SIEMENS

Deliverable For:

Gateway Cities Traffic Signal Synchronization and Bus Speed Improvement Project

I-5/Telegraph Road Corridor

Deliverable 5.1.2

Systems Alternatives Analysis and Recommendations

Final

version 1.0

Submitted To:

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Submitted By:

Siemens ITS

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Revision History

Version	Date Submitted	Comments
Draft version 1	April 24, 2003	Initial submittal
Draft version 1.1	May 9, 2003	Revision to clarify support for 2070 and NEMA controllers
Final version 1.0	December1, 2003	Address County's Comments on Draft Version 1.1

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1 INTRODUCTION

1.1 Background

The County of Los Angeles Department of Public Works Traffic Signal Synchronization, Operation and Maintenance (SOM) Program has proven successful in creating an institutional infrastructure to coordinate the activities of the agencies responsible for traffic signal operations in the County. A key feature of this infrastructure is the Forums - groups of bordering agencies created to encourage and promote inter-agency cooperation. These 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 ITS systems in Los Angeles County and in Southern California.

The I-5/Telegraph Road Corridor is one such project which will result in arterial infrastructure improvements along Telegraph Road in the South-East Los Angeles County (Gateway Cities) Forum. The Project area contains 274 intersections in 10 different jurisdictions, comprising 8 cities, the County and Caltrans.

The objective of this Project is to design, develop and deploy traffic control systems in the Corridor so that the signals in the Project area can be synchronized across the jurisdictional boundaries. This Project concentrates on the needs of the agencies in this Corridor with respect to signal synchronization and recommends improvements to field infrastructure (including controllers, loops, detectors, and communications) and central traffic control systems to meet those needs.

When successfully completed, each of the agencies responsible for traffic signal operations in the I-5/Telegraph Road Corridor will have full access to an Advanced Traffic Management System (ATMS) that monitors and controls the traffic signals under their jurisdiction. Agencies will be able to synchronize their signals with neighboring agencies, and exchange traffic information in real-time.

Agencies will also be able to exchange data with other agencies in the Gateway Cities region. This will allow the agencies to respond to recurrent and non-recurrent congestion in a coordinated fashion across the jurisdictional boundaries. The traffic control systems therefore form part of a larger, regional approach supporting multi-agency traffic signal operations.

Earlier reports for the I-5 / Telegraph Road Corridor Project addressed the user and functional requirements for the various ATMS, the interfacing systems, the communication system, and the local control centers. These requirements enabled development of the High Level Design Definition Report (Deliverable 4.1.2), which included Local Control Center (LCC) typical designs for each participating City.

This report analyzes options for the ATMS for use in the project corridor. The analysis is based upon the system requirements as mentioned above, together with work carried out on other Forum projects, as well as the County's own internal analysis of candidate ATMS for use by the County. The objective here is to derive a short-list of candidate systems which will form the basis of a more detailed system selection process during Phase 2 of the project.

1.2 Organization of Document

This document is organized into the following Sections:

Section 1: Introduction

Presents the Project background and introduces the document.

Section 2: Process Followed

Describes the process followed in the ATMS analysis and recommendation.

Section 3: Requirements Definition

Summarizes the ATMS requirements for the I-5/Telegraph Road Corridor cities

Section 4: Vendor and Agency Interviews

Presents information collected through the Agency interviews and presents an analysis of issues

Section 5: Analysis and Recommendations

Presents recommendations for ATMS system for each City.

1.3 Regional Area and Agencies Involved

The I-5/Telegraph Road Corridor Project encompasses several jurisdictional boundaries. Furthermore, it will be integrated, or have the ability to integrate, with many other projects and existing systems in the region through the Information Exchange Network (IEN) architecture. The IEN is a communications network linking together traffic control systems within the County of Los Angeles. It permits the exchange of real-time traffic system data and supports the coordination of traffic signal operations between agencies. The following cities and agencies are involved in the Project:

- Commerce
- Downey
- La Mirada
- Montebello
- Norwalk
- Pico Rivera
- Santa Fe Springs
- Whittier
- Los Angeles County Department of Public Works (The County)
- Caltrans District 7

1.4 Referenced Documents

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

- I-5/Telegraph Road Corridor Project
  - Deliverables 2.1/2.3: Stakeholder's Operational Objectives and Individual City Reports
  - Deliverable 3.1.2: Advanced Traffic Management System (ATMS) User Requirements
  - Deliverable 3.2.1: ATMS Functional and Local Traffic Control Center Requirements
  - Deliverable 3.3.1: Integration System Requirements
  - Deliverable 3.5.1: Communications System Requirements
  - Deliverable 4.1.2: High Level Design Definition Report
- I-105 Corridor Project
  - TSMACS User Requirements Report (Final)
  - Functional Requirements Report (Draft)
  - TMC High Level Design Definitions and Recommendations (Draft)
- San Gabriel Valley Pilot Project
  - System Design Report, Final Version 1.0
  - System Overview and Status Update (October 2000)
- Pomona Valley ITS Project
  - 2nd Draft ATMS Alternative Analysis Report

2 PROCESS FOLLOWED

The ATMS analysis for the I-5/Telegrpah Road Project is based on the work performed by County staff and its consultants on other Forum Projects and follows the process described below and illustrated in Flow Chart in Figure 2.1.

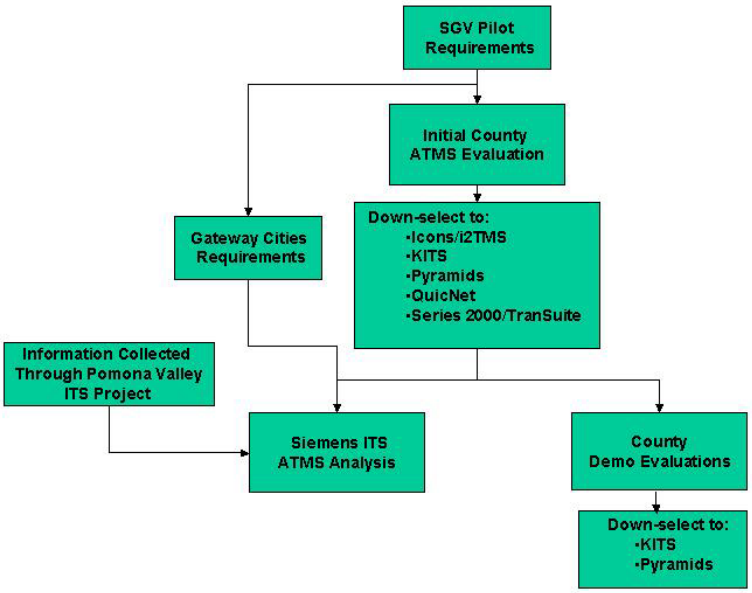

Figure 2.1: ATMS Analysis Process for I-5/Telegraph Road Corridor Project

The County conducted a comprehensive ATMS analysis whereby more than a dozen ATMS vendors were contacted and asked to respond to a questionnaire. The questionnaire was based upon requirements developed through the San Gabriel Valley Pilot Project. The vendors were asked to respond as to what extent their respective systems met those requirements. Based on these responses, the County short-listed the following five systems that met most of County's critical requirements:

- Escort by Kimley Horn (renamed KITS later)
- ***Icons***[1] by Siemens ITS/Econolite (also referred to as i2 TMS)
- Pyramids by AECOM
- QuicNet4 by Bi Tran Systems
- Series 2000 by Transcore (renamed TransSuite later)

The County invited the five vendors to provide a demonstration system at the County's facilities for a period of two months for evaluation purposes. The County staff evaluated the various systems during this period and also checked references to get other agencies' perspective on system performance. Based on this evaluation, County has down-selected to two systems, Escort by Kimley Horn & Associates (KHA) and Pyramids by AECOM.

In addition, the County's Consultant (MMA) for Pomona Valley ITS project conducted an ATMS analysis where MMA collected information from various vendors on their systems' functionality (Please see Appendix A for this information). The County directed Siemens ITS to use the County's five short listed systems and the information collected by MMA

[1] I***cons*** is a registered trademark of Econolite Control products Inc.

as a starting point for the ATMS analysis for the I-5/Telegraph Road Corridor Project. Further, the County instructed Siemens ITS to limit their analysis to particular requirements of the I-5/Telegraph Road Project which were not included in either the County's analysis nor in the analysis performed by MMA on the Pomona Valley Project.

Based on these guidelines, Siemens ITS contacted the five vendors with a questionnaire. All vendors responded to the survey except for Bi Tran. The County directed Siemens ITS to drop Bi Tran from the list of systems to be evaluated and proceed with the analysis of the four remaining systems.

3 PROJECT SPECIFIC REQUIREMENTS DEFINITION

3.1 System Architecture

The LCC High Level Design recommended an architecture (see Figure 3.1) for the corridor based on the functionality desired by each City and their ability and willingness to operate and maintain the LCC equipment.

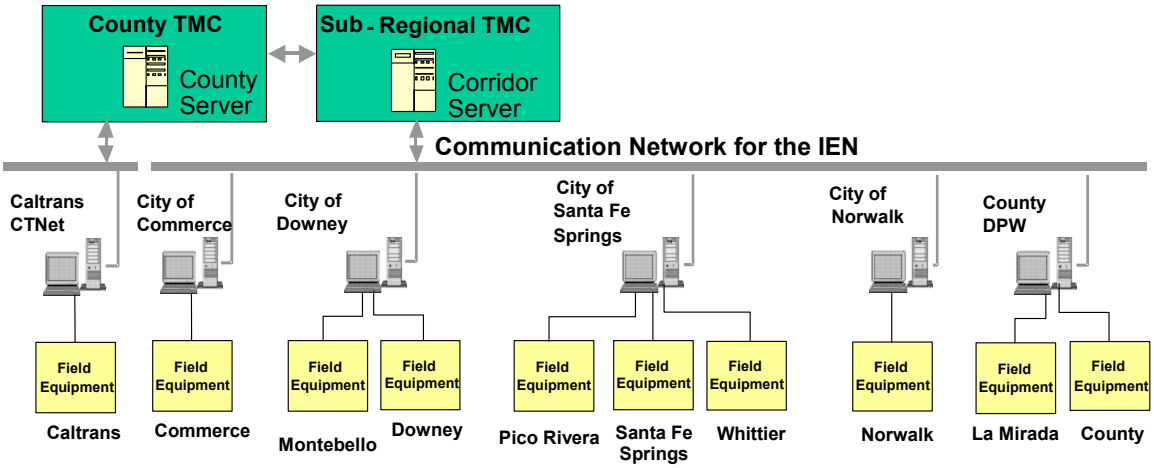

Figure 3.1: I-5/Telegraph Rd. Corridor System Architecture

This was based on the interviews held with the cities during the requirements phase of the project in early 2000. The architecture defined the following three types of LCCs:

(1) Sites with an ATMS client workstation(s) and IEN Access:

The Cities of Montebello, Pico Rivera, La Mirada and Whittier were assigned to this category.

(2) Sites with ATMS client workstation(s), ATMS server functions, IEN access and IEN Server function:

The Cities of Commerce and Norwalk were assigned to this category.

(3) Sites with ATMS client workstation(s), ATMS server functions, IEN access, IEN Server function and hosting for field device communications for partner cities:

The City of Downey, City of Santa Fe Springs and LA County Department of Public Works were assigned to this category.

3.2 Project Specific ATMS Requirements

The ATMS requirements definition task of this project resulted in some requirements that were not included explicitly in the Pomona Valley ITS report. These requirements are as follows:

3.2.1 General

- Integrated CMS and CCTV support in the ATMS

3.2.2 County

- Need for a multi-jurisdictional system

3.2.3 Commerce

- Use of open protocol

3.2.4 Downey

- Need for a multi-jurisdictional system
- Support for IP-based Ethernet communications protocol
- Support for both Type 2070 and Type 170 controllers
- Support of IP-based communications (see below)

3.2.5 Norwalk

- Support for NEMA controllers
- Transit Priority

3.2.6 Santa Fe Springs

- Need for a multi-jurisdictional system
- Support for both Type 170 and NEMA controllers
- Traffic diversion due to rail crossing closures (CMS Usage)
- Transit Priority

3.2.7 Whittier

- Support for NEMA controllers
- Transit Priority

Omitted Requirements:

The ATMS analysis for the I-5/Telegraph Road Project concentrated on the above requirements. The following two requirements were not included in this analysis:

- Transit Priority
- Traffic diversion due to rail crossing closures

These requirements were not included in the ATMS analysis as there are various ways of implementing these features within an ATMS. The requirements for these functions need to be defined in more detail and their implementation would require some custom software independent of basic ATMS selection. In addition, the County and the MTA are involved in a number of transit priority projects which are undergoing evaluation at this time. It would be advisable for cities to wait for the results of these evaluations before deciding on the strategy they want to use.

IP-Based Communications:

The City of Downey has developed a Communications Master Plan to guide and support the deployment of ITS components within the City. The future communications network for the City will be based upon a fiber optic backbone supporting Ethernet-based communications. This imposes a requirement of support of the Internet Protocol (IP) by the central system.

4 VENDOR & AGENCY INTERVIEWS

This Section summarizes information collected by Siemens ITS regarding the four candidate traffic control systems. Gathering of the information was accomplished in two steps.

Initially, the County and Siemens ITS surveyed the identified vendors to gather specific information about their own system. This information gathering was limited to the requirements identified by the I-5/Telegraph Road Project that were not included in the Pomona Valley ITS Project (see Section 3). Information was collected on the following requirements:

- Multi-agency support
- Integrated operations for CMS and CCTV
- Support for different protocols for traffic signals, CMS, and CCTVs.
- Cost

This was performed using a written survey (see Appendix B for the complete questionnaire used in the survey), with responses being provided in writing to Siemens ITS. The Siemens ITS Team reviewed and documented the responses provided by the vendors.

Secondly, the Team surveyed users of the systems to gain an understanding of their implementation experience. The selection of the system users (Agencies) was done in conjunction with the County. Interviews were performed by teleconference after supplying the users with a written survey (see Appendix C for the complete questionnaire used in the survey).

4.1 Vendor Surveys

Table 4.1 presents summary of information gathered from the vendors while Table 4.2 presents the Cost Information provided by Vendors. Table 4.3 presents the listing of central Hardware/COTS required for each system. Central Systems costs were requested for deploying a system with 100 controllers, 5 CCTV Cameras, 5 CMS, and 2 workstations for Graphical User Interface. For CMSs and CCTV, vendors were asked to assume the protocol supported by them and for controllers, use of AB3418E was required. Also, vendors were requested to assume the availability of a suitable communications infrastructure between the Central TMC and local controllers.

Table 4.1: Summary of Information on System Functionality As Provided By Vendors

Vendor/ System	Integrated CMS Support/ Protocols Supported	Integrated CCTV Support/ Protocols Supported	Multi-Jurisdictional Support	Support for AB3418E Protocol	Support for NTCIP	Support for Ethernet IP Based Protocol
AECOM/ Pyramids	No	Yes Vicon Switch Panasonic – Under development	Yes	No	No	No
KHA/KITS	Yes/NTCIP	Yes All manufacturers	Yes	Yes	Yes	No
Siemens ITS/ i2 TMS	Yes/NTCIP	Yes Diamond, Pelco, Cohu, Iteris; Vicon and Sierra switches	Yes	Yes	Yes	Yes
Transcore/ TransSuite	Yes/NTCIP	Yes Javelin, Cohu, Phillips/Burle, Others	Yes	Yes	Yes	No

Table: 4.2: System Cost Information As Provided By Vendors

Vendor/ System	License Fee	System Integration	Computer Hardware	Third Party COTS	Total System Cost	Annual Maintenance
AECOM/ Pyramids	$185,000	$67,000	$30,525	$5,279	$287,804	$25,000
KHA/KITS	$125,000	$50,000-$100,000	$22,000	$8,700	$205,700-$255,700	$15,000
Siemens ITS/ i2 TMS	$120,000	$150,000	$18,000	$2,900	$288,900	$18,000
Transcore/ TransSuite	$150,000	$150,000	$53,000	$2,100	$355,100	$50,000

Table: 4.3: Estimated Costs for Central Hardware/COTS Software

AECOM/Pyramids		KHA/KITS		Siemens ITS/i2 TMS		Transcore/TransSuite	
Hardware		**Hardware**		**Hardware**		**Hardware**	
Database server, Communication Server		Database server	$6,000	2 Server	$12,000	5 ATMS SERVERS (One each for TCS, CCTV, CMS, Database, Communications)	$40,000
		Communication server	$4,000				
Workstation		2 Operator Workstation computers (given)	$5,000	2 Workstations	$4,000	2 Workstations	$3,000
8 Port 10/100 Network Switch, Proconnect 2 Port KVM Switch Kit PS2, Dual 9-Pin Serial Add-in Card, Intelligent Communication Module (2CC 6DC), Miscellaneous cables		Multiport serial controller	$2,500	Network/Comm. Equipment	$2,000		
		Network switch, Miscellaneous cables, Monitor, KVM Switch, UPS	$4,000				
Subtotal Hardware	**$30,525**	**Subtotal Hardware (plus shipping)**	**$22,000**	**Subtotal Hardware**	**$18,000**	**Subtotal Hardware**	**$53,000**
Software		**Software**		**Software**		**Software**	
SQL Server (5 User/CAL)	$2,291	SQL Server	$1,800	MS SQL Server 2000 w/5 CALS	$1,400	Oracle, 7 licenses (5 servers & 2 W/S)	$2,100
Crystal Reports (2)	$340	Crystal Reports	$600	MS Windows 2000 Server w5/ CALS	$900		
Page Gate (Paging Software)	$308	Paging Software	$1,500	Veritas Backup Exec	$600		
Microsoft Office (3)	$2,340	ArcView	$1,600				
		Synchro	$3,200				
Subtotal Software	**$5,279**	**Subtotal Software**	**$8,700**	**Subtotal Software**	**$2,900**	**Subtotal Software**	**$2,100**

4.2 Agency Surveys

Tables 4.4 through 4.8 present summary of information gathered from the five Agencies using the four systems as follows:

- San Jose, CA (Series 2000)
- Windsor, Canada (KITS)
- Philadelphia, PA (KITS)
- City of Cheyenne, WY (Pyramids)
- Houston Metro, TX (icons™/i2 TMS)

The information collected was divided into the following five categories:

- Installation History
- ATMS Size
- Support for Controllers (compiled from Pomona Valley ITS Report)
- System Cost
- Maintenance/Upgrade Issues
- Staffing

Please note that the collected information on system functionality represents the agency responses, and does not necessarily reflect the current functionality available from the four systems. In all cases, significant upgrades have been made to the systems since these installations.

Table 4.4: Summary of Agency Responses
Agency: San Jose
System/Vendor: Series 2000 / TransCore

Installation History	ATMS Size	System Cost	Maintenance/ Upgrade Issues	Staffing

• City has been using Series 2000 system for 12 years. The system currently utilizes DEC Alpha, OS/2, and Windows NT operating systems.
• The City is in the process of upgrading this system – upgrade is happening in stages.
• GUI was upgraded to Windows NT in 2001 (Some features will be upgraded in the future)
• Communications Server was upgraded in 2002.
• One application is still running on DEC Alpha. It is intended to upgrade this to Windows NT system in the future.
	• 800 – NEMA controllers
	• CMS system is OS/2 based – not integrated with Series 2000.
	• CCTV system is provided by COHU, not integrated with Series 2000
		• Total System: $30 million including field communications.
		• Transcore:
		  • Initial System - $180k
		  • Upgrades – 250k
		  • Computer Hardware - $70k
		  • COTS - $40k
		  • TMC - $100k
			• Open Purchase Order for $20,000.
			• Vendor does not provide any automatic software upgrades.
			• No plans to upgrade to TransSuite as long as system is proven.
			• Maintenance calls are answered by staff in Atlanta
			• City can add intersections themselves since the upgrade to communications server.
			• City has the Site license as long as City of San Jose is controlling the signals.
				• No staff required to maintain the system
				• 8 people are dedicated to timing plan development operation
				• No involvement from IT personnel

Table 4.5: Summary of Agency Responses
Agency: Windsor, Canada
System/Vendor: KITS / KHA

Installation History	ATMS Size	System Cost	Maintenance/ Upgrade Issues	Staffing
• DOS Based System – ESCORTS installed in 1987. • Upgrade underway, new system will be all PC based, will be installed in next few months.	• 270 – Type 170 controllers using Sonex Telegenics ZDC software. • At this time no CMSs and CCTVs planned	• Initial Cost - $1 million, includes License Fee, Hardware, System Integration costs. • City has spent another $3.5 million system implementation which has included controllers and field communications. • The cost of recent upgrade was not available.	• No maintenance contract with KHA • System has not been upgraded at all since its installation. • Forthcoming upgrade considered significant. • City has not requested any new features from KHA since the system installation • The current upgrade will include Fire Pre-emption feature.	• The System is operated/maintained by two staff persons • No IT persons are involved with the system. • Staff is very hands-on with the system and knows the system very well. • Staff capable of re-installing the system, adding controllers etc.

Table 4.6: Summary of Agency Responses
Agency: Philadelphia, PA
System/Vendor: KITS / KHA

Installation History	ATMS Size	System Cost	Maintenance/ Upgrade Issues	Staffing

• OS/2 Based System – ESCORTS installed in 2001.
• The City's bidding process took a long time. The process started in 1988, when finally City awarded the contract to KHA in 2001, it was based on 1994 specifications which called out for OS/2 system.
• The above system does not meet all of system's functionality, City added more money to the contract and is currently negotiating a contract with KHA for a MS Windows based system and some additional features.
	• 500 Type 170 controllers using Bi Tran 233 PHL 2.8 software
	• City plans to install 2070s, CMSs, and CCTVs in the future.
	• No multi-agency operation at this time.
		• Approximately $1.5 million – does not include hardware or COTS but includes services such as fiber-optic inspection, construction management etc.	• No maintenance contract in place
			• City plans to have a maintenance contract in place which would be based on time and material – for services only - will not include any software upgrades.
			• New features requested:
			  ◦ Auto Backup
			  ◦ Use redundant fiber-optic capability
			  ◦ Remote access for Police
			  ◦ Support for technicians to have database access on their laptops.
			• KHA maintenance personnel located in Phoenix.
				• The System is operated/maintained by one staff person.
				• No IT persons are involved with the system.
				• Staff capable of re-installing the system, adding controllers etc.

Table 4.7: Summary of Agency Responses
Agency: City of Cheyenne
System/Vendor: Pyramids / AECOM

Installation History	ATMS Size	System Cost	Maintenance/ Upgrade Issues	Staffing
• 1999 – upgraded from TSC/2 (closed loop system) • New features included Sequel Server and support for Crystal Reports, and SYNCHRO.	• 113 – Type 170 controllers using Wapiti software • 60 NEMA controllers • Server is located at the City, State dials into the system for viewing purposes, does not control. • City responsible for all control features.	• The system upgrade - $25,000 in addition to hardware • City does graphics in-house.	• No maintenance contract in place • City has experienced very few problems. • Vendor is paid for their time if called for any major issues • No regular software upgrades are provided. • If new features are requested, City pays for them. • License includes 200 intersections and 10 dial-up connections.	• The system operates by itself, no dedicated operator • 3 staff members are involved with the system, monitor the system on exception basis. • No IT personnel involvement.

Table 4.8: Summary of Agency Responses
Agency: Houston Metro
System/Vendor: icons™ (i2 TMS) / Siemens ITS

Installation History	ATMS Size	System Cost	Maintenance/ Upgrade Issues	Staffing

• Initial system installed in 1999.
• System has been upgraded twice within the current project to reflect new software releases.
• System supplied by Siemens ITS under sub contract to GEC Prime.
	• 85, Type 2070 controllers running NextPhase software.
	• The final system size is expected to be 1500 intersections in next 10 years.
	• The system was modified to support:
	  ◦ IP address messaging for wireless CDPD
	  ◦ Transit Priority
		• Total system integration budget - $1.4million – contract based on time and material
		• License Fee for central
		  ◦ $50k for 250 intersections
		  ◦ $5k for each workstation up to $50k maximum.
			• 5-year contract with the Prime contractor – provides free upgrades to the software (included with the system cost).
			• Plans to enter into a contract with the vendor when initial 5-year contract with Prime is over.
				• No IT personnel involvement.

4.3 Analysis

This section presents an analysis of issues identified based on the information collected from the vendors and agencies. The premises for the analysis include the following:

- Lack of responsiveness on the part of Bi Tran resulted in the removal of the QuicNet system for consideration.
- ***Icons***™ is the name under which a subset of the Siemens ITS-developed i2 TMS traffic management software is marketed by Econolite, who is an exclusive distributor of the software. i2 TMS is marketed and distributed by the Gardner Consulting group of Siemens ITS. For the most part, these two packages can be considered equivalent, however, i2 TMS does have extensions (e.g. some specific controller and communications support) which may not be available in the standard ***icons***™ system.
- The KHA Pomona Valley survey and the interviews with the Windsor and Philadelphia users referenced the Escort system. The information provided by KHA as part of this project's survey related to the KITS system, which is being classified as an upgraded Escort. This includes moving the system from an OS/2 platform to an MS Windows platform. A minimum requirement for this project's ATMS is that they operate on the latter.

  In this analysis, it is being assumed that the Escort functionality will be maintained in the KITS system.
- The AECOM Pyramids is an upgrade from the TSC/2 system. In this analysis, it is being assumed that the TCS/2 functionality will be maintained in the Pyramids system.
- The KHA Pomona Valley survey and the interviews with the City of San Jose referenced the Series 2000 system. The information provided by TransCore as part of this project's survey related to the TransSuite system, which is being classified as an upgraded Series 2000. This includes moving the system from a mixed DOS, OS/2 and DEC Alpha based system to an MS Windows platform. A minimum requirement for this project's ATMS is that they operate on the latter.

  In this analysis, it is being assumed that the Series 2000 functionality will be maintained in the TransSuite system. It would appear that the TransSuite system has not yet been deployed.

4.3.1 Operating System

Except for i2 TMS which was developed in the MS windows environment, all other systems are an upgrade from non-MS Windows platforms to MS Windows-based systems.

The City of San Jose is operating a DEC Alpha-based Series 2000 system and has no plans to upgrade to a TransSuite system. However, there have been several upgrades to sub-systems of the existing Series 2000 system, such as converting the communications server and the GUI to MS Windows-based components. At the time of writing, TransSuite had not yet been implemented in an operational setting.

The Cities of Windsor and Philadelphia are using older versions of KHA's system, Escort. The system in Windsor is DOS based and the system in Philadelphia is OS/2 based. Both cities are in the process of negotiating a contract to upgrade to a Windows- based KITS system.

The City of Cheyenne had been using a DOS based system (TSC/2) until the end of 2002. This system was going through an upgrade and this upgrade (Pyramids) was installed in December 2002.

It can be concluded from the above that the Agency surveys for TransSuite, Pyramids, and KITS do not reflect experience with the systems which are the candidates for deployment in this project.

4.3.2 Support for controllers

According to vendor responses, all systems support Type 170 controllers. In the case of i2 TMS/***icons™,*** current support comprises status monitoring, time synchronization, plan selection, and system detector data status.

All systems support Type 2070 controllers. AECOM supports Type 2070 controllers from one Manufacturer, Safetran.

According to the survey, all systems provide some form of support for NEMA controllers. Pyramids (TCS/2 upgrade) supports NEMA controllers through a field-based interface unit (ICM). The use of a controller interface unit approach limits access to controller functionality to timing plan and schedule parameters and precludes direct access to the controller database. In addition, the introduction of an additional item of hardware in the field may reduce system reliability.

Series 2000 and KITS have a similar solution in deployed legacy systems. As the newer versions of these systems include support for the NTCIP protocol, it is anticipated that future interfaces to NEMA controllers will utilize the NTCIP protocol. It should be noted that Series 2000 already supports Econolite's ASC/2.

i2 TMS offers NEMA support under the NTCIP, AB3418E and native controller manufacturer protocols; ASC/2 support is provided under the first two of these protocol options.

4.3.3 Integrated ATMS/CMS and CCTV operations

According to the vendor responses, all systems except Pyramids support an integrated CMS feature utilizing the NTCIP protocol.

In addition, all systems support integrated CCTV feature using a range of protocols and switches.

None of the agencies surveyed have either the CMS or CCTV features integrated with ATMS at this time.

However, Transcore has stated that this functionality is provided in the City of San Jose OS/2-based integrated workstation which is independent of the ATMS Graphical User Interface. KHA has stated that the upgraded system in the City of Windsor will be equipped with integrated CMS functionality and the upgraded system in the City of Philadelphia will be equipped with integrated CCTV functionality.

4.3.4 Support for Multi-Jurisdictional Functionality

All vendors have stated that they support multi-jurisdictional functionality by providing user rights at the device level. None of the agencies surveyed were using this feature.

4.3.5 Support for Communications Protocols

All systems except AECOM support both AB3418E and NTCIP protocols. Only i2 TMS currently supports an Ethernet, IP-Based protocol.

4.3.6 Maintenance Agreements

Only San Jose and Houston Metro have on-going maintenance contracts with the vendor.

In the case of San Jose, the maintenance contract is in the form of a Task Order where the City requests the vendor to perform work as the need arises. This does not include any arrangement for the City to receive regular software upgrades from the vendor. The City seems to be satisfied with this arrangement and does not see any need to get regular software upgrades.

In the case of Houston Metro, the Agency has a five-year maintenance contract through the GEC Prime consultant and plans to have a maintenance contract directly with Siemens ITS on its expiration. The contract includes free upgrades to the central as well as local software.

None of the agencies except Houston Metro have received any free upgrades from their vendor. All upgrades are requested and paid for by the agencies.

4.3.7 IT staff Involvement

All agencies surveyed stated that they do not like to get their IT staff involved with the maintenance of their traffic signal control system equipment.

4.3.8 Cost

KITS has the lowest estimated overall costs, varying between approximately $206,00 to $256,000. The cost of installing and integrating the specified Pyramids system is estimated to be about $288,00; the equivalent cost for i2 TMS system installation and integration is about $290,000 and the cost of installing and integrating a TransSuite system is about $355,100.

The license fees for the systems range between $120,000 to $185,000 for a 100 signal system with five CMSs and CCTVs. The license fees for these systems are one-time fees for the size quoted.

Computer hardware costs (including commercial-off-the-shelf software) for i2 TMS and KITS are approximately $19,000 and $31,000 respectively. Equivalent costs for the other systems are: Pyramids ($36,000) and TransSuite ($55,000).

Annual maintenance cost for KITS system is the lowest at $15,000, i2 TMS maintenance cost is $18,000. The Pyramids and TransSuite systems have higher annual maintenance costs at $25,000 and $50,000 respectively. Note that these are typical costs provided by the vendor and may include varying degrees of support. The actual costs may differ significantly based on agency needs and system size.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Some Considerations

The objective of this exercise is to derive a short-list of candidate systems to form the basis for a more detailed system selection process during Phase 2 of the project. It should be noted that the starting point is down-selection to five candidate ATMSs as a result of the County's own evaluation of ATMS with Type 170 controller support. Since all of the cities in the project area that follow NEMA standards are using ASC/2 controllers, an essential feature of the ATMS for these cities is support of this type of controller. Siemens ITS contacted Econolite, the manufacturer of the ASC/2, and confirmed that i2 TMS/icons™, KITS and TransSuite support ASC/2 controllers.

The approach taken in deriving recommendations has been to establish if any of the candidate systems do not meet the requirements established for use by the agencies, or to raise any significant concerns that should be addressed in the next phase of the project.

It should be recognized that the majority of traffic control systems are under continuous development. This is necessitated, for example, by new releases of the third-party COTS software which the systems use, changes in field equipment (e.g. controllers and controller firmware) and the addition of new functionality as custom features are added for customers. As a result, an analysis such as this represents a snapshot of a system's capabilities; a situation which may change at a later date.

Vendors will often anticipate the availability of functionality prior to it being available as it is "in the pipeline of development". Such functionality may or may not be available at the time of procurement of a system.

As a consequence of the above, even though specific systems are recommended for the project cities, it may be worthwhile to solicit proposal and bids from other suppliers prior to procurement to confirm if significant changes have (or have not) been made in their products.

Finally, any estimates of system costs at this stage should be treated as purely budgetary. Only when the system supplier has to commit to provide functionality and services can the estimates be considered firm. The estimates in this report are likely to be useful for relative comparisons only.

None of the candidate systems provide support for the Type 170 controller using any variant of the LACO4 firmware. All systems will therefore need modification for use in any installations involving this field equipment.

5.2 Conclusions: System View

5.2.1 QuicNet

Lack of responsiveness on the part of Bi Tran resulted in the removal of the QuicNet system for consideration. The City of Commerce, however, has an existing QuicNet system. Some consideration therefore has to be given to this system due to its legacy status.

Key issues for the City of Commerce are the need to support CCTV and a desire to move to an open protocol for its upgraded ATMS (the system currently uses a proprietary protocol).

From information received as part of other projects, it is understood that the QuicNet system does support integrated CCTV but has only limited integrated DMS operations. Bi Tran has indicated that QuicNet supports both NTCIP and AB3418 protocols, but this could not be verified.

5.2.2 i2 TMS/icons™/

The one area in which the i2 TMS/ ***icons***™/ software shows deficiencies for this project is in the support of the Type 170. Only one such system has been deployed to-date with Type 170's and Caltrans C8 controller firmware in the Bay Area. The support is for status monitoring only using the AB3418 protocol. Development is currently under way to provide complete support for a Type 170 software package.

With respect to Type 2070 and NEMA support, there is a large installed base of i2 TMS/***icons***™ systems supporting these controllers using direct communications and a variety of protocols and controller firmware. The Econolite ASC/2 is one of the NEMA controller types supported.

The i2 TMS/***icons***™ systems lend themselves to consideration for Type 170, Type 2070 an NEMA controller-based systems, those requiring integrated CMS and CCTV control and for multi-jurisdictional systems. i2 TMS also meets the specific requirement for the City of Downey in its support of IP-based communications.

5.2.3 KITS

In this analysis, it is being assumed that the current Escort functionality will be maintained in the KITS system.

KITS support of NEMA controllers is through a controller interface unit. The use of this approach limits access to controller functionality and precludes access to the controller database. In addition, the introduction of an additional item of hardware in the field tends to reduce system reliability. This is not a recommended practice for new systems.

KITS support for Type 2070 controllers is currently limited to Bi Tran controller firmware. Deployment for cities intending to use other 2070 controller firmware would result in central system modifications.

Given the above, the forthcoming KITS system would appear to support the functionality required by the project, with the exception of its use with NEMA-based systems.

The KITS systems lends itself to consideration for Type 170 and Type 2070 controller-based systems, those requiring integrated CMS and CCTV control, and multi-jurisdictional systems.

5.2.4 Pyramids

The AECOM Pyramids is an upgrade from the TSC/2 system. In this analysis, it is being assumed that the current TCS/2 functionality will be maintained in the Pyramids system.

Pyramids support of NEMA controllers is through a controller interface unit. The use of this approach limits access to controller functionality and precludes access to the controller database. In addition, the introduction of an additional item of hardware in the field tends to reduce system reliability. This is not a recommended practice for new systems.

Pyramids support for Type 2070 controllers is limited to the OASIS controller firmware. Deployment for cities intending to use other 2070 controller firmware would result in central system modifications.

The Pyramids system lends itself for consideration for Type 170 and Type 2070 controller - based systems with no intention of deploying CMS in the field.

5.2.5 TransSuite

In this analysis, it is being assumed that the current Series 2000 functionality will be maintained in the TransSuite system. It would appear that the TransSuite system short-listed by the County has not yet been deployed.

TransSuite support for Type 2070 controllers is currently limited to the Econolite 2070 controller firmware. Deployment for cities intending to use other 2070 controller firmware would result in central system modifications.

Its support of NEMA controllers without the use of a controller interface unit, is limited to the Econolite ASC/2 through NTCIP.

TransSuite lends itself for consideration to Type 170, Type 2070 and ASC/2 Econolite (NTCIP) based systems, those requiring integrated CMS and CCTV control, and multi-jurisdictional systems.

5.3 Recommendations: City View

City of Commerce

In deciding the approach to take for the City of Commerce, the following factors need to be taken into account:

1. Provision of a CCTV control interface: Though not currently available, Bi Tran can be asked to quote on provision of this feature and the cost compared to provision of a stand-alone CCTV control feature independent of the system.

2. Open protocols: A move to an open protocol would involve an upgrade of the controller firmware and a central upgrade. Impact on controller hardware would be limited by use of AB3418E (as opposed to NTCIP which would require additional hardware such as the 470i board).

3. Controller firmware: If the controller firmware is being upgraded, consideration can be given to use of the County's LACO4.

4. Given the use of LACO4 in Commerce controllers, then the cost of a Bi Tran upgrade should be measured against a central upgrade to an alternative ATMS.

Recommendations:

1. The target for the City of Commerce should be Type 170 based controllers using the AB3418E protocol.

2. Consideration should be given by the City to the use of the LACO4 controller firmware.

3. In procuring the system, alternative proposals should be obtained for:

    - Upgrading the QuicNet central
    - Changing out the system with an ***icons***™/i2 TMS, KITS, TransSuite or Pyramids system

City of Downey

As host to the City of Montebello intersections, the City of Downey's system requires multi-jurisdictional support. The City is intending to maintain the use of Type 170 (LACO) controllers, but eventually move to the use of Type 2070's, implement IP-based communications and deploy CCTV surveillance.

Recommendations:

1. Alternative proposals should be obtained for i2 TMS, TransSuite, KITS and Pyramids systems.

City of Santa Fe Springs

As host to the Cities of Whittier and Pico Rivera intersections, the City of Santa Fe Spring's system requires multi-jurisdictional support. The system will need to support Econolite NEMA controllers and Type 170 (LACO) controllers. Santa Fe Springs wishes to deploy CMS (as part of rail-crossing mitigation) and transit priority. The latter is also the case for the City of Whittier.

Recommendations:

1. Alternative proposals should be obtained for ***icons***™/i2 TMS, KITS and TransSuite systems, as these are the only systems that currently support ASC/2 controllers.
2. Transit Priority should be included in the requirements for the system.

City of Norwalk

The City intends to maintain its Econolite NEMA controller base and implement transit priority.

Recommendations:

1. Alternative proposals should be obtained for ***icons***™/i2 TMS, KITS, and TransSuite systems, as these are the only systems that currently support ASC/2 controllers.
2. Transit Priority should be included in the requirements for the system.

5.4 Recommendations Summary

Table 5.1 presents a summary of ATMS system recommendations for the four cities based on the above analysis.

Table 5.1: ATMS System Recommendations Summary

City	Hosting ATMS Server For	Controllers to be supported	Recommended ATMS Options*

Commerce	• Commerce	• Type 170	• Upgrade existing QuicNet II to QuicNet IV
			• Change out the system to one of the following:
			  • i2 TMS/ ***icons***™
			  • KITS
			  • TransSuite
			  • Pyramids

Downey	• Downey • Montebello	• Type 170 • Type 2070 (Downey future)	• i2 TMS/ ***icons***™ • KITS • Pyramids • TransSuite
Santa Fe Springs	• Santa Fe Springs • Pico Rivera • Whittier	• Type 170 • Econolite ASC/2	• ***icons***™/i2 TMS • KITS • TransSuite
Norwalk	• Norwalk	• Econolite ASC/2	• ***icons***™/i2 TMS • KITS • TransSuite

* The recommendations do not preclude the solicitation of bids and proposals from other vendors in order to verify any significant changes in the products from the time of this analysis. Ordering is alphabetical.

Appendix A

List of ATMS System Features from Pomona Valley ITS Report

Table 3.2 ATMS General and System Features Comparison

Vendor	Bi Tran	Eagle	Gardner	Naztec	Transcore	Kimley Horn	AECOM
System	**QuicNet/4**	**Actra**	**icons**	**Streetwise**	**Series 2000**	**Escort**	**TCS-II**
Control Strategy							
Sync Pulse (Define Comm. Rate)	No	Once per cycle	N/A	No	N/A	N/A	N/A
Closed-loop with On-Street Masters	Yes	Yes	In Development	Yes	N/A	N/A	Yes
Time-Based Coordination with Centralized Management	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Centralized	Yes	Yes	Yes	Yes	N/A	Yes	N/A
Server Hardware	Pentium	Pentium	Pentium III	Pentium II	Pentium II (will be available in early 2003)	Pentium II	Pentium II
Operating System	Win NT Win 2000 Win 98	Win NT Win 2000	Win 2000	Win NT, Win , 2000, Win 98, Win 95, OS/2	Win NT (will be available in early 2003)	Win NT	Win 98/NT
LAN Capabilities	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WAN Capabilities (Fire/Police Remote Workstation)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Capacity							
Local Traffic Signals	2000 to 4000	32 per channel	9999	No Limit	1000+	Unlimited	1000+
On-Street Masters	2000	Unlimited	Unlimited	No Limit	N/A	Unlimited	N/A
Control Areas (Sections or Groups)	2000 groups	Unlimited	Yes	No Limit	100+	Unlimited	N/A
System Detectors	8 per controller, 4000 max.	Unlimited	9999	48 per Field Master	1000+	Unlimited	N/A
Coordination Timing Plans	32	48	Function of controller firmware	48	32	Unlimited	N/A
Local Controller Compatibility (communications)							
NEMA (Hardware/Software)							
Eagle	N/A	Yes	Yes	Yes	No	N/A	N/A
Econolite	N/A	Yes	Yes	Yes	Yes	Yes	N/A
IDC-Multisonics	N/A	Yes	Yes	Yes	N/A	N/A	N/A
CSC	N/A	Yes	No	Yes	No	N/A	N/A
Peek-Transyt, TCT	N/A	Yes	Under Development	Yes	Under Development	N/A	N/A
IDC-Traconex	N/A	Yes	Partial	Yes	Yes	N/A	N/A
Other (Identify)	McCain TS1 Vector TS1 Vector TS2	N/A	McCain Vector	N/A	All NEMA with RCU	Yes, with modification	Any NEMA controller with a DMJM supplied Interface unit (ICM)
Type 170/Type 170E (Firmware)							

Vendor	Bi Tran	Eagle	Gardner	Naztec	Transcore	Kimley Horn	AECOM
System	**QuicNet/4**	**Actra**	**icons**	**Streetwise**	**Series 2000**	**Escort**	**TCS-II**
Type 170 / Type 170E	Both, and Type 179	No	AB 3418 status monitoring , time synchronization, plan selection, and system detector data supported	Modifications Required	Yes, via Remote Control Unit (RCU)	Yes	Yes
Preferred Firmware	200, 233 and others	N/A	N/A	N/A	N/A	233	W4IKS v.48a+
Other Compatible Firmware	N/A	N/A	N/A	970 (developed by Naztec)	N/A	Bitran and Wapiti	N/A
ATC (2070/2070N) (Software)							
Type 2070 / Type 2070N	233 2070	Both	Type 2070 Type 2070N Type 170 ATC	Both	N/A	Yes	Safetran 2707 controller
Preferred Software	N/A	SE-PAC	NextPhase	Apogee	N/A	Bitran	OASIS-2070 Software
Other Compatible Software	N/A		EPAC, ASC2070	N/A	N/A	N/A	N/A
NTCIP Communication Protocol Support	Yes, DMS	Yes	Yes	Yes	Yes	Yes	Yes
AB3418 (or AB3418E)	Yes	No	Yes	Yes	N/A	Yes	N/A
SHOWCASE Communication Protocol Support	Yes, as becomes available	Yes, as becomes available	Yes	No	Yes, as becomes available	Yes	Yes
Communications Experience							
Fiber Optics Cable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Twisted Pair	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Radio	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Phone Dial Up	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Microwave	Yes	Yes	Yes	Yes	Yes	Yes	N/A
CDPD	Yes	N/A	Yes	No	N/A	Yes	N/A
Ethernet	Yes	Yes	Yes	Yes	N/A	Yes	Yes
Coax Cable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Communication Requirement (Half Duplex/Full Duplex)	Full	Half or Full	Both	Both	N/A	N/A	N/A
Communication Baud Range							
Master Controller (bps)	19200	1200 to 19200	1200 to 57,600	56000	N/A	N/A	N/A
Local Controller (bps)	1200 to 9600	1200 to 19200	1200 to 57,600	56000	N/A	1200 to 9600	N/A
# of Signals on one 1200 Baud Line	32	32	8	8	7	8	N/A
Local Communications Interface	RS-232	TWP, RS232, Fiber	All common communication protocols	56K	Internal and External via Remote Control Unit (RCU)	233	Local controller or RS-232
Controller Polling Rate							
Typical/Recommended	Once per second	Once per minute/once per second	once per second	19.2	Once per second	Once per seconds – all controllers at all times	N/A
Maximum	Once per second	Once per second	continuous	56K	Once per second	Once per seconds – all controllers at all times	N/A

Vendor	Bi Tran	Eagle	Gardner	Naztec	Transcore	Kimley Horn	AECOM
System	**QuicNet/4**	**Actra**	**icons**	**Streetwise**	**Series 2000**	**Escort**	**TCS-II**
Communication Upload/Download Duration	One minute	10 sec to 4 minutes	13.7sec for upload 26.6 sec for download	One minute	Based on size of up/download	About 30 seconds for entire controller database	N/A
Traffic Control Features							
Unattended System Operation	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Backup Operation	Local controller time-based coordination	Local controller time-based coordination	Local controller time-based coordination	Local controller time-based coordination	Local controller time-based coordination	Local controller time-based coordination	N/A
Coordination Plan Selection Methods							
Time of Day	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Day of Week	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Traffic Responsive Plan Selection	Yes	Yes	Yes	Yes	Yes	Yes	Yes (2070)
Manual	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Critical Intersection Control (CIC)	Yes	Yes	No – please provide definition	Yes	Yes	Yes	N/A
Dynamic change of subgroups to allow different cycle lengths for different subareas	Yes	Yes	Yes	No	Yes	Yes	N/A
Allow Multiple Remote Users	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Override Capability	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Data Logging Features	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Error/Failure Logging and Diagnostics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alarms							
Prioritize	Yes	Yes	Future Release	No	No	Yes	Yes (2070)
Pager	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Offline Capability During Communication Failure	Yes	Controller reverts to Local Time Base Control	The controller reverts back to local stored TOD plans	Yes	Yes	Controller reverts to Local Time Base Control	N/A
Offline Preparation of Timing Plans	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Graphics (Define)	Yes	CAD Microstation ESRI format	Win 2000 based	All industry standard graphical formats	User defined with Softgraph	All industry standard graphical forms	Yes
Graphical User Interface (GUI)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Signalized Network	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Real-time Display of Intersection Operation	Yes	Yes	Yes	Yes	N/A	Yes	Yes
Display Other ITS Elements (CCTV, DMS)	Yes	Yes,	Yes	Yes	N/A	Yes	N/A
Display Priority/Preemption Data	Yes	Yes	Yes	Yes	N/A	Yes	Yes
Display Police/Fire AVL/AVI data	Yes		Yes for AVL	No	N/A	Yes	N/A
Evaluation							
Off-Line Calculation of MOEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Vendor	Bi Tran	Eagle	Gardner	Naztec	Transcore	Kimley Horn	AECOM
System	**QuicNet/4**	**Actra**	**icons**	**Streetwise**	**Series 2000**	**Escort**	**TCS-II**
On-Line Calculation of MOEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Display Raw Collected Data	Yes	Yes	Yes	Yes	N/A	Yes	N/A
Pattern Verification Capability	Yes	Yes	Yes	Yes	N/A	Yes	N/A
Plan Storage Duration	Indefinitely	Stored at local EEPROM	Indefinite	N/A	Central and Local	Indefinite	N/A
Easy Copy Features	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Reports	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Relational Database	Yes		Yes	Interface only	N/A	Yes	Yes
Database Options							
SQL	Yes	Yes	Yes	N/A	No	Yes	Yes
Microsoft Access	Yes	Yes	Partial	Yes	No	Yes	Yes
Oracle	Yes	No	Yes	N/A	Yes	Yes	Yes
Other	Paradox Sybase	N/A	N/A	N/A	N/A	Interface Paradox	N/A
Detection							
Local Detectors	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Advanced Detectors	Yes	Yes	Yes	Yes	Yes	Yes	Yes
System Detection							
Volume	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupancy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Density	Yes	N/A	Derived	Yes	Derived	Yes	N/A
Speed	Yes	Yes	Yes	Yes	Derived	Yes	Yes
Video Detection	Yes	Yes	Yes	Yes	N/A	Yes	N/A
ATMS/ATIS							
Closed Circuit Television (CCTV)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dynamic Message Signs	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Traveler Information		Web Server	Export of real-time data	Web Server	N/A	Yes	N/A
Video Display Wall	Yes	Yes	Yes	Yes	N/A	Yes	N/A
Advanced Functions							
Transit Priority Interface	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Emergency/Rail Preemption	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Incident Management	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Multi-jurisdictional Access	Yes	Yes	Yes	Yes	N/A	Yes	N/A
Off-line Preparation of Timing Plans	N/A	N/A	Please explain	N/A	N/A	Yes	Yes
Transyt 7F Upload/ Download	Yes	Up/Down	No	No	Yes	No	No
Syncro Upload/Download	Yes	Up/Down	Yes	Up/Down	No	Yes	Yes
PASSER	N/A	Up/Down	No	Yes, Passer IV	N/A	No	No
Other Upload/Download (Identify)	NETSIM	N/A	nextWeb with NextPhase	N/A	1.5GC	N/A	CORSIM
Coordination Optimization	Yes	Yes	Yes	Yes	N/A	Yes	N/A
GIS-based Map Display Capability	Yes	Yes	No	Yes	No	Yes	N/A

Vendor	Bi Tran	Eagle	Gardner	Naztec	Transcore	Kimley Horn	AECOM
System	QuicNet/4	Actra	icons	Streetwise	Series 2000	Escort	TCS-II
Other (Identify)	N/A	N/A	Real-Time Space Diagrams, Real-Time Split Monitor, Color Coded Links	N/A	1) A port to Win 2000/XP is in process 2) Support 1.5GC use of Transyt 7F	Windows XP, Real-time Space Diagram, CCTV scheduling	N/A

Note: N/A means that no sufficient supporting data or information is currently provided by the vendor or from Web-based research to indicate the specified features.

Appendix B
Vendor Questionnaire

SIEMENS

Gateway Cities Traffic Signal Synchronization and Bus Speed Improvement Project

I-5/Telegraph Road Corridor

ATMS Alternative Analysis

Vendor Questionnaire

Vendor Name:_____

Vendor Contact:_____

Date and Time of Interview:_____

General Information:

1. Name of your ATMS system?

2. What is the latest Version Number or Release?

3. Does your ATMS system support single ATMS with multi-site clients?

CMS and CCTV Support:

4. Does your ATMS system support Changeable Message Signs (CMS)?

5. If yes, what types of protocols, switches, manufacturers and models does it support?

6. Does your ATMS system support Closed-Circuit Television (CCTV)?

7. If yes, what types of protocols, switches, manufacturers and models does it support?

Multi-Jurisdictional Support:

8. Does you ATMS system support multi-jurisdictional function? If yes, briefly explain how.

9. Does your ATMS system support multi-jurisdictional security? If yes, briefly explain how.

Cost:

10. Please give a cost-breakdown for installing a standard ATMS system with the following attributes:
    - Assume a communication infrastructure exists
    - 100 existing Type 170 controllers
    - Use of AB3418 protocol
    - 5 CCTV Cameras *
    - 5 CMS's *
    - 2 Workstations for Graphical user Interface
    - One or more server, based on your system requirements

    * For CCTV camera and CMS, assume the use of protocols supported by your system

    Please provide cost breakdowns for the following items:
    - License Fee
    - System integration costs (include labor for system definition, in-house system integration, on-site system integration, acceptance testing, documentation and training)
    - Computer Hardware costs
    - COTS software (like MS SQL Database, Win2000 Server license, etc if not part of the Hardware costs)
    - Annual Maintenance Cost

Reference:

11. Please provide recent references for ATMS systems that you have installed in the last 3 years by filling out the following table. Please select clients that have one or more of the features listed in the table.

	Features Supported (Please Check)									
Name of Client with Phone number, Fax number, email address and System Installation Date	**Multi-jurisdictional**	**CMS**	**CCTV**	**Non-cable based comm.**	**AB3418E**	**Ethernet / IP-Based**	**NTCIP**	**Controller / Firmware**	**CMS Vendor Protocol**	**CCTV Vendor Protocol**
_____										
_____										
_____										
_____										

	Features Supported (Please Check)									
Name of Client with Phone number, Fax number, email address and System Installation Date	**Multi-jurisdictional**	**CMS**	**CCTV**	**Non-cable based comm.**	**AB3418E**	**Ethernet / IP-Based**	**NTCIP**	**Controller / Firmware**	**CMS Vendor Protocol**	**CCTV Vendor Protocol**
_____ _____ _____ _____ _____										
_____ _____ _____ _____ _____										
_____ _____ _____ _____ _____										
_____ _____ _____ _____ _____										

Appendix C
Agency Questionnaire

SIEMENS

Gateway Cities Traffic Signal Synchronization And Bus Speed Improvement Project

I-5/Telegraph Road

ATMS Alternative Analysis

Agency Questionnaire

Agency Name:_____

Agency Contact:_____

Date and Time of Interview:_____

Informational:

1. What type of ATMS system do you have? Please provide vendor name/s and version number.

2. What is the size of the ATMS System? Please provide devices (controllers, CMS's, CCTV's …)

System Procurement / Installation Cost:

3. Did the ATMS system procured need any software modifications to meet Agency requirements?

4. What was the final cost of the ATMS system after installation?

5. Please provide cost breakdowns for the following:
   - License Fee
   - System integration costs
   - Software Upgrade (if system required upgrades)
   - Computer Hardware costs
   - COTS software (like MS SQL Database, Win2000 Server license, etc if not part of the Hardware costs)

O&M Issues:

6. Do you have a maintenance contract with the vendor?

7. Does the maintenance contract include software upgrades? If no, do you have a separate contract for software upgrades?

8. What type of maintenance contract do you have (Annual/Lifetime/per call)? Please provide cost information.

9. Where are the vendor's personnel responding to the maintenance calls located?

10. What is the level and number of agency staff required to maintain the system?

11. Are Agency IT personnel involved in maintaining or upgrading the ATMS system?

12. Can Agency staff reinstall the ATMS system without vendor support?

13. Have you requested any new/additional features from the vendor? Were the features made available to you? Please provide cost information.

System Upgrade:

14. Does the vendor provide regular upgrades to the software? If yes, how often? Are these upgrades included in the maintenance contract?

15. If the vendor does not provide regular upgrades, how are software upgrades handled?

16. Have you had any upgrades to the Software?

17. Have you had any upgrade to the Hardware?

18. What was the cost of the upgrade?

19. Have additional Devices/Clients been added to the system since initial installation? Who integrates these devices/clients?

20. What are the licensing arrangements for the ATMS system?