

CITY OF SANTA ANA, CALIFORNIA

LOCAL SIGNAL SYNCHRONIZATION PLAN 2023

Prepared for:



June 20, 2023





Introduction

On November 6, 1990, the voters in Orange County approved a ½ percent sales tax for twenty years to fund transportation improvements known as Measure M. This sales tax provides funding for street and road improvements to local agencies through formula distribution and competitive process. On November 6, 2006, voters approved Measure M2 to continue the ½ percent sales tax for thirty years, beginning in 2011. Project P, the Regional Traffic Signal Synchronization Program (RTSSP), was included as part of Measure M2.

The RTSSP is comprised of a 750-mile regional signal synchronization network with approximately 2,000 signals. The goals of the program are to improve the flow of traffic on Orange County streets and roads by implementing multi-agency signal synchronization.

Local agencies and Caltrans are encouraged to work cooperatively with the Orange County Transportation Authority (OCTA) to synchronize traffic signals throughout Orange County on a corridor basis to improve travel time and reduce stops. Local agencies will maintain local control and responsibility for signals within their jurisdiction. Any changes to traffic signals, signal timing equipment, or related signal policies (including transit signal priority, transit preemption, or emergency vehicle preemption) are at the full discretion of the responsible local agency.



City of Santa Ana

Local Signal Synchronization Plan

To establish eligibility for Measure M2 funds in general and Traffic Signal Synchronization Program (TSSP) in specific, including both fair-share and competitive programs, local agencies must meet the following requirements:

1. Local Signal Synchronization Plan Adoption

Adopt and maintain a Local Signal Synchronization Plan by June 30, 2023. The plan must be consistent with OCTA Regional Traffic Signal Synchronization Plan.

2. Local Signal Synchronization Plan Update

To remain eligible, the local agencies must maintain and update the plan every three years for the duration of Measure M2.

In addition to the requirement for Measure M2 funds, the City of Santa Ana's Local Signal Synchronization Plan also establishes the needs for well-maintained and synchronized traffic signals to reduce congestion and provide safe and efficient traffic movements in the City.

The City initially adopted the Local Signal Synchronization Plan on December 6, 2010 and subsequently updated on June 19, 2014, June 28, 2017, and June 16, 2020. This is the update for June 2023.



City of Santa Ana

Local Signal Synchronization Plan

I. Local Signal Synchronization Goals

The primary goal is to maintain a safe and efficient transportation network with emphasis on traffic signal synchronization along major corridors. This Local Signal Synchronization Plan will serve as a guide for the implementation and maintenance of optimized signal timing along these corridors. The objective is to reduce delay, number of stops, fuel consumption and air

pollution emissions and maximizing the traffic progression through the system. A key focus of the City is improving safety of all roadway users. A well-timed, synchronized system will reduce collisions as a result of improved traffic flow and will minimize diversion of traffic to local and residential neighborhoods improving safety and traffic conditions in those areas. Along with providing optimized signal timing, the City is also focused on providing key technology improvements for pedestrian accessibility, bicycle detection and emergency vehicle pre-emption, allowing for much safer travel through the signal system.

The City has been synchronizing its traffic signals since the 1970's with the implementation of the Multisonics Vehicle Management System. Since then the City has continued to upgrade and improve its traffic signal infrastructures and operations. The City's major effort in improving its traffic signal operations and infrastructures began in early 1990's when the City received numerous funding from State of California Transportation System Management grants to implement an Advanced Traffic Management System that included traffic communication infrastructure, new traffic signal system and incorporated many elements of Intelligent Vehicle Highway System such as CCTV, Video detection, and Changeable Message Signs (CMS). The City continues to actively upgrade traffic signal communications infrastructure to Fiber Optic technology allowing for faster and more reliable communication to support synchronization between intersections and the central ATMS system.

Recognizing the needs to maintain uninterrupted traffic flow through adjacent agencies, the City started to work with Caltrans in early 1990's for the City to maintain and operate majority of Caltrans' ramp traffic signals in Santa Ana so they can be synchronized with local traffic signals. Similarly, in 1992, the City of Fountain Valley agreed to share the operation of its traffic signals on Harbor Blvd with Santa Ana so Harbor Blvd can be synchronized throughout both cities.



City of Santa Ana

Local Signal Synchronization Plan

Similar to this agreement, Santa Ana has maintenance agreements with the neighboring cities of Costa Mesa, Garden Grove, Orange, Tustin and Fountain Valley to maintain and operate signals that reside in both City limits. Since then, the City has been active in replacing outdated equipment and upgrading traffic signal infrastructures to help achieve its goals of maintaining a safe and efficient network of streets.

As part of the effort to maintain traffic flow and reduce congestion, the City actively monitored and synchronized all of its arterial streets including synchronization on all major arterials in the City in 2004 and again in 2010. Since then, the City has participated in numerous OCTA Regional Traffic Signal Synchronization Program (RTSSP) corridors. The City fully supports and commits to working with OCTA and other local agencies to maintain Regional traffic synchronization on all arterials in the OCTA Regional Traffic Signal Synchronization Program.

The recent completed RTSSP corridors in City of Santa Ana include:

- Bolsa St/First St Corridor 2015
- Edinger Ave Corridor 2015
- Grand Ave Corridor 2018
- Bristol St Corridor 2018
- Harbor Blvd Corridor 2018
- Westminster Ave/ 17th St 2019
- Fairview St Corridor in 2020
- Main St Corridor 2021
- Garden Grove Blvd/ Memory Ln 2021
- Bear St Corridor 2022





City of Santa Ana

Local Signal Synchronization Plan

The City's plan going forward to maintain its goals:

1. Near term:

- (a) Maintain synchronization on all arterials in the City and OCTA RTSSP
- (b) Complete synchronization timing for the following corridors:
 - Edinger Ave Corridor
 - Warner Ave Corridor
 - MacArthur Blvd Corridor
 - Tustin Ave Corridor
 - Segerstrom Ave/ Dyer Rd Corridor
 - 1st St Corridor
 - Euclid St Corridor
- (c) Complete Traffic Signal & ITS Master Plan
- (d) Upgrade central business district (downtown) traffic signal controllers

2. Long Term:

- (a) Continue to maintain synchronization on all arterials in the City and OCTA RTSSP
- (b) Complete Citywide fiber communication network
- (c) Upgrade all traffic signal controllers to Advance Traffic Controllers
- (d) Retime arterials every 3 to 4 years or Citywide every 6 to 10 years
- (e) Relocate Traffic Management Center to Ross Annex Building
- (f) Complete implementation of Video detection Citywide
- (g) Replace outdated traffic signal cabinets
- (h) Upgrade signals to current standards for pedestrians and bicycles
- (i) Implement the latest proven technology to monitor and improve traffic signal operations where feasible
- (j) Employ Advance Traffic Signal Performance Measures
- (k) Prepare for Connected Vehicle technology



City of Santa Ana

Local Signal Synchronization Plan

II. Traffic Signal Synchronization Street Routes

The following arterials and streets in the City Master Plan of Streets and Highways are part of the City LSSP. Many of these arterials are also part of OCTA's Regional Traffic Signal Synchronization Plan. **Table 1** (Synchronized Streets) and **Figure 1** (Traffic Signal Synchronization Routes) represent all streets and traffic signals that are currently synchronized and monitored on a regular basis.

Table 1- Synchronized Streets

	Arterial	Classification	Synchronized	OCTA RTSSP
1	Westminster Ave/17 th St	Major	Yes	Yes
2	1 st St	Major/Primary	Yes	Yes
3	Edinger Ave	Major	Yes	Yes
4	Warner Ave	Major	Yes	Yes
5	Segerstrom Ave/Dyer Rd	Principal/Major/Primary	Yes	Yes
6	MacArthur Blvd	Major	Yes	Yes
7	Euclid St	Major	Yes	Yes
8	Harbor Blvd	Major	Yes	Yes
9	Fairview St	Major	Yes	Yes
10	Bear St	Secondary	Yes	Yes
11	Bristol St	Major	Yes	Yes
12	Main St	Major/Primary/Secondary	Yes	Yes
13	Grand Ave	Major	Yes	Yes
14	Tustin Ave	Major	Yes	Yes
15	McFadden Ave	Primary/Secondary/Collector	Partial	No
16	Newhope St	Secondary	Yes	No
17	Civic Center Dr	Secondary/Collector	Partial	No
18	Santa Ana Blvd	Primary/Secondary/Collector	Partial	No
19	4 th St	Major/Primary/Collector	Partial	No
20	Flower St	Primary/Secondary/Collector	Partial	No
21	Central Business District	Misc.	Yes	No
22	Broadway	Collector	Partial	No
23	Standard Ave	Collector	Partial	No
23	Raitt St	Collector	Partial	No



City of Santa Ana

Local Signal Synchronization Plan

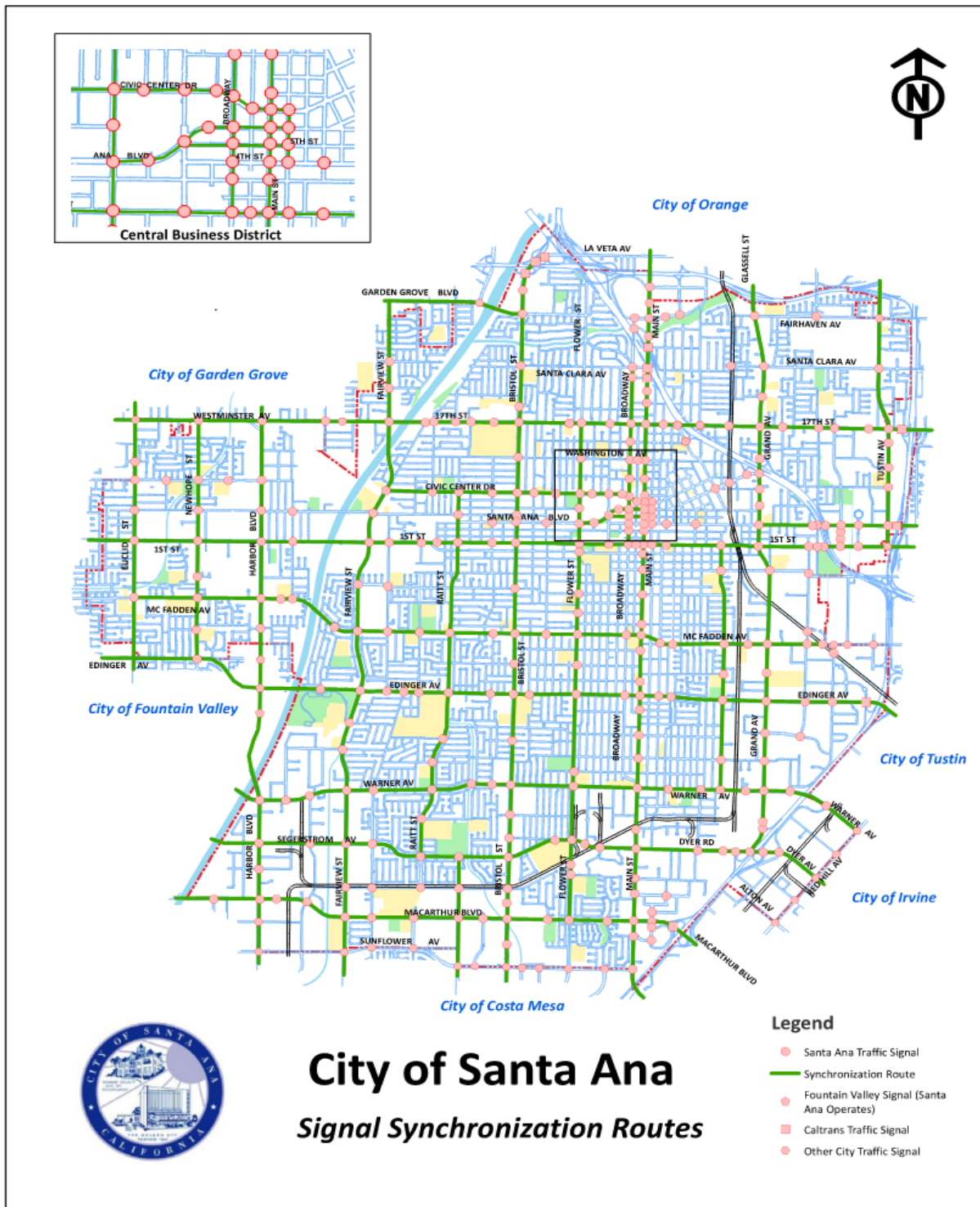


Figure 1- Traffic Signal Synchronization Routes



City of Santa Ana

Local Signal Synchronization Plan

III. Traffic Signal Infrastructures and Synchronization Inventory

A. Traffic Management Center

The TMC provides City staff with a centralized command and control of all City traffic signals. It supports all current and future Intelligent Transportation Systems (ITS) field devices and technologies. It is a central housing for all traffic signal system, communication hardware and traffic signal video/monitoring system.

The City has a Main Traffic Management Center (TMC) located at the City Hall Building, 20 Civic Center Plaza, Santa Ana, CA 92701, **shown in Figure 2**. There is also a Remote TMC located with the same address in the adjacent Ross Annex Building, **shown in Figure 3**.



Figure 2 – City of Santa Ana Traffic Management Center



Figure 3 – City of Santa Ana Remote Traffic Management Center



City of Santa Ana

Local Signal Synchronization Plan

City plans to relocate the existing Main TMC facility and systems into the Annex Building. This will allow the City to decommission the existing Remote TMC (RTMC) and centralize its traffic operations and related systems within a new Main TMC. The new Main TMC is to be relocated to the same floor space and operations area as all traffic engineering personnel.

The TMC systems communicate to the entire traffic network through seventeen (17) separate fiber optic legs. Each cable is terminated on 1 of 3 FDUs (Fiber Distribution Units) housed in the TMC server racks. These (17) communication legs are all landed on a Layer 3 Ethernet Switch which acts as the central gateway on the network. An image of the TMC equipment room is shown in **Figure 4**.



Figure 4 – City of Santa Ana TMC Equipment Room

With the City's future plans to move the Main TMC into the Annex Building, allowing the City to decommission the Remote TMC, an opportunity exists for upgrading these systems rather than attempting to move and re-use them.



City of Santa Ana

Local Signal Synchronization Plan

support certain newly developed advance functions. The City plans to upgrade all controllers to Advance Traffic Controllers to prepare for advanced traffic signal performance measures, transit signal priority and connect vehicle technology.

The majority of Santa Ana's traffic signal cabinets are Type 332 which are built to conform to the widely used Caltrans TEES standards. The Type 332 cabinets utilize rack mount equipment for the output file, input files, PDA, and other components that are in the cabinet. The City also has numerous legacy cabinets that are National Electric Manufacturers Association (NEMA), Type P (TS1) and Type G (Pole Mount). The City currently plans on upgrading all cabinets to the preferred Type 332 or Advanced Traffic Controller Cabinet (ATCC). Both cabinets take up the same footprint, while the ATCC operates with reduced equipment, allowing for additional rack space for future advance technology needs.

C. Traffic Signal Video Monitoring System

The City has installed closed circuit television (CCTV) cameras at just over one hundred (100) intersections. These cameras are installed to assist the City with a multitude of tasks that include observing traffic conditions, road construction activities, incident management and identifying other issues on the roadway that directly leads to improved response time in alleviating traffic concerns. The City also have video feeds from the Video Detection System (VDS) locations with IP communications, which can be viewed remotely from the TMC and the Remote TMC. The VDS feeds allow City to quickly diagnosed vehicle and bicycle detection issues and make better informed timing adjustment decisions.

The City's CCTV cameras are managed and monitored through Milestone Video Management software. All Cameras are available to City staff at workstations running Milestone VMS Client software and are available to the video wall from the display PCs. City staff actively utilize the CCTV cameras to monitor traffic conditions along the busiest and most traveled corridors and intersections.

D. Traffic Signal Communication

The City currently uses a combination of twisted wire pair (TWP), Fiber Optics (FO), and wireless radios for field device communications. Most of the traffic signals communication is via the City



City of Santa Ana

Local Signal Synchronization Plan

underground hardwired interconnect network, and similarly, communication to CCTV cameras is via the City underground fiber-optic network. Where fiber-optic is not available, wireless or hardwire interconnect is used for CCTV cameras. The City plans to upgrade all communication to Fiber-optic as funding is available.

The City traffic signal network is comprised of 'network zones' configured in one or more daisy chain rings which provides a redundant interconnection of all devices originating from the TMC. The network redundancy and IP network segmentation provide multiple paths for communication so that data can keep flowing even in the event of hardware malfunction. Each zone is supported by a Layer 3 Ethernet switch providing the network routing for devices on that ring. In addition, each traffic signal is supported with Layer 2 fiber optic switch completing the link to the traffic management center. The traffic signal network provides a high speed, high bandwidth and secure connection from the TMC to the ITS field elements. Furthermore, Santa Ana employs a Network Performance Monitor (NPM) software for network management and monitoring which allows City staff to quickly and remotely troubleshoot network and communication issues.

E. Traffic Signal Synchronization

The traffic signals on the designated arterials in the LSSP are inventoried and listed in **Table 2** (Traffic Synchronization Inventory). The table identifies all intersections for each arterial, associated controller type and firmware, detailed synchronization data such as cycle length of each synchronized period and Intelligent Transportation Systems (ITS) equipment. Synchronization periods include AM, Mid-day, PM and Weekend.



Table 2 - Traffic Synchronization Inventory

Corridor	Cross Street Intersection	Cycle Length				Maintenance Responsibility	Equipment										Status
		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	
Westminster/17th	Newhope St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	Bluetooth	Centracs	Online
	Harbor Blvd	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	Centracs	Online
	Clinton St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Fairview St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Bosch	N/A	Wireless	Bluetooth, EVP	Centracs	Online
	King St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber		Centracs	Online
	English St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Alona St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	College Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Bristol Market Pl	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Bristol St	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	Cohu	N/A	Fiber	Bluetooth	Centracs	Online
	Fire Station	Free	Free	Free	Free	Santa Ana	M	ASC/3	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Flower St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	EVP	Centracs	Online
	Ross St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Broadway	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	EVP	Centracs	Online
	Main St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Spurgeon St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Penn Wy	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Santiago St/I-5 NB off	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Lincoln Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Grand Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Linwood Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Mabury St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Video	Yes	Axis	N/A	Fiber	EVP	Centracs	Online
	Cabrillo Pk/Sherry Ln	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	EVP	Centracs	Online
	Centre on 17th	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Tustin Ave	140	130	140	130	Santa Ana	P (TS2 Type 1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP, Bluetooth	Centracs	Online



City of Santa Ana
Local Signal Synchronization Plan

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Corridor	Cross Street Intersection	Cycle Length				Maintenance Responsibility	Equipment										
		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	Status
1st Street	Euclid St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	Centracs	Online
	Newhope St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	Axis	N/A	Fiber	Bluetooth	Centracs	Online
	Harbor Blvd	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Jackson St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Fairview St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Wireless	EVP	Centracs	Online
	Sullivan St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Center St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Townsend St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Raitt St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Pacific St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Bristol St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Flower St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Axis	N/A	Fiber	EVP	Centracs	Online
	Ross St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Wireless	EVP	Centracs	Online
	Broadway	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Sycamore St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Main St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Bush St/Cypress St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Copper	EVP	Centracs	Online
	Downtown Plaza	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Standard Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Grand Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Lyon St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Elk Ln/I-5 NB off	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	I-5 SB on	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Cabrillo Park Dr	Free	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Golden Circle	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online



City of Santa Ana
Local Signal Synchronization Plan

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Edinger Ave	Newhope St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Harbor Blvd	140	130	140	130	Fountain Valley	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	Centracs	Online
	Mohawk Dr	140	130	140	130	Santa Ana	332	Cobalt	EOS	Video	Yes	N/A	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Fairview St	140	130	140	130	Santa Ana	332	2070	EOS	Video	Yes	Axis	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Sullivan St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Greenville St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Center St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Video	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Raitt St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Video	Yes	Axis	N/A	Fiber	EVP	Centracs	Online
	Pacific Ave	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Bristol St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Video	Yes	Cohu	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Baker St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Flower St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Video	No	Cohu	N/A	Wireless	EVP	Centracs	Online
	Broadway	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Main St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Orange St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Maple Bike Trail	70	65	70	65	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Standard Ave	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Wireless	EVP	Centracs	Online
	Grand Ave	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Lyon St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Ritchey St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online



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Corridor	Cross Street Intersection	Cycle Length				Maintenance Responsibility	Equipment										
		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	Status
Warner Ave	Harbor Blvd	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Axis	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Yale St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Susan St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Fairview St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	Axis	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Greenville St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Raitt St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	Yes	Cohu	N/A	Wireless		Centracs	Online
	Alton Bike Trail	70	130	70	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Pacific Ave	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Bristol St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	Axis	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Flower St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Main St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Maple Bike Trail	70	65	70	65	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Halladay St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Standard Ave	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Wireless	EVP	Centracs	Online
	Fire Station #2	140	130	140	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Grand Ave	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Video	Yes	Cohu	N/A	Fiber	Bluetooth	Centracs	Online
	Wright St	Free	Free	Free	Free	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Pullman St	Free	Free	Free	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
Segerstrom Ave	Harbor Blvd	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Susan St	140	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Fairview St	130	130	130	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		Centracs	Online
	Greenville St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		Centracs	Online
	Raitt St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		Centracs	Online
	Bear St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Wireless	EVP	Centracs	Online
	Bristol St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	Centracs	Online
	Lowell St	140	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Flower St	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		Centracs	Online



City of Santa Ana

Local Signal Synchronization Plan

Table 2 - Traffic Synchronization Inventory

Corridor	Cross Street Intersection	Cycle Length				Maintenance Responsibility	Equipment										
		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	Status
Dyer Road	Garnsey St	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Alton Bike Trail	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Other	No	N/A	N/A	Copper		Centracs	Online
	Main St	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Loops	No	Axis	N/A	Fiber		Centracs	Online
	Halladay St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Tech Center Dr	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Hotel Terrace/SR-55 SB ramp	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Other	EVP	Centracs	Online
	Grand Ave	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	SR-55 NB off ramp	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Pullman St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		Centracs	Online
MacArthur Blvd	Hyland St	Free	Free	140	Free	Santa Ana	P (TS1)	Cobalt	EOS	Video	Yes	N/A	N/A	Wireless	EVP	Centracs	Online
	Harbor Blvd	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber		Centracs	Online
	Home Depot	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Susan St	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Fairview St	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Greenville St	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Raitt St	140	130	140	Free	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Bear St	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Plaza Dr	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Bristol St	140	130	140	140	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Towner St	140	130	140	Free	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Flower St	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Axis	N/A	Fiber		Centracs	Online
	Birch St	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Main St	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	MacArthur Pl	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Video	Yes	Axis	BBS	Fiber	EVP	Centracs	Online
Euclid St	Oakfield St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Hazard Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	EVP	Centracs	Online
	5th St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	McFadden Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online



City of Santa Ana
Local Signal Synchronization Plan

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		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	Status
Harbor Blvd	Hazard Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	5th St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	McFadden Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		Centracs	Online
	Kent Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Lilac Ave	140	130	140	130	Fountain Valley	Other	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Heil St	140	130	140	130	Fountain Valley	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Garry Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
Fairview St	Trask Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Axis	N/A	Wireless	EVP	Centracs	Online
	Edna Dr	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Civic Center Dr	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Wireless	EVP	Centracs	Online
	5th St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Willits St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		Centracs	Online
	McFadden Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Wireless		Centracs	Online
	Centennial Rd/St. Andrew	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Video	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Harvard St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Alton Ave	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
Bear St	Alton Ave	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Video	Yes	N/A	BBS	Fiber		Centracs	Online



City of Santa Ana
Local Signal Synchronization Plan

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		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	
Bristol St	Riverglen Ln	140	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Memory Ln	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	Cohu	N/A	Fiber		Centracs	Online
	Santa Clara Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Bristol Mkt Pl/19th	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Washington Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Civic Center Dr	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	EVP	Centracs	Online
	Santa Ana Blvd	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Bishop St	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	McFadden Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	Cohu	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Wilshire Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Video	No	N/A	N/A	Fiber	EVP	Centracs	Online
	St Andrew Pl	140	130	140	130	Santa Ana	332	2070	EOS	Video	Yes	Axis	N/A	Fiber		Centracs	Online
	Glenwood Pl	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Central Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber		Centracs	Online
	Hemlock Wy	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Alton Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	Cohu	N/A	Fiber		Centracs	Online
	Target/Bristol Plaza	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Callens Common	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online



City of Santa Ana

Local Signal Synchronization Plan

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		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	Status
Main St	MainPlace/Town & Country	120	120	120	120	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	Axis	N/A	Wireless	EVP	Centracs	Online
	MainPlace/City Place	120	120	120	120	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Memory Ln	120	120	120	120	Santa Ana	332	Cobalt	EOS	Loops	No	Axis	N/A	Copper	EVP	Centracs	Online
	Walkie Wy	120	120	120	120	Santa Ana	P (TS1)	Cobalt	EOS	Video	No	N/A	N/A	Copper	EVP	Centracs	Online
	Bowers Museum	140	Free	140	Free	Santa Ana	332	Cobalt	EOS	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	20th St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	15th St	140	130	140	130	Santa Ana	332	Cobalt	EOS	Video	Yes	N/A	N/A	Fiber		Centracs	Online
	Washington Ave	90	90	90	90	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	10th St	90	90	90	90	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	8th St	90	90	90	90	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Civic Center Dr	90	90	90	90	Santa Ana	332	Cobalt	EOS	Video	Yes	Axis	N/A	Fiber	EVP	Centracs	Online
	Santa Ana Blvd	90	90	90	90	Santa Ana	332	Cobalt	EOS	Video	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	5th St	90	90	90	90	Santa Ana	332	Cobalt	EOS	Video	Yes	Axis	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	4th St	90	90	90	90	Santa Ana	332	Cobalt	EOS	Video	Yes	N/A	N/A	Copper	EVP	Centracs	Online
	3rd St	90	90	90	90	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Walnut St	70	65	70	65	Santa Ana	332	Cobalt	EOS	Video	Yes	N/A	N/A	Fiber		Centracs	Online
	Chestnut Ave	70	130	70	130	Santa Ana	332	Cobalt	EOS	Video	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Bishop St	70	130	70	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Cubbon St	70	130	70	130	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	McFadden Ave	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Russell Ave	70	65	70	65	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Borchard Ave	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Pomona St	140	130	140	130	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	St. Andrew Pl	70	65	70	65	Santa Ana	332	Cobalt	EOS	Video	Yes	Axis	N/A	Fiber	EVP	Centracs	Online
	St. Gertrude Pl	70	65	70	65	Santa Ana	332	Cobalt	EOS	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Goetz Ave	140	Free	140	Free	Santa Ana	P (TS1)	Cobalt	EOS	Video	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Alton Ave	140	130	140	Free	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Columbine Ave	140	130	140	Free	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Murphy Ave/Sandpointe Ave	140	Free	Free	Free	Santa Ana	P (TS1)	Cobalt	EOS	Loops	No	N/A	N/A	Copper		Centracs	Online
	Sunflower Ave	140	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Copper		Centracs	Online



City of Santa Ana

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Grand Ave	Fairhaven Ave	120	90	120	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	N/A	N/A	Copper	Bluetooth	Centracs	Online
	Santa Clara Ave	120	90	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber		Centracs	Online
	21st St	120	90	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber		Centracs	Online
	I-5 NB off	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Santa Ana Blvd/I-5 SB on	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Copper		Centracs	Online
	Fruit St	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	6th St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		Centracs	Online
	4th St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	EVP	Centracs	Online
	Chestnut Ave	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		Centracs	Online
	McFadden Ave	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online
	Century High	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	St. Andrew Pl	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	St. Gertrude Pl	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Hotel Terrace/Brookhollow	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		Centracs	Online
	SR-55 SB off ramp	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Other	EVP	Centracs	Online
Tustin Ave	Santa Clara Ave	140	100	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Centre on 17th/Tustin Center	140	100	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Wellington Ave	140	100	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Fruit St	140	100	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	4th St	130	100	130	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	EVP	Centracs	Online



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		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	Status
Civic Center Dr	English St	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Raitt St	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Pacific Ave	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Baker St	140	Free	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Boyd Wy	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Flower St	100	100	100	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Copper		Centracs	Online
	Parton St	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Ross St	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	OC Entrance/ Ped Xing	90	90	90	Free	Santa Ana	332	Cobalt	EOS	Video	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Broadway	90	90	90	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		Centracs	Online
	Sycamore St	90	90	90	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Bush St	90	90	90	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
Santa Ana Blvd	Pacific Ave	100	100	100	Free	Santa Ana	P (TS2 Type 1)	2070	ASC/3	Video	Yes	N/A	N/A	Copper		Centracs	Online
	Shelton St	100	100	100	Free	Santa Ana	P (TS2 Type 1)	2070	ASC/3	Video	Yes	N/A	N/A	Copper		Centracs	Online
	Flower St	100	100	100	Free	Santa Ana	332	2070	ASC/3	Video	Yes	Axis	N/A	Fiber	EVP	Centracs	Online
	Parton St	100	100	100	Free	Santa Ana	332	2070	ASC/3	Video	Yes	Cohu	N/A	Copper		Centracs	Online
	Ross St	100	100	100	Free	Santa Ana	332	2070	ASC/3	Video	Yes	N/A	N/A	Copper		Centracs	Online
	Ped Xing	90	90	90	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Broadway	90	90	90	Free	Santa Ana	332	2070	ASC/2	Video	Yes	Cohu	N/A	Fiber		Centracs	Online
	Bush St	90	90	90	Free	Santa Ana	332	2070	ASC/3	Video	Yes	N/A	N/A	Copper		Centracs	Online
4th Street	I-5 SB Ramp	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	I-5 NB Ramp	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Cabrillo Park Dr	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Golden Circle Rd	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online



City of Santa Ana

Local Signal Synchronization Plan

Table 2 - Traffic Synchronization Inventory

Corridor	Cross Street Intersection	Cycle Length				Maintenance Responsibility	Equipment										
		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	Status
McFadden Ave	Newhope St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	Axis	N/A	Fiber	EVP	Centracs	Online
	Riverview Mktpl	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Jackson St	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Mohawk Dr	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		Centracs	Online
	Sullivan St	70	65	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Center St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Raitt St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Pacific Ave	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Shelton St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Flower St	140	130	140	Free	Santa Ana	332	Cobalt	EOS	Video	Yes	N/A	N/A	Fiber		Centracs	Online
	Broadway	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Orange Ave	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Maple Bike Trail	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Copper		Centracs	Online
	Standard Ave	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	Bluetooth	Centracs	Online
	Hathaway St	70	65	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Lyon St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
	Metrolink Xing	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Video	No	N/A	BBS	Copper		Centracs	Online
Newhope St	Kent Ave	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	Axis	N/A	Fiber	Bluetooth, EVP	Centracs	Online
	Camille St	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	5th St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	EVP	Centracs	Online
	Hazard Ave	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Axis	N/A	Fiber	EVP	Centracs	Online
Raitt St	5th St	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	Glenwood Pl	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	St. Gertrude Pl	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Adams St	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless	EVP	Centracs	Online
	Alton Ave	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Video	No	N/A	N/A	Fiber	EVP	Centracs	Online



Table 2- Traffic Synchronization Inventory

Corridor	Cross Street Intersection	Cycle Length				Maintenance Responsibility	Equipment										
		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	Status
Flower St	Washington Ave	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		Centracs	Online
	6th St	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Walnut St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber	EVP	Centracs	Online
	Bishop St	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Highland St	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	Wilshire Ave	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	N/A	N/A	Copper	EVP	Centracs	Online
	Anahurst Pl	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	Bike Trail	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Other	No	N/A	N/A	Copper		Centracs	Online
	Alton Ave	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Video	No	N/A	N/A	Copper		Centracs	Online
Central Business District	Downtown Signals	90	90	90	Free	Santa Ana	332	2070	ASC/2	Loops	No	N/A	N/A	Fiber	Copper	Centracs	Online
Broadway	Santa Clara Ave	100	Free	100	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Copper		Centracs	Online
	Buffalo Ave	100	Free	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	EVP	Centracs	Online
	15th St	140	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper	EVP	Centracs	Online
	Washington Ave	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		Centracs	Online
	10th St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber		Centracs	Online
	5th St	90	90	90	90	Santa Ana	332	Cobalt	EOS	Video	Yes	N/A	N/A	Fiber		Centracs	Online
	4th St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	3rd St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Copper		Centracs	Online
Standard Ave	Chestnut Ave	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	N/A	N/A	Copper		Centracs	Online
	Hobart St	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online
	St. Gertrude Pl	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		Centracs	Online



City of Santa Ana

Local Signal Synchronization Plan

IV. Three-Year Capital, Operations and Maintenance Plans

The City is committed to providing a high level of effort to maintain its traffic signals, signal systems and related communication infrastructure. The effort will include funding for proper maintenance, operations and upgrade of traffic signals to current standard where necessary.

Table 3 (3 Year Outlook- Constrained)

outlines a constrained budget which includes activities planned for the next three years that have full funding identified. Funding includes approved Project P, Federal and State allocations identified in the current CIP. **Table 4** (3 Year Outlook- Unconstrained) lists an unconstrained budget which includes the constrained budget as well as unconstrained projects that could be implemented in the next three years if funding were available. The 3-year outlook will help identify preliminary project priorities and potential multi-agency coordination opportunities.

Table 5 (Candidate Signal Synchronization Project) identifies planning level capital funding needs for a full buildout of Santa Ana's Advance Traffic Management System network as shown in Figure 1 of section two of the LSSP. This is a comprehensive list of improvements planned without an identified period.



City of Santa Ana

Local Signal Synchronization Plan

Table 3 - 3 Year Outlook Traffic Signal Synchronization, Funding Needs for Synchronized Operations (Constrained)

Reporting Jurisdiction Expenditures: City of Santa Ana

Type of Traffic Signal Synchronization Expenditures in Year of Expenditure Dollars

Maintenance				
Project	FY23/24	FY24/25	FY25/26	Total
Traffic Signals Maintenance	\$1,104,800	\$1,104,800	\$1,104,800	\$3,314,400
Communication Maintenance	\$100,000	\$100,000	\$100,000	\$300,000
Traffic Signal Utility	\$200,000	\$200,000	\$200,000	\$600,000
Traffic Signal System Maintenance	\$253,800	\$253,800	\$253,800	\$761,400
Subtotal Maintenance	\$1,658,600	\$1,658,600	\$1,658,600	\$4,975,800
Construction				
Project	FY23/24	FY24/25	FY25/26	Total
Traffic Signal Equipment Replacement	\$100,000	\$100,000	\$100,000	\$300,000
New LT Phasing		\$600,000	\$600,000	\$1,200,000
Euclid TSSP Communication & Signal upgrade	\$100,000			\$100,000
Subtotal Construction	\$200,000	\$700,000	\$700,000	\$1,600,000
Operations				
Project	FY23/24	FY24/25	FY25/26	Total
Tustin Ave TSSP maintenance	\$16,800			\$16,800
Segerstrom Ave/Dyer Rd TSSP maintenance	\$43,200			\$43,200
1st St TSSP maintenance		\$72,000		\$72,000
Euclid TSSP maintenance			\$23,000	\$23,000
Subtotal Operations	\$60,000	\$72,000	\$23,000	\$155,000
TOTAL	\$1,918,600	\$2,430,600	\$2,381,600	\$6,730,800



City of Santa Ana

Local Signal Synchronization Plan

*Table 4 - 3 Year Outlook, Traffic Signal Synchronization
Funding Needs for Synchronized Operations (Unconstrained)*

Reporting Jurisdiction Expenditures: City of Santa Ana

Type of Traffic Signal Synchronization Expenditures in Year of Expenditure Dollars

Maintenance				
Project	FY23/24	FY24/25	FY25/26	Total
Traffic Signals Maintenance	\$1,500,000	\$1,500,000	\$1,500,000	\$4,500,000
Communication Maintenance	\$150,000	\$150,000	\$150,000	\$450,000
Traffic Signal Utility	\$250,000	\$250,000	\$250,000	\$750,000
Traffic Signal System Maintenance	\$300,000	\$300,000	\$300,000	\$900,000
Subtotal Maintenance	\$2,200,000	\$2,200,000	\$2,200,000	\$6,600,000
Construction				
Project	FY23/24	FY24/25	FY25/26	Total
Traffic Signal Equipment Replacement	\$300,000	\$300,000	\$300,000	\$900,000
Traffic Management Center Relocation			\$2,500,000	\$2,500,000
CCTV Upgrade	\$100,000	\$100,000	\$100,000	\$300,000
First St Conduit & Comm		\$250,000	\$250,000	\$500,000
Grand Ave Conduit & Comm	\$500,000			\$500,000
McFadden Conduit & Comm		\$250,000	\$250,000	\$500,000
Main St Conduit & Comm		\$500,000	\$500,000	\$1,000,000
Seegerstrom Ave/Dyer Rd Conduit & Comm		\$250,000	\$250,000	\$500,000
Fairview St Conduit & Comm			\$500,000	\$500,000
Warner Ave Conduit & Comm		\$350,000		\$350,000
MacArthur Blvd Conduit & Comm		\$300,000		\$300,000
Edinger Ave Conduit & Comm			\$500,000	\$500,000
Controllers upgrade- Various Locations	\$100,000	\$100,000	\$100,000	\$300,000
System Detections- Various Locations	\$150,000	\$150,000	\$150,000	\$450,000
Video Detection- Various Locations	\$200,000	\$200,000	\$200,000	\$600,000
APS Push Buttons- Various Locations	\$300,000	\$300,000	\$300,000	\$900,000



City of Santa Ana

Local Signal Synchronization Plan

Uninterruptible Power Supply System- Various Locations	\$200,000	\$200,000	\$200,000	\$600,000
Subtotal Construction	\$1,850,000	\$3,250,000	\$6,100,000	\$11,200,000
Operations				
Project	FY23/24	FY24/25	FY25/26	Total
Citywide Traffic Signal Synchronization			\$1,120,000	\$1,120,000
Advance Traffic Signal Performance Measures	\$100,000	\$100,000	\$100,000	\$300,000
Subtotal Operations	\$100,000	\$100,000	\$1,220,000	\$1,420,000
TOTAL	\$4,150,000	\$5,550,000	\$9,520,000	\$19,220,000



City of Santa Ana

Local Signal Synchronization Plan

*Table 5 - LSSP Implementation,
Candidate Signal Synchronization Projects with Estimated Costs*

Reporting Jurisdiction Expenditures: City of Santa Ana

Corridor	Improvement Summary	Estimated Costs
Grand Ave	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$3,000,000
McFadden Ave	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$4,000,000
Standard Ave	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$2,000,000
Raitt St	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$2,000,000
Newhope St	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$3,000,000
Harbor Blvd	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$4,000,000
Bristol St	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$4,000,000
Westminster Ave/ 17th St	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$4,000,000
Flower St	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$3,000,000
TOTAL ESTIMATED COSTS		\$29,000,000



City of Santa Ana

Local Signal Synchronization Plan

V. Traffic Signal Synchronization Assessment, Review + Revision

As stated earlier, maintaining efficient traffic movements throughout the City and surrounding area is one of the primary objectives. Many components of the traffic signal system including its infrastructure must be repaired, upgraded and or maintained to provide the desired operation results. In addition to maintaining the synchronization of all the arterials in the

City, the City also participated in synchronizing many inter-jurisdiction arterials (corridors).

Travel time and stop reduction, average speed and gas savings have been the normal parameters the City used to measure the success or performance of synchronization. As part of this LSSP, the City supports the use of Corridor Synchronization Performance Index (CSPI) established by OCTA **shown in Figure 6** to measure the inter-jurisdiction corridor performance. The CSPI utilizes parameters such as average speed, ratio of green to red signals and stops per mile to compile the score and grade for the entire corridor. The sum of the scores from each of the categories gives the total of the index. The CSPI value is categorized into five levels – Tier I through V. Tier I refers to a CSPI score at or above 80 and indicates very good signal synchronization conditions. Tier II with value of 70 to 80 is considered good progression with few stops and good travel time. Tier III with score 60-70 is considered the baseline for good operational performance. CSPI value ranging from 50 to 60 indicates a problem generally fixable with a low-cost solutions or signal timing modification. A CSPI below 50 however, indicates a poor corridor performance thereby necessitating larger scale investigation into corridor operations.



City of Santa Ana

Local Signal Synchronization Plan






CSPI Score	Signal Synchronization Description	Level
 >=80	<u>Very good progression</u> – traveling through signalized intersections with minimal stops and favorable travel speeds.	Tier 1
 70-80	<u>Good progression</u> – traveling through signalized intersections with few stops and good travel speeds.	Tier 2
 60-70	<u>Fair progression</u> – traveling through signalized intersections with moderate stops and fair travel speeds.	Tier 3
 50-60	<u>Limited progression*</u> – traveling through signalized intersections with moderately high stops and slower travel speeds.	Tier 4
 < 50	<u>Very limited progression*</u> – traveling through signalized intersections with frequent stops and slow travel speeds.	Tier 5

Figure 6 - CSPI Score and Description

Over the past three years from 2020 to 2023, the City, in cooperation with OCTA and other local agencies, participated in synchronizing a number of important corridors in the City and adjacent jurisdictions. Many corridors have been previously synchronized and maintained, however due to changes in traffic conditions and patterns, periodically complete re-time is necessary and can result in significant improvement in travel time and reduction in delays.

The following corridors were synchronized or currently in the process of implementation:

- Fairview St, Bear St, and Garden Grove/Memory Ln Corridors synchronization were completed in 2022.
- Main St Corridor synchronization was completed in 2021 and is currently in the monitoring stage for 2 years.
- Warner Ave Corridor synchronization is ongoing and expected to be completed by winter 2023.
- Edinger Ave Corridor synchronization is ongoing and expected to be completed by Winter 2023.



City of Santa Ana

Local Signal Synchronization Plan

- MacArthur Blvd Corridor synchronization is ongoing and expected to be completed by winter 2023.
- Segerstrom Ave/ Dyer Rd Corridor synchronization is ongoing and expected to be completed by early 2024.
- Tustin Ave / Rose Dr Corridor synchronization is ongoing and expected to be completed by winter 2023.
- 1st St / Bolsa Ave Corridor synchronization is ongoing and expected to be completed in winter 2023.

A. Performance Results:

The main objective of improving traffic flow along the entire corridor was met on every one of these corridors, even on corridors that are currently synchronized. The improvements are evident in every category of travel time reduction, stop reduction, increased green to red signal ratio and overall corridor performance improvements.

A summary of the corridor improvements from local traffic signal synchronization projects is shown on **Table 6** (Traffic Signal Synchronization Assessment, Review & Revision). The assessment breaks down the results for each corridor by direction and time of day to provide a detailed analysis of the corridors performance. A graphical representation of corridor performance Citywide is shown in **Figure 7** (Santa Ana 2023 Corridor Synchronization Performance Map). The map shows overall CSPI results derived from OCTA's 2021 Corridor Performance Report.



City of Santa Ana

Local Signal Synchronization Plan

Table 6 - Traffic Signal Synchronization Assessment, Review & Revision

LOCAL AGENCY CORRIDOR	TIMING REVIEWED (Past 3 Years)	DID TIMING REQUIRE AN UPDATE?	TIMING UPDATE RESULTS											
			Direction	Peak	Speed Travel		Green per Red		Stops per Mile		CSPI Score		CSPI Tier	
					Before	After	Before	After	Before	After	Before	After	Before	After
Fairview St	2020	Yes	NB	AM	21.0	31.4	1.2	4.7	1.8	0.7	48.5	102.6	5	1
				MD	25.9	29.8	2.1	4.0	1.3	0.8	68.4	93.9	3	1
				PM	14.1	26.1	0.9	3.6	2.7	1.0	33.0	82.5	5	1
				WKND	23.5	27.1	1.6	4.1	1.5	0.8	58.3	91.2	4	1
			SB	AM	17.0	30.5	1.3	3.8	2.4	0.8	38.3	93.5	5	1
				MD	25.4	28.0	2.1	2.7	1.2	1.0	67.6	78.7	3	2
				PM	20.6	27.2	1.4	2.6	1.8	1.1	49.6	75.8	5	2
				WKND	27.3	27.5	3.6	2.3	0.9	1.2	85.2	73.2	1	2
Bear St	2020	Yes	NB	AM	16.5	18.0	12.0	16.4	17.2	21.3	45.7	55.7	5	4
				MD	13.5	15.0	8.0	11.1	17.0	17.0	38.5	43.1	5	5
				PM	10.5	13.5	8.0	10.3	17.0	17.0	35.5	40.8	5	5
				WKND	10.5	13.5	8.0	11.1	17.0	17.0	35.5	41.6	5	5
			SB	AM	9.0	15.0	12.0	17.9	17.2	22.3	38.2	55.2	5	4
				MD	12.0	13.5	8.9	14.0	17.0	19.2	37.9	46.7	5	5
				PM	10.5	12.0	8.0	15.2	17.0	20.3	35.5	47.5	5	5
				WKND	10.5	12.0	8.0	12.0	17.0	17.2	35.5	41.2	5	5
Garden Grove /Memory	2021	Yes	EB	AM	24.2	26.3	2.1	3.0	1.3	1.0	65.7	79.0	3	2
				MD	21.2	26.2	1.1	2.9	1.8	1.0	47.0	76.8	5	2
				PM	21.1	24.3	1.5	1.9	1.6	1.4	52.9	62.7	4	3
				WKND	21.4	26.5	1.1	2.2	1.8	1.2	48.1	70.0	5	2
			WB	AM	22.5	26.3	1.5	2.8	1.6	1.1	54.8	76.5	4	2
				MD	22.8	27.9	1.8	5.4	1.4	0.7	59.9	99.5	4	1
				PM	21.5	22.5	1.5	1.9	1.5	1.3	54.0	61.2	4	3
				WKND	22.3	25.2	1.7	2.7	1.5	1.1	57.1	73.5	4	2
Main St	2021	Yes	NB	AM	20.5	23.8	1.98	3.58	1.97	1.42	52.0	75.2	4	2
				MD	19.7	22.7	1.79	3.51	2.1	1.4	47.9	73.3	5	2
				PM	17.2	20.8	1.31	2.90	2.25	1.77	38.8	61.8	5	3
				WKND	19.4	22.3	1.75	2.72	2.10	1.98	47.1	63.4	5	3
			SB	AM	22.6	28.0	2.88	4.33	1.53	0.91	66.7	92.6	3	1
				MD	20.2	24.97	1.74	4.02	2.12	1.18	48.0	82.9	5	1
				PM	20.5	21.9	1.91	2.95	1.97	1.65	51.4	65.0	4	3
				WKND	21.2	21.6	2.16	2.21	1.84	1.87	55.7	56.5	4	4
Edinger Ave	2023	Yes			Results not yet available									



City of Santa Ana

Local Signal Synchronization Plan

Warner Ave	2023	Yes				Results not yet available
MacArthur Blvd	2023	Yes				Results not yet available
Tustin Ave	2023	Yes				Results not yet available
Seegerstrom/Dyer	2023	Yes				Results not yet available
1st St	2021	Yes				Results not yet available



City of Santa Ana

Local Signal Synchronization Plan

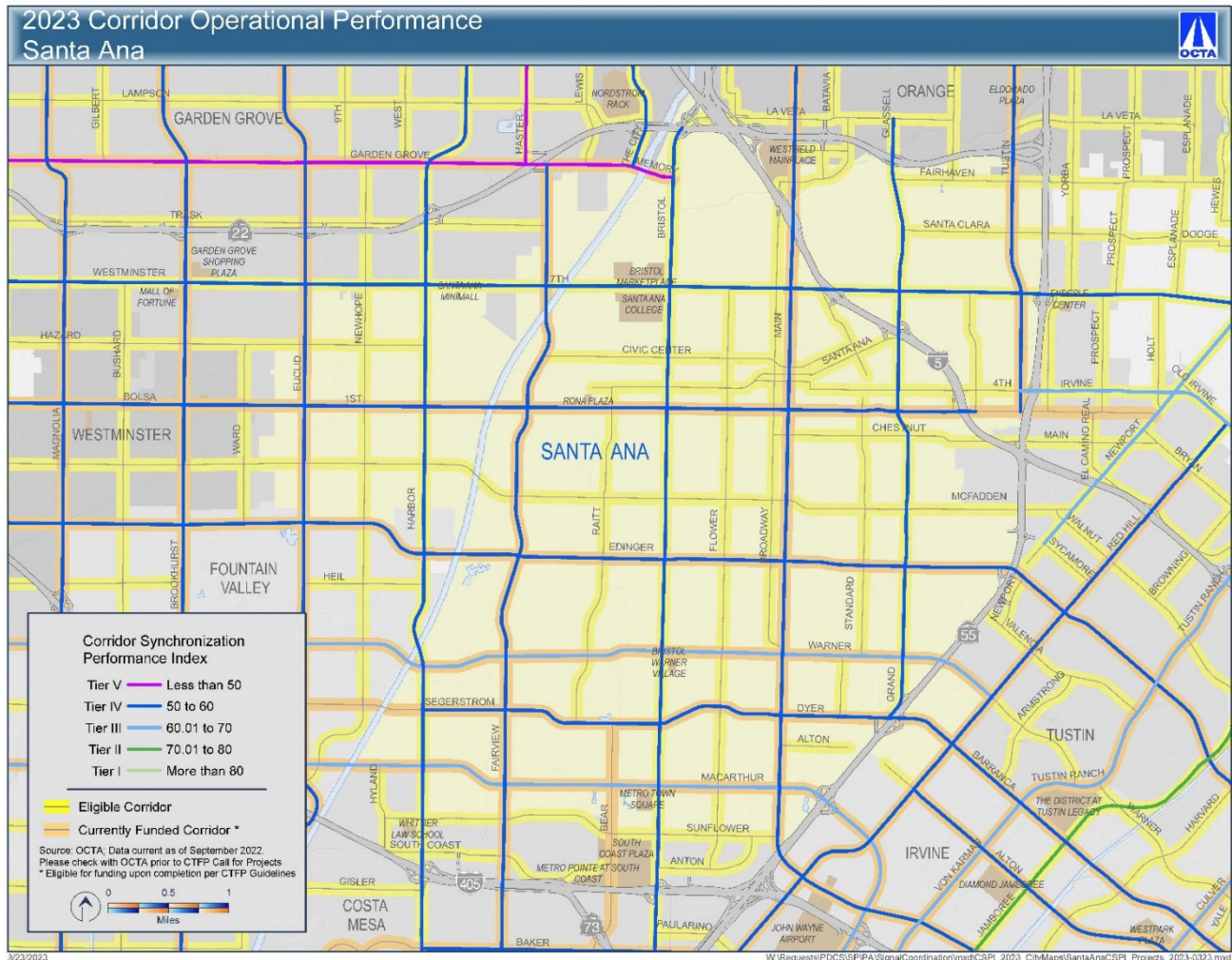


Figure 7 - Santa Ana 2023 Corridor Synchronization Performance Map



City of Santa Ana

Local Signal Synchronization Plan

C. System Improvements:

In addition to the corridor synchronization, improvements to the traffic signal system, communication and monitoring infrastructure were made to allow the City to better monitor traffic condition, manage traffic signals and maintain the synchronization.

1. Fairview St Corridor: The project is complete. The upgrades included all controllers to ATC, Upgrade traffic signal communication to IP addressing, install conduit with fiber optic cable and wireless communication links, install/upgrade CCTV camera at 5 locations, install system detection at Harvard St, and replace traffic signal cabinets at 7 locations.
2. Bear St Corridor: The project is complete. The upgrades included all controllers to ATC, upgrade traffic signal communication to IP addressing, install/upgrade CCTV camera at MacArthur Blvd and Segerstrom Ave, install UPS system and video detection at Alton Ave, and replace traffic signal cabinet at MacArthur Blvd.
3. Garden Grove / Memory Corridor: The project is complete. The upgrades included Video detection systems at Bristol St.
4. Main St Corridor: The project is complete. The upgrades included Advance Traffic Management System at TMC and all controllers to ATC; installed conduit with fiber optic cable; installed/upgraded CCTV cameras at 8 locations; installed system detection at MacArthur Blvd; replaced traffic signal cabinets at 6 locations; and installed Bluetooth travel time system at 2 locations. Provided additional video management system licenses.
5. Tustin Ave / Rose Dr Corridor: This project will soon be in construction. The upgrades include replace existing controllers to ATC; install fiber optic cable; install ethernet switch and install CCTV camera at Santa Clara Ave; and replace traffic signal cabinet at 2 locations.
6. Edinger Ave Corridor: This project will soon be in construction. The upgrades include all controllers to ATC, install/upgrade CCTV cameras and video detection cameras, install conduit and fiber optic cable, Ethernet switches, ATMS License expansion and Signal Performance Measures.



City of Santa Ana

Local Signal Synchronization Plan

7. Warner Ave Corridor: This project will soon be in construction. The upgrades include upgrade all controllers to ATC, install/upgrade CCTV cameras and video detection cameras, install conduit and fiber optic cable, Ethernet switches, Bluetooth travel systems, replace traffic signal cabinet at 2 locations, ATMS License expansion and Signal Performance Measures.
8. MacArthur Blvd Corridor: This project will soon be in construction. The upgrades include upgrade all controllers to ATC, install/upgrade CCTV cameras and video detection cameras, install conduit and fiber optic cable, Ethernet switches, Bluetooth travel systems, replace traffic signal cabinet at 3 locations, ATMS License expansion and Signal Performance Measures.
9. Segerstrom/Dyer Corridor: This project will soon be in construction. The upgrades include upgrade all controllers to ATC, install/upgrade CCTV cameras and video detection cameras, install conduit and fiber optic cable, Ethernet switches, and Signal Performance Measures.
10. 1st St / Bolsa Ave Corridor: This project will soon be in construction. The upgrades include upgrade all controllers to ATC, install/upgrade CCTV cameras and VDS, install APS systems, install conduit and fiber optic cable, Ethernet switches, replace traffic signal cabinet with ATCC cabinets at 5 locations, and Signal Performance Measures.
11. Euclid St Corridor: This project will begin design. The upgrades include upgrade all controllers to ATC, install/upgrade CCTV cameras and VDS, install APS systems, install EVP, Ethernet switches, Signal Performance Measures and TMC hardware upgrades.