operate some other ITS devices (small amount)
    - Agency may "host" another Agency's traffic signals
    - Houses an IEN LCCS to manage traffic signals & incident management activities
        - IEN W/S [Regional view]
        - ATMS W/S [Local view]
        - CDI between the ATMS & IEN
- Level 3
    - Agency actively manages its own ATMS & other ITS devices (large amount)
        - Typically AM peak thru PM peak operations
        - May support 24/7 operations
    - Agency may operate other Agencies' traffic signals (Level 1)
    - Agency may "host" other Agencies' traffic signals (Level 2A)
    - Agency will have a TMC from which to operate its ATMS, the IEN, & other ITS devices
    - Houses an IEN LCCS to manage ATMS & incident management activities
        - IEN W/S (Regional view)
        - ATMS W/S (Local view)
        - CDI between the ATMS & IEN
- Regional Coordinator (RC)
    - Coordinates traffic control activities across a specified Region (multiple Corridors/Traffic Forums)
    - Manages the tools and processes used in Regional and Corridor traffic and incident management activities
    - Has typical traffic and incident management duties

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

SGVTF Agency/Level Mapping

LEVEL 1	LEVEL 2A	LEVEL 2B	LEVEL 3	RC
Bradbury San Marino Sierra Madre MTA* Foothill Transit* Montebello Transit* *Transit operators – no traffic operations	Baldwin Park Duarte El Monte Glendora La Puente Monrovia South El Monte Temple City	Alhambra Arcadia Azusa Covina Irwindale Montebello Monterrey Park Rosemead San Dimas San Gabriel South Pasadena West Covina	Caltrans LACODPW Pasadena	LACODPW

Note that transit operators have been categorized as Level 1 Agencies since they do not have any traffic-related operations and may be provided with an IEN W/S to monitor Regional traffic operations/conditions.

1.6   Purpose of Document

This document is Deliverable 2.3.5.1 – Sub-Regional TMC Requirements. The objective of this report is to identify the requirements for the SGVTF Sub-Regional TMC. The Sub-Regional TMC will be the location of the systems that will enable the TMC staff to monitor and control traffic conditions and incident management activities throughout the Corridor, taking actions as needed (following the Corridor Operations Management Plan).

This site may also house the TCS(s) that would be hosting Level 1 and Level 2A Agencies and be the location where those systems are operated. Additionally, the facility will house the Countywide IEN system components needed to support the sharing of information between Agencies in the SGVTF, other Traffic Forums, as well as other Agencies or organizations outside of the Corridor.

1.7   Report Organization

After this introduction, the report is broken into the following sections:

- Section 2: Sub-Regional TMC – Overview
- Section 3: Sub-Regional TMC – Requirements
- Section 4: Proposed Floor Plan

1.8 Referenced Documents

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

- San Gabriel Valley Traffic Forum Project
    - Deliverable 2.1.1: Operational Objectives
    - Deliverable 2.2.1: System Needs
    - Deliverable 2.3.1.1: Concept-of-Operations
    - Deliverable 2.3.2.1: ATMS User Requirements
    - Deliverable 2.3.3.1: ATMS Functional Requirements
- I-105 Corridor Project
    - TSMACS User Requirements Report (Final)
    - Functional Requirements Report (Draft)
- San Gabriel Valley Pilot Project
    - System Design Report, Final Version 1.0
- Pomona Valley ITS Project
    - Sub-Regional TMC Report
- LACO DPW TMC Design Specifications

2.   SUB-REGIONAL TMC – OVERVIEW

The SGVTF Sub-Regional TMC (SGV TMC) will house the infrastructure (systems, communications, and personnel) to support intra- and inter-regional traffic and incident management for SGVTF Agencies and commuters.

2.1   Sub-Regional TMC – Location

The SGV TMC will be co-located at the new LACO DPW T&L TMC (LACO TMC) in Alhambra. This decision is the lowest cost and most efficient option and was based on several factors. First, the construction of the LACO TMC has been completed, it is *in* the SGV, and it is ready for use.   Therefore, there are no additional costs related to finding, acquiring, and constructing new space for a new SGV TMC.

As a modern TMC, the LACO TMC already provides a wide-ranging set of tools for the SGV TMC, such as a video wall, telecommunications, ergonomic workspaces and lighting, etc. In addition, the LACO TMC was designed to support the hosting of Sub-Regional TMCs, and there are technical infrastructure and personnel already supporting the LACO TMC that can be applied to the SGV TMC, when needed.

Two (2) adjacent LACO TMC workspaces should be allocated as the SGV TMC. One of the workspace should be dedicated to the SGVTF. The other workspace can be shared and used for other projects, but should be ready for use for SGVTF incident management or other uses as needed. See Section 4 for a proposed SGVTF TMC floor plan.

2.2   Function

The SGV TMC will support the following high-level inter-jurisdictional functions for the SGVTF Agencies (for a more detailed description of the functions to be performed, please refer to Deliverable 2.3.1.1: Concept-of-Operations):

- Traffic and incident management within the SGV via the IEN
    - Monitoring and control of traffic signals
    - Monitoring and control of other ITS devices (e.g., CCTV, CMS, etc.)
    - Notification of affected Agencies and organizations
- Hosting Agency for L1 and L2A Agencies via the LACO TCS (some L1 and L2A Agencies may be hosted on other L2B or L3 TCSs)
- Back-up support to L2B and L3 Agencies
- SGVTF IEN data archival
- Inter-corridor collaboration (Regional)
    - Sharing of traffic and incident information via the IEN
    - Sharing of CCTV images and control via the IEN
    - Notification of affected Agencies and organizations
- Information service provider to non-Traffic Forums (e.g., media, Internet website etc.)

2.3 Users

Not all Users will perform the same set of functions at the SGV TMC (for a more detailed description of TCS and IEN Users, please refer to Deliverable 2.3.2.1: ATMS User Requirements). All User types may need access to SGVTF systems at the SGVTF TMC. The various Users can be categorized into the following User types:

- System Users – those using the system to manage traffic operations
- System Administrators – those using the system to support system operators, such as LACO ITD, Vendors, etc.

2.4 Infrastructure

The SGV TMC will need to have the following equipment (in addition to that already in the LACO TMC) to support the aforementioned users and functions:

- IEN
    - SGVTF IEN Corridor Server
    - SGV IEN Workstation(s)
    - SGV IEN Site Server(s)
    - Communications infrastructure to support the SGVTF IEN Agencies
    - Local/IEN LAN TMC printer
- LACO TCS (outside the scope of this project, listed for sub-bullets)
    - Communications infrastructure to support hosted L1 and L2A Agencies
    - CDI to and network infrastructure to IEN (outside the scope of this project)

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3.   SUB-REGIONAL TMC – REQUIREMENTS

As stated earlier, the SGV TMC will be co-located in the new LACO TMC. As such, the LACO TMC will fulfill most of the needs of the SGV TMC, and those needs will not be duplicated herein. In addition, since there is no regional SGVTF TCS, there are no SGV TMC-specific requirements related to a TCS.

3.1   Requirements Overview

In a departure from prior and upcoming requirements documents, there will not be a set of User and Functional Requirements. The requirements presented below are those that are specific to the SGV TMC with respect to the LACO TMC. Please note that all network bandwidth and equipment requirements will be established during the completion of the communications alternatives analysis, Task 2.5.2.

3.2   TMC Space/Workspace Requirements

- TMC-SP01: The SGV TMC shall be co-located in the LACO TMC and designed to fit within a sub-area therein (operator workspace).
- TMC-SP02: The SGV TMC operator workspace shall be sized to comfortably house two (2) personnel and their associated work area, three (3) workstations, and shared documentation.
- TMC-SP03: The SGV TMC operator workspace shall provide (US standard) power (outlets and current) to support three (3) workstations and workspace lighting, plus at least two (2) extra power outlets.
- TMC-SP04: The SGV TMC operator workspace shall be situated such that operators can easily view the LACO TMC video wall.
- TMC-SP05: The SGV TMC operator workspace shall have at least three (3) live Ethernet (RJ-45) outlets for SGVTF IEN connectivity.
- TMC-SP06: The SGV TMC operator workspace shall have at least one (1) live Ethernet (RJ-45) outlet for TMC (LACO) connectivity.
- TMC-SP07: The SGV TMC operator workspace shall have two (2) telephones that have dedicated DID numbers, but can also access (call transfer, conference, etc.) the LACO DPW phone network.
- TMC-SP08: The SGV TMC shall have adequate space (server area) and power to house the SGVTF Corridor Server, SGV IEN Site Server(s), SGVTF IEN communications equipment (to be determined in Task 2.5.2), back-up media library, and documentation.
- TMC-SP09: The SGV TMC server area shall have at least two (2) live Ethernet (RJ-45) outlet for SGVTF IEN connectivity (Corridor Server, Site Server(s), and communications equipment).

3.3   Technical Requirements

- TMC-TR01: The SGV TMC shall provide adequate WAN bandwidth to support IEN communications to all SGVTF Agencies.

- TMC-TR02: The SGV TMC shall provide connectivity and adequate bandwidth between the SGVTF IEN Corridor Server and the LACO DPW IEN Regional Server.
- TMC-TR03: The SGV TMC shall provide 100mb/s Ethernet connectivity between the IEN workstations, SGV IEN Site Server(s), and the SGVTF IEN corridor server.
- TMC-TR04: The SGV TMC shall allow IEN workstations to print on a local/IEN LAN TMC printer.
- TMC-SP05: The SGV TMC operator workspace telephones shall have preset speed dials for each SGVTF Agency.
- TMC-TR06: Each SGV TMC workstation shall be able to feed its display to the LACO TMC video wall.

4. PROPOSED FLOOR PLAN

The following schematic (Figure 1) is from the floor plan of the LACO TMC. The recommended location of the SGV TMC is the area bounded by the solid black rectangle. The dashed rectangle is the shared SGV TMC workspace.

Figure 1 – SGVTF Sub-Regional TMC Floor Plan