



LOCAL SIGNAL SYNCHRONIZATION PLAN

2020



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 until 2011 when the Measure M ended. On November 6, 2006, voters approved Renewed Measure M (Measure M2) to continue the ½ percent sales tax for thirty years, beginning in 2011.

The Measure M2 is a long-term program designed to reduce traffic congestion, improve quality of life by upgrading key freeways, fixing major freeway interchanges, maintaining streets and roads, synchronizing traffic signals countywide, building a visionary rail-transit system, and protecting the environment.

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, 2020. 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 and June 28, 2017. This is the update for June 2020.



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.

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).

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. 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:

- Euclid St Corridor in 2008 and 2012
- Fairview St Corridor in 2013
- Warner Ave Corridor in 2013
- Tustin Ave/Rose St Corridor in 2013
- MacArthur Blvd/Talbert Ave Corridor 2014
- 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

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:
 - Fairview St Corridor
 - Bear St Corridor
 - Edinger Ave Corridor
 - Warner Ave Corridor
 - MacArthur Blvd Corridor
 - Tustin Ave Corridor
 - Segerstrom Ave/ Dyer Rd Corridor
 - (c) Complete citywide Bluetooth Travel Time System
 - (d) Upgrade central business district (downtown) traffic signal controllers
 - (e) Upgrade existing Central Traffic Management System
 - (f) Complete real time city traffic congestion map



2. Long Term:

- (a) Continue to maintain synchronization on all arterials in the City and OCTA RTSSP
- (b) Complete Citywide fiber communication network
- (c) Convert all analog CCTV cameras to High Definition CCTV Cameras
- (d) Upgrade all traffic signal controllers to Advance Traffic Controllers
- (e) Retime arterials every 3 to 4 years or Citywide every 6 to 10 years
- (f) Relocate Traffic Management Center to Ross Annex Bldg.
- (g) Complete implementation of system detection citywide
- (h) Replace outdated traffic signal cabinets
- (i) Upgrade signals to current standards for pedestrians and bicycles
- (j) Implement the latest proven technology to monitor and improve traffic signal operations where feasible

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.

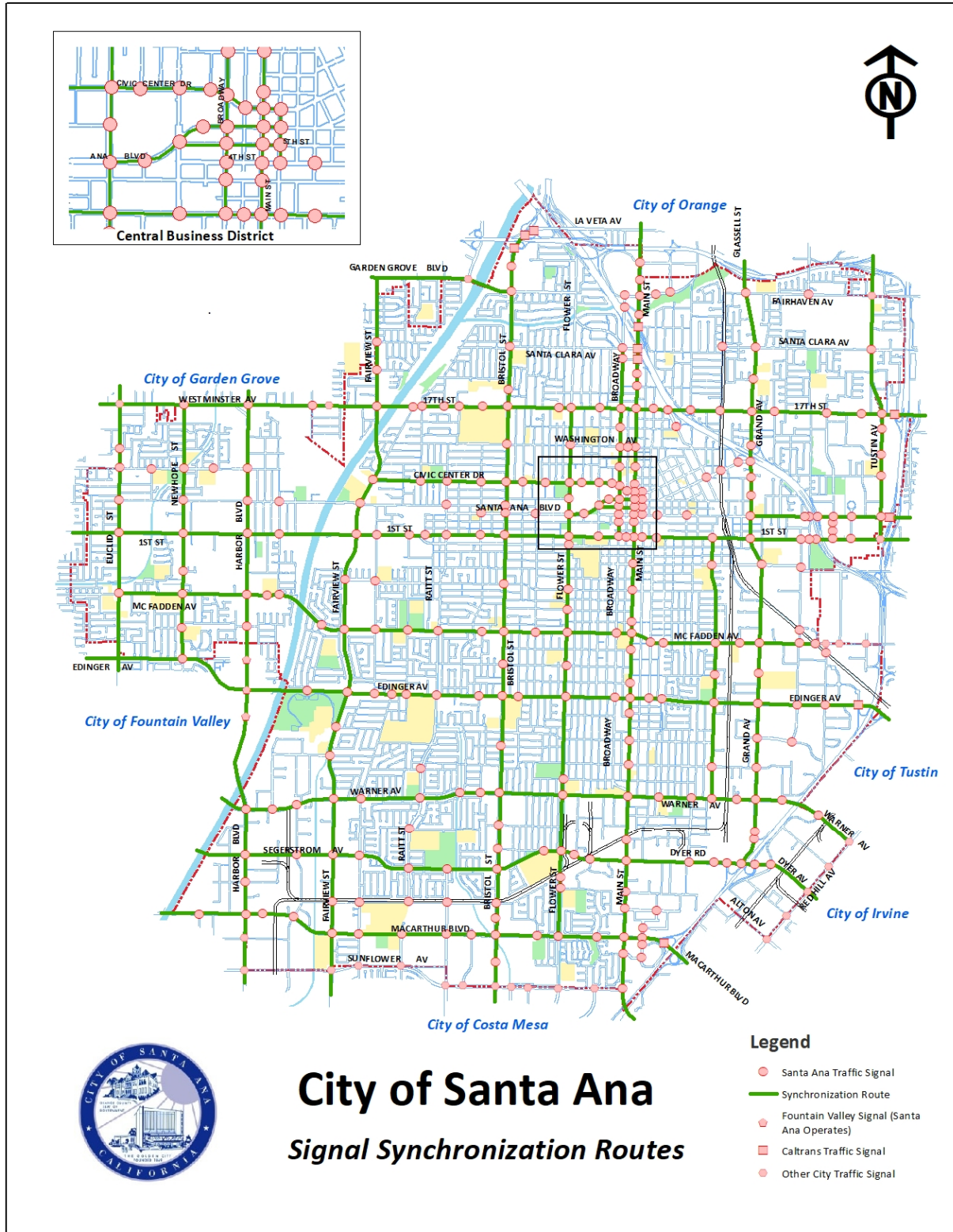


Table 1- Synchronized Streets

	Arterial	Classification	Synchronized	OCTA RTSSP
1	Westminster Ave/17 th St	Major	Yes	Yes
2	1 st St	Major	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	Bristol St	Major	Yes	Yes
11	Main St	Major/Primary/Secondary	Yes	Yes
12	Grand Ave	Major	Yes	Yes
13	Tustin Ave	Major	Yes	Yes
14	McFadden Ave	Secondary	Partial	No
15	Newhope St	Secondary	Yes	No
16	Civic Center Dr	Secondary	Partial	No
17	Santa Ana Blvd	Major/Primary	Partial	No
18	4 th St	Major/Primary	Partial	No
19	Flower St	Primary/Secondary	Partial	No
20	Central Business District	Misc.	Yes	No
21	Broadway	Secondary	Partial	No
22	Standard Ave	Secondary	Partial	No



Figure 1- Traffic Signal Synchronization Routes



City of Santa Ana

Signal Synchronization Routes

- Legend**
- Santa Ana Traffic Signal
 - Synchronization Route
 - Fountain Valley Signal (Santa Ana Operates)
 - Caltrans Traffic Signal
 - Other City Traffic Signal



III. Traffic Signal Infrastructures and Synchronization Inventory

A. Traffic Management Center

The City's Traffic Management Center was constructed in 1993 to provide a central housing for all traffic signal system, communication hardware and traffic signal video/monitoring system. The TMC is located in main City Hall.

In 2016, the City replaced the outdated video wall display with a state of the art LED matrix digital video wall. The digital video wall display allowed for the integration of a new open platform video management system.

B. Traffic Signal System, Controllers and Cabinets

City's current Traffic Signal System is Telvent's Management Information System for Traffic (MIST, version 4.0); a computer based centralized traffic control system that runs on Windows operating system and utilizes user friendly Graphical User Interface. MIST allows the city to manage and control the traffic signals on a real-time basis. The City plans to upgrade the system to Econolite Centrac's ATMS that will provide an improved User Interface, GIS Based Maps, System Scalability, Data Analytics and many advanced traffic operation tools to assist with traffic signal operations.

In 2011, The City completed an eight-phase project to upgrade all outdated NEMA controllers to the latest 2070 controller and firmware. The project has allowed the City to fully integrate and utilize MIST in managing all 303 traffic signals effectively. The City's standard traffic signal controller is Econolite 2070L or 2070N with ASC3-2070 firmware. The City plans to upgrade all controllers to Advance Traffic Controllers to prepare for advance traffic signal performance measures, transit signal priority and connect vehicle technology.

The City currently has two types of traffic signal cabinets in the field: NEMA (P & M) and Type 332 cabinets. The City plans to upgrade the cabinets to Type 332 as funding is available.



C. Traffic Signal Surveillance System

The City started utilizing CCTV cameras to monitor and manage its traffic in 1993. The City now has 110 CCTV cameras to monitor traffic at every major intersection and critical points on the City arterial network. There are 10 older analog CCTV camera and 100 digital High Definition CCTVs. The City plans to upgrade all analog to digital high definition CCTV cameras in upcoming projects and as funding is available.

In 2015, the City deployed Milestone XProtect Video Management System to fully integrate all CCTV cameras into one centralized video management system. The video management system has optimized the video viewing experience, provides recording capabilities and will allow for future video sharing with other departments. The City continues to build up the system by adding new CCTV cameras and Video Detection cameras. In addition, the system is updated regularly as new software releases are made available.

D. Traffic Signal Communication

Communication to field traffic signal controllers and CCTV cameras is done via several methods: Hardwire interconnect, Fiber-optic and wireless. Most of the traffic signals communication is via the City 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.

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.



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
Westminster/17th	Newhope St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Harbor Blvd	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Clinton St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Fairview St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Bosch	N/A	Wireless	Bluetooth	MIST	Online
	King St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber		MIST	Online
	English St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber		MIST	Online
	Alona St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	College Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Bristol Market Pl	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Bristol St	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Fire Station	Free	Free	Free	Free	Santa Ana	332	ASC/3	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Flower St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Ross St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Broadway	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Main St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Spurgeon St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Penn Wy	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Santiago St/I-5 NB off	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Lincoln Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	BBS	Fiber		MIST	Online
	Grand Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
Linwood Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online	
Cabrillo Pk/Sherry Ln	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online	
Centre on 17th	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online	
Tustin Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	BBS	Fiber	Bluetooth	MIST	Online	
1st Street	Euclid St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Newhope St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	Axis	N/A	Fiber		MIST	Online
	Harbor Blvd	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Axis	N/A	Fiber	Bluetooth	MIST	Online
	Jackson St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Fairview St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Wireless	Bluetooth	MIST	Online
	Sullivan St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Center St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Townsend St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Raitt St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Pacific St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Bristol St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber	Bluetooth	MIST	Online
	Flower St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	Online
	Ross St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Cellular		MIST	Online
	Broadway	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Sycamore St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	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
	Main St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Bush St/Cypress St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Downtown Plaza	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Standard Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Grand Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Lyon St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Elk Ln/I-5 NB off	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	I-5 SB on	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Cabrillo Park Dr	Free	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
Golden Circle	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper	Bluetooth	MIST	Online	
Edinger Ave	Newhope St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper	Bluetooth	MIST	Online
	Harbor Blvd	140	130	140	130	Fountain Valley	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Mohawk Dr	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	N/A	N/A	Fiber		MIST	Online
	Fairview St	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	Axis	N/A	Fiber	Bluetooth	MIST	Online
	Sullivan St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Greenville St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Center St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Video	Yes	N/A	N/A	Fiber		MIST	Online
	Raitt St	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	Yes	Axis	N/A	Fiber		MIST	Online
	Pacific Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Bristol St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Baker St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Other	N/A	Copper		MIST	Online
	Flower St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Wireless		MIST	Online
	Broadway	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Main St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber	Bluetooth	MIST	Online
	Orange St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Maple Bike Trail	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Standard Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
Grand Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online	
Lyon St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online	
Ritchey St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online	
Warner Ave	Harbor Blvd	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Axis	N/A	Fiber	Bluetooth	MIST	Online
	Yale St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Susan St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Fairview St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber	Bluetooth	MIST	Online
	Greenville St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Raitt St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Wireless		MIST	Online
	Alton Bike Trail	70	130	70	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Pacific Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Bristol St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber	Bluetooth	MIST	Online



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		AM	MID	PM	WKND		Cabinet	Type	Software	Detection	Bike Detection	CCTV	Power Backup	Comm	Other ITS	ATMS	Status
Warner Ave	Flower St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Main St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Maple Bike Trail	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Halladay St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Standard Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	Fire Station #2	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Grand Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Wright St	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
Seegerstrom Ave	Pullman St	Free	Free	Free	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Harbor Blvd	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	Online
	Susan St	140	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Fairview St	130	130	130	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Greenville St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	Raitt St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	Bear St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	Bristol St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
Dyer Road	Lowell St	140	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Flower St	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	Garnsey St	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Alton Bike Trail	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Other		MIST	Online
	Main St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber	Bluetooth	MIST	Online
	Halladay St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Tech Center Dr	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Hotel Terrace/SR-55 SB ramp	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
MacArthur Blvd	Grand Ave	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	SR-55 NB off ramp	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Pullman St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Hyland St	Free	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Video	Yes	N/A	N/A	Wireless		MIST	Online
	Harbor Blvd	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Home Depot	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Susan St	140	130	140	Free	Santa Ana	M	ASC/3	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Fairview St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Greenville St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Raitt St	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
Bear St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online	
MacArthur Blvd	Plaza Dr	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Bristol St	140	130	140	140	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Towner St	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Flower St	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	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
	Birch St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Main St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	MacArthur Pl	140	130	140	Free	Santa Ana	332	2070	ASC/3	Video	No	Axis	BBS	Fiber		MIST	Online
Euclid St	Oakfield St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Hazard Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	5th St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	McFadden Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
Harbor Blvd	Hazard Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	5th St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	McFadden Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Kent Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	Online
	Lilac Ave	140	130	140	130	Fountain Valley	Other	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Heil St	140	130	140	130	Fountain Valley	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Garry Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
Fairview St	Trask Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	Edna Dr	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Civic Center Dr	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Wireless		MIST	Online
	5th St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Willits St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	McFadden Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Wireless		MIST	Online
	Centennial Rd/St. Andrews	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Harvard St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	Online
Bristol St	Alton Ave	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Riverglen Ln	140	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Memory Ln	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	No	Cohu	N/A	Fiber		MIST	Online
	Santa Clara Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Bristol Mkt Pl/19th	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Washington Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Video	No	N/A	N/A	Fiber		MIST	Online
	Civic Center Dr	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber		MIST	Online
	Santa Ana Blvd	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber		MIST	Online
	Bishop St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber		MIST	Online
	McFadden Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber	Bluetooth	MIST	Online
	Wilshire Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber		MIST	Online
	Glenwood Pl	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Central Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Hemlock Wy	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
Alton Ave	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online	
Target/Bristol Plaza	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online	
Callens Common	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	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
Main St	MainPlace/Town & Country	120	120	120	120	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Axis	N/A	Wireless	Bluetooth	MIST	Online
	MainPlace/City Place	120	120	120	120	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Memory Ln	120	120	120	120	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Copper		MIST	Online
	Walkie Wy	120	120	120	120	Santa Ana	P (TS1)	2070	ASC/3	Video	No	N/A	N/A	Copper		MIST	Online
	Bowers Museum	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	20th St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Copper		MIST	Online
	Washington Ave	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	10th St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	8th St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Civic Center Dr	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	Online
	5th St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	Online
	Santa Ana Blvd	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	4th St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	3rd St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Chestnut Ave	70	130	70	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Bishop St	70	130	70	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Cubbon St	70	130	70	130	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	McFadden Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	Online
	Russell Abe	70	65	70	65	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Borchard Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Pomona St	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
St. Andrew Pl	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online	
St. Gertrude Pl	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online	
Goetz Ave	140	Free	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Video	No	N/A	N/A	Fiber		MIST	Online	
Alton Ave	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online	
Columbine Ave	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online	
Murphy Ave/Sandpointe Ave	140	Free	Free	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online	
Sunflower St	140	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online	
Grand Ave	Fairhaven Ave	120	90	120	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	N/A	N/A	Copper		MIST	Online
	Santa Clara Ave	120	90	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber		MIST	Online
	21st St	120	90	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber		MIST	Online
	I-5 NB off	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Santa Ana Blvd/I-5 SB on	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Fruit St	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	6th St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	4th St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	Cohu	N/A	Fiber		MIST	Online
	Chestnut Ave	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	McFadden Ave	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Century High	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	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
	St. Andrew Pl	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	St. Gertrude Pl	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Hotel Terrace/Brookhollow	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	SR-55 SB off ramp	70	65	70	65	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
Tustin Ave	Santa Clara Ave	140	100	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Centre on 17th/Tustin Center	140	100	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Wellington Ave	140	100	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Fruit St	140	100	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	4th St	130	100	130	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
McFadden	Newhope St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	Yes	Axis	N/A	Fiber		MIST	Online
	Riverview Market Pl	70	Free	Free	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Jackson St	70	Free	Free	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Mohawk Dr	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	Sullivan St	70	65	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Center St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Raitt St	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	Online
	Pacific Ave	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Shelton St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Flower St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Broadway	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Orange Ave	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Maple St	70	65	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Standard Ave	140	130	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Hathaway St	140	130	140	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
Lyon St	140	Free	140	Free	Santa Ana	332	2070	ASC/3	Loops	No	Axis	BBS	Fiber		MIST	Online	
McFadden Queue Cutter	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	BBS	Copper		MIST	Online	
Newhope St	Hazard Ave	140	130	140	130	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	Axis	N/A	Fiber		MIST	Online
	5th St	140	130	140	130	Santa Ana	332	2070	ASC/3	Loops	Yes	N/A	N/A	Fiber		MIST	Online
	Camille St	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Kent Ave	70	Free	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
Civic Center Dr	English St	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Raitt St	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Pacific Ave	70	Free	70	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
	Baker St	70	Free	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Boyd St	100	Free	100	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Flower St	100	100	100	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	Cohu	N/A	Copper		MIST	Online
	Parton St	100	100	100	Free	Santa Ana	332	2070	ASC/2	Loops	No	N/A	N/A	Copper		MIST	Online
	Ross St	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	OC Parking Garage	100	100	100	Free	Santa Ana	332	2070	ASC/2	Loops	No	N/A	N/A	Copper		MIST	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
	Broadway	90	90	90	90	Santa Ana	332	2070	ASC/2	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Sycamore St	90	90	90	90	Santa Ana	332	2070	ASC/2	Loops	No	N/A	N/A	Copper		MIST	Online
	Bush St	90	90	90	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
Santa Ana Blvd	Flower St	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	Axis	N/A	Fiber		MIST	Online
	Parton St	100	100	100	Free	Santa Ana	332	2070	ASC/2	Loops	No	N/A	N/A	Copper		MIST	Online
	Ross St	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	OCTA Xing	100	100	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Broadway	90	90	90	90	Santa Ana	332	2070	ASC/2	Loops	No	Cohu	N/A	Fiber		MIST	Online
	Bush St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Santiago St	Free	Free	Free	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Santa Ana Queue Cutter	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
I-5 SB on/off ramp	140	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online	
4th St	French St	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Lacy St	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	I-5 SB off ramp/Mabury St	130	100	130	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	I-5 NB on/off ramp/Mabury	130	100	130	Free	Santa Ana	332	2070	ASC/3	Loops	No	Cohu	N/A	Copper		MIST	Online
	Cabrillo Park Dr	130	100	130	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
Golden Circle	130	100	130	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online	
Flower St	Washington Ave	100	Free	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Wireless		MIST	Online
	6th St	100	Free	100	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Bishop St	70	65	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Highland St	Free	Free	Free	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Wilshire St	70	65	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Alton Bike Trail	Free	Free	Free	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
Alton Ave	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online	
Central Business District	Downtown Signals	90	90	90	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber	Copper	MIST	Online
Broadway	Memory Ln	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	I-5 NB Off ramp	Free	Free	Free	Free	Santa Ana	Other	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Santa Clara Ave	90	Free	90	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Buffalo Ave	90	Free	90	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	15th St	70	65	70	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	Washington Ave	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	10th St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	5th St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Fiber		MIST	Online
4th St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online	
3rd St	90	90	90	90	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online	
Standard Ave	Chestnut Ave	Free	Free	Free	Free	Santa Ana	P (TS1)	2070	ASC/3	Loops	Yes	N/A	N/A	Copper		MIST	Online
	Hobart St	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online
	St. Gertrude Pl	Free	Free	Free	Free	Santa Ana	332	2070	ASC/3	Loops	No	N/A	N/A	Copper		MIST	Online



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 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.



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	FY20/21	FY21/22	FY22/23	Total
Traffic Signals Maintenance	\$877,000	\$877,000	\$877,000	\$2,631,000
Communication Maintenance	\$50,000	\$50,000	\$50,000	\$150,000
Traffic Signal Utility	\$200,000	\$200,000	\$200,000	\$600,000
Traffic Signal System Maintenance	\$74,000	\$74,000	\$74,000	\$222,000
Subtotal Maintenance	\$1,201,000	\$1,201,000	\$1,201,000	\$3,603,000
Construction				
Project	FY20/21	FY21/22	FY22/23	Total
Traffic Signal Equipment Replacement	\$100,000	\$100,000	\$100,000	\$300,000
New LT Phasing	\$500,000		\$500,000	\$1,000,000
Edinger Ave TSSP Comm & signal upgrade	\$100,000			\$100,000
Warner Ave TSSP Comm & signal upgrade	\$100,000			\$100,000
MacArthur Blvd TSSP Comm & signal upgrade	\$100,000			\$100,000
Tustin Ave TSSP Comm & signal upgrade		\$100,000		\$100,000
Seegerstrom Ave/ Dyer Rd TSSP Comm & signal upgrade		\$275,000		\$275,000
Subtotal Construction	\$900,000	\$475,000	\$600,000	\$1,975,000
Operations				
Project	FY20/21	FY21/22	FY22/23	Total
Westminster Ave/17th St TSSP maintenance	\$28,800			\$28,800
Fairview St TSSP maintenance	\$20,400	\$20,400		\$40,800
Bear St TSSP maintenance	\$3,600	\$3,600		\$7,200
Main St TSSP maintenance		\$40,800	\$40,800	\$81,600
Edinger Ave TSSP maintenance			\$24,000	\$24,000
Warner Ave TSSP maintenance			\$22,000	\$22,000
MacArthur Blvd TSSP maintenance			\$22,000	\$22,000
Subtotal Operations	\$52,800	\$64,800	\$108,800	\$226,400
TOTAL	\$2,153,800	\$1,740,800	\$1,909,800	\$5,804,400



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	FY20/21	FY21/22	FY22/23	Total
Traffic Signals Maintenance	\$877,000	\$877,000	\$877,000	\$2,631,000
Communication Maintenance	\$50,000	\$55,000	\$60,000	\$165,000
Traffic Signal Utility	\$200,000	\$200,000	\$200,000	\$600,000
Traffic Signal System Maintenance	\$74,000	\$80,000	\$90,000	\$244,000
Subtotal Maintenance	\$1,201,000	\$1,212,000	\$1,227,000	\$3,640,000
Construction				
Project	FY20/21	FY21/22	FY22/23	Total
Traffic Signal Equipment Replacement	\$200,000	\$200,000	\$200,000	\$600,000
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		\$280,000		\$280,000
McFadden Conduit & Comm	\$250,000	\$250,000		\$500,000
Main St Conduit & Comm	\$250,000	\$350,000		\$600,000
Seegerstrom Ave/Dyer Rd Conduit & Comm		\$250,000		\$250,000
Fairview St Conduit & Comm	\$500,000			\$500,000
Warner Ave Conduit & Comm			\$350,000	\$350,000
MacArthur Blvd Conduit & Comm		\$200,000		\$200,000
Edinger Ave Conduit & Comm		\$250,000		\$250,000
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	\$100,000	\$100,000	\$100,000	\$300,000
Uninterruptible Power Supply System- Various Locations	\$150,000	\$150,000	\$150,000	\$450,000
Subtotal Construction	\$2,000,000	\$2,830,000	\$4,100,000	\$8,930,000
Operations				
Project	FY20/21	FY21/22	FY22/23	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	\$3,301,000	\$4,142,000	\$6,547,000	\$13,990,000



Table 5
LSSP IMPLEMENTATION
CANDIDATE SIGNAL SYNCHRONIZATION PROJECTS WITH ESTIMATED COSTS
Reporting Jurisdiction Expenditures: City of Santa Ana

Corridor	Improvement Summary	Estimated Costs
Euclid St	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$900,000
First St	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$5,000,000
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
Main St	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$5,000,000
Segerstrom Ave/Dyer Rd	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$2,500,000
Fairview St	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$3,500,000
Warner Ave	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$2,500,000
MacArthur Blvd	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$2,000,000
Edinger Ave	Upgrade timing, controllers, CCTV, cabinets, system detection, video detection, communication, active transportation, UPS, travel time system and TMC improvements	\$2,500,000
	Total Estimated Costs	\$30,900,000



V. Traffic Signal Synchronization Assessment, Review and 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 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.

Over the past three years from 2017 to 2020, 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:

- Grand Ave, Bristol St and Harbor Blvd Corridor synchronization was completed in 2018.
- Westminster Ave/ 17th St Corridor synchronization was completed in 2019 and is currently in the monitoring stage for 2 years.



- Fairview St and Bear St Corridors synchronization are on-going and expected to complete in late 2020.
- Main St Corridors synchronization is in early design stage and expected to complete in 2021.

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 2** (Santa Ana 2017 Corridor Synchronization Performance Map). The map shows overall CSPI results derived from OCTA's 2017 Corridor Performance Report.



Table 6- Traffic Signal Synchronization Assessment, Review & Revision

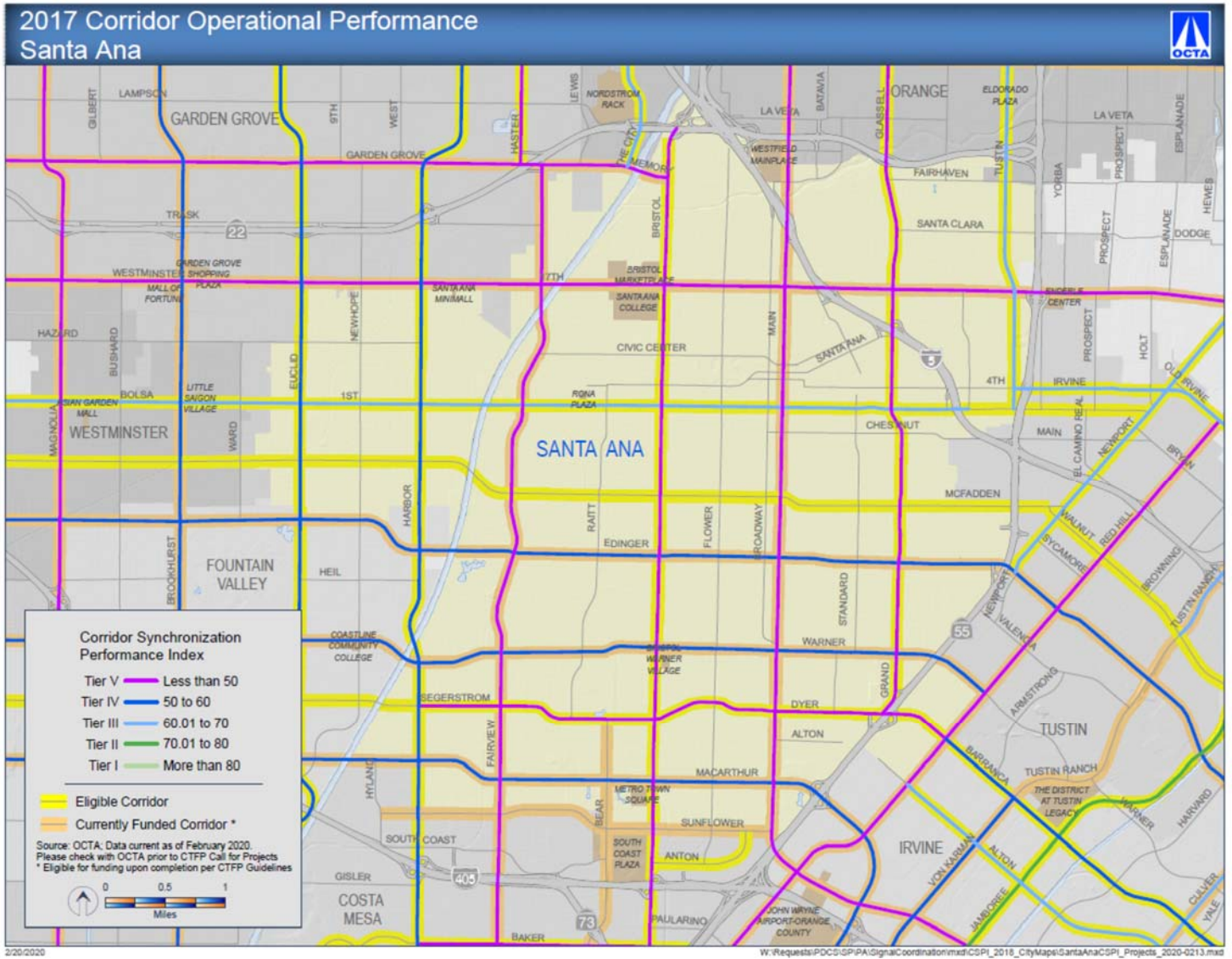
LOCAL AGENCY CORRIDOR	TIMING REVIEWED (Past 3 Years)	DID TIMING REQUIRE AN UPDATE?	TIMING UPDATE RESULTS											
			Direction	Peak	Speed Travel		Green per Red		Stops per Mile		CSPI Score		CSPI Tier	
					Before	After	Before	After	Before	After	Before	After	Before	After
Grand Ave	2018	Yes	NB	AM	20.0	23.2	1.85	2.26	2.10	1.66	48.8	60.9	5	4
				MD	21.7	23.0	1.97	2.18	2.02	1.81	51.8	57.6	4	4
				PM	17.2	18.6	1.60	2.03	2.80	2.40	33.6	44.2	5	5
				WKND	No Data Collected. Not Synchronized WKND.									
			SB	AM	19.3	21.8	1.39	2.44	2.06	1.85	42.1	57.8	5	4
				MD	22.0	22.2	1.91	2.26	1.74	1.94	56.8	57.7	4	4
				PM	20.2	20.4	1.74	1.91	2.07	2.08	47.8	49.4	5	5
				WKND	No Data Collected. Not Synchronized WKND.									
Harbor Blvd	2018	Yes	NB	AM	25.2	24.8	2.61	2.91	1.25	1.23	71.2	73.1	2	2
				MD	21.4	24.7	2.05	2.60	1.55	1.25	58.0	70.3	4	2
				PM	15.0	16.6	1.13	1.65	2.30	3.30	33.7	42.2	5	5
				WKND	19.7	23.9	2.02	2.90	1.71	1.23	53.6	71.6	4	2
			SB	AM	21.0	20.7	2.27	2.01	1.69	1.67	57.8	55.5	4	4
				MD	22.8	26.0	2.71	3.57	1.36	1.09	67.2	81.7	3	1
				PM	19.3	21.7	2.19	2.25	1.63	1.46	55.2	60.9	4	3
				WKND	24.1	24.9	3.41	3.72	1.14	1.09	77.1	81.2	2	1
Bristol St	2018	Yes	NB	AM	25.7	27.4	3.30	4.10	1.50	1.20	74.9	86.9	2	1
				MD	29.1	28.2	4.10	4.50	1.20	1.00	89.4	93.3	1	1
				PM	17.2	16.9	3.00	2.90	2.00	2.00	55.1	53.7	4	4
				WKND	24.3	27.3	4.00	4.30	1.30	1.20	80.7	88.3	1	1
			SB	AM	23.8	26.7	3.10	3.90	1.60	1.30	69.5	83.2	3	1
				MD	25.1	26.6	3.40	3.30	1.30	1.30	76.8	78.3	2	2
				PM	21.2	23.6	2.30	3.50	1.80	1.40	57.4	74.4	4	2
				WKND	24.1	27.5	2.30	3.00	1.60	1.40	63.2	76.2	3	2
Westminster Ave/ 17th St	2019	Yes	EB	AM	17.0	20.9	1.76	3.08	1.81	1.42	50.0	66.8	5	3
				MD	22.7	22.9	2.59	3.36	1.36	1.31	66.2	73.1	3	2
				PM	20.1	18.9	2.72	1.99	1.55	1.83	61.4	51.1	3	4
				WKND	24.8	24.4	2.83	3.50	1.30	1.17	71.8	76.6	2	2
			WB	AM	21.9	20.0	2.20	2.36	1.62	1.62	59.3	57.7	4	4
				MD	21.0	21.8	2.53	3.20	1.48	1.16	61.9	71.7	3	2
				PM	18.0	16.3	1.76	1.78	2.00	1.94	50.0	50.0	5	5
				WKND	22.9	24.5	2.69	4.33	1.36	0.86	67.3	87.8	3	1
Fairview St	2020	Yes		Results not yet available										
Bear St	2020	Yes		Results not yet available										
Main St	2020	Yes		Results not yet available										



City of Santa Ana

Local Signal Synchronization Plan

Figure 2- Santa Ana 2017 Corridor Synchronization Performance Map:





B. 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. Grand Ave Corridor: Upgraded traffic signal communication to IP addressing, installed fiber optic and wireless communication links, installed/upgraded CCTV at 7 locations, installed system detection at 6 locations, replaced traffic signal cabinets at 4 locations. Installed new communication HUB at McFadden Ave. Installed Bluetooth travel time system at 5 locations. Upgraded video management system at the TMC.
2. Harbor Blvd Corridor: Upgraded traffic signal communication to IP addressing, installed fiber optic and wireless communication links, installed/upgraded CCTV at 4 locations, installed system detection at 3 locations, installed Bluetooth travel time system at 3 locations, and installed new communication HUB at 5th St. Upgraded video wall display at the TMC.
3. Bristol St Corridor: Upgraded traffic signal communication to IP addressing, install fiber optic and wireless communication links, install/upgrade CCTV at 6 locations, install system detection at Segerstrom Ave, replace traffic signal cabinets at 7 locations and install Bluetooth travel time system at 4 locations. Provided additional video licenses and upgrade motorist information system at the TMC
4. Westminster Ave/ 17th St Corridor: Upgraded all controllers to ATC, upgraded traffic signal communication to IP addressing, installed conduit with fiber optic cable, installed/upgraded CCTV camera at 7 locations, installed system detection at Newhope and Fairview , replace traffic signal cabinets at 7 locations and install Bluetooth travel time system at 3 locations. Provide additional video management system licenses.
5. Fairview St Corridor: Upgrade 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.



City of Santa Ana

Local Signal Synchronization Plan

6. Bear St Corridor: Upgrade all controllers to ATC, upgrade traffic signal communication to IP addressing, install/upgrade CCTV camera at MacArthur Blvd, install UPS system and video detection at Alton Ave, and replace traffic signal cabinet at MacArthur Blvd.
7. Main St Corridor: Upgrade Advance Traffic Management System at TMC, upgrade all controllers to ATC, upgrade traffic signal communication to IP addressing, install conduit with fiber optic cable, install/upgrade CCTV cameras at 8 locations, install system detection at MacArthur Blvd, and replace traffic signal cabinet at 6 locations and install Bluetooth travel time system at 2 locations. Provide additional video management system licenses.