

City of Garden Grove

INTER-DEPARTMENT MEMORANDUM

To: Matthew Fertal
Dept.: City Manager
Subject: MAGNOLIA CORRIDOR TRAFFIC SIGNAL SYNCHRONIZATION PROJECT MEMORANDUM OF UNDERSTANDING WITH THE ORANGE COUNTY TRANSPORTATION AUTHORITY

From: William E. Murray
Dept.: Public Works
Date: July 12, 2011

OBJECTIVE

To secure City Council authorization of a Memorandum of Understanding (MOU) between the Orange County Transportation Authority (OCTA) and the City of Garden Grove for the Magnolia Corridor Traffic Signal Synchronization Project.

BACKGROUND

OCTA is proposing to implement a TLSP project on Magnolia Street. The goal of the project is to improve the coordination of traffic signals to enhance traffic flow and reduce congestion across city boundaries. The project is approximately sixteen (16) miles in length and includes fifty-three (53) traffic signals located in the cities of Garden Grove, Anaheim, Fountain Valley, Fullerton, Huntington Beach and Westminster.

The project includes preparation of new timing plans optimized for signal synchronization, hardware and software upgrades to traffic controllers, telecommunications and inter-tie systems, central traffic master controllers and associated systems.

DISCUSSION

While not participating in the costs, Garden Grove will make available its timing plans, currently in design within the city limits, to assist with the overall timing for the length of the project. The agreement stipulates that the City's timing plans will not be modified by OCTA's TLSP project.

FINANCIAL IMPACT

There is no impact to the General Fund. The proposed street improvements will be funded by OCTA Growth Management Area 6 (GMA) funds.

RECOMMENDATION

It is recommended that the City Council:

- Approve the Magnolia Corridor Traffic Signal Synchronization Project Memorandum of Understanding among the Orange County Transportation Authority, Caltrans and other affected cities.
- Authorize the Mayor to execute the Magnolia Corridor Traffic Signal Synchronization Project Memorandum of Understanding on behalf of the city.


William E. Murray, P.E.
Public Works Director/City Engineer


By: Dan Candelaria, P.E., T.E.
City Traffic Engineer

Attachment 1: Vicinity Map

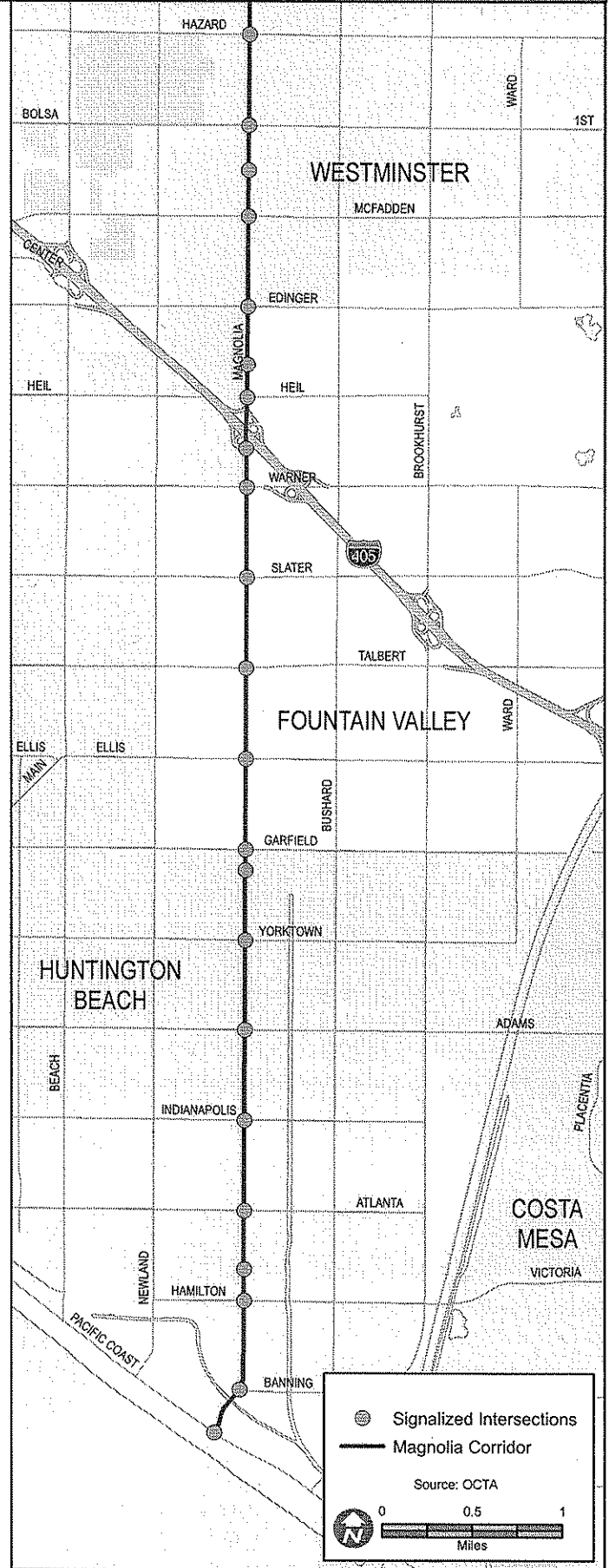
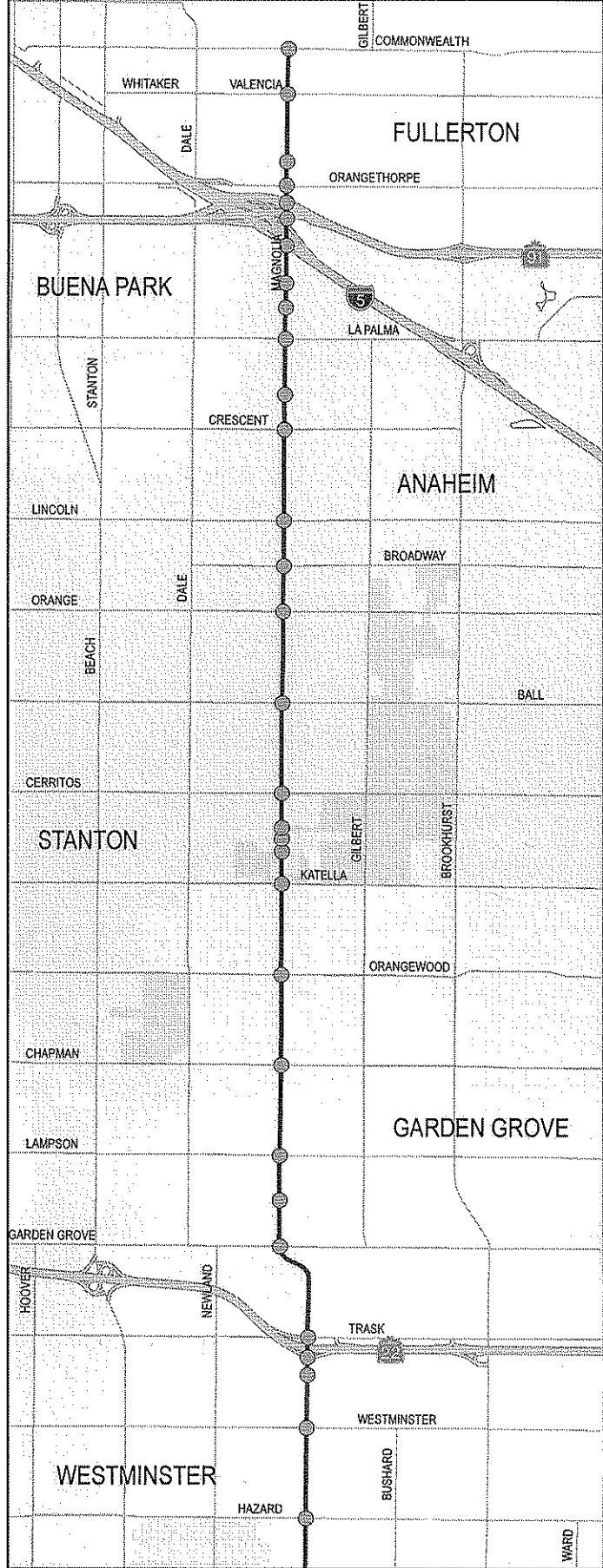
Attachment 2: Magnolia Corridor Traffic Signal Synchronization Project
Memorandum of Understanding

Recommended for Approval


Matthew Ferial
City Manager



Magnolia Street Traffic Signal Synchronization Project



● Signalized Intersections
 — Magnolia Corridor

Source: OCTA

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 Miles

**AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC LIGHT SYNCHRONIZATION PROGRAM**

MEMORANDUM OF UNDERSTANDING C-1-2648

BY AND BETWEEN

ORANGE COUNTY TRANSPORTATION AUTHORITY

AND

THE CITIES OF

ANAHEIM, FOUNTAIN VALLEY, FULLERTON, GARDEN GROVE,

HUNTINGTON BEACH, STANTON, WESTMINSTER

AND

THE COUNTY OF ORANGE

AND

THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

FOR

THE MAGNOLIA CORRIDOR TRAFFIC SIGNAL SYNCHRONIZATION PROJECT

The following Memorandum of Understanding (hereinafter, "MOU") is effective _____ day of _____, 2011 entered by and between the Orange County Transportation Authority (hereinafter, "AUTHORITY"), the City of Anaheim, the City of Fountain Valley, the City of Fullerton, the City of Garden Grove, the City of Huntington Beach, the City of Stanton, the City of Westminster, the County of Orange, and the State of California Department of Transportation (Caltrans) hereinafter jointly referred to as the "AGENCIES" and severally as "AGENCY"; with regard to the following matters:

WHEREAS, coordinating traffic signals across cities' boundaries is a major component in enhancing countywide traffic flow and reducing congestion; and

WHEREAS, AUTHORITY has the responsibility to carry out signal coordination and synchronization efforts in Orange County; and

WHEREAS, AUTHORITY has successfully completed two interjurisdictional traffic signal synchronization demonstration projects (one located in the northern part of the Orange County and the other located in the southern part of Orange County); and

**MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC LIGHT SYNCHRONIZATION PROGRAM**

1 **WHEREAS**, AUTHORITY has successfully completed three interjurisdictional traffic signal
2 synchronization projects through the Traffic Light Synchronization Program (TLSP) funded by
3 Proposition 1B and Measure M (M1) Signal Improvement Funds; and

4 **WHEREAS**, Growth Management Area 6 (GMA #6) has requested that AUTHORITY be the
5 LEAD Agency on the Traffic Signal Synchronization (TSS) Project for Magnolia Corridor and has
6 transferred funds for this project to AUTHORITY through the Semi Annual Review (SAR) process.

7 **WHEREAS**, the Magnolia Corridor Traffic Signal Synchronization Project (hereinafter
8 PROJECT) shall consist of a traffic signalized intersection corridor spanning nine (9) jurisdictions, will
9 not require immediate street widening, and has sufficient traffic volume to show a measurable benefit of
10 interagency signal synchronization through cooperative time-based traffic signal coordination; and

11 **WHEREAS**, the PROJECT will include retiming for approximately fifty three (53) traffic signals
12 located from the City of Fullerton to the City of Huntington Beach; and

13 **WHEREAS**, the PROJECT will also include certain hardware and software upgrades to traffic
14 controllers, traffic telecommunications and inter-tie systems, central traffic master controllers and
15 associated systems (hereinafter collectively referred to as "traffic control elements"), and these traffic
16 control elements will be constructed and/or installed and implemented as part of the PROJECT ; and

17 **WHEREAS**, AUTHORITY agree to work with AGENCIES to coordinate the inclusion of other
18 traffic control elements that must be installed at the same time as the construction of the PROJECT that
19 are NOT included in the PROJECT Scope of Work and will be the responsibility of the AGENCY owning
20 each and any of those traffic control elements during the course of the project; and

21 **WHEREAS**, AUTHORITY and AGENCIES acknowledge that other similar corridor traffic signal
22 timing projects are currently underway or completed that intersect the PROJECT, and

23 **WHEREAS**, AUTHORITY and AGENCIES acknowledge that these other similar corridor traffic
24 signal timing projects respective corridor timing operations cannot be supplanted and must by necessity
25 be integrated with and incorporated into the design and completion of the PROJECT; and
26 /

**MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT**

1 **WHEREAS**, the AUTHORITY and AGENCIES desire to enter into this MOU to demonstrate
2 their commitment to improving transportation opportunities for Orange County and to develop and
3 implement the Magnolia Street Traffic Signal Synchronization PROJECT;

4 **NOW, THEREFORE**, the AUTHORITY and AGENCIES enter into the following
5 Memorandum of Understanding with respect to the matters set forth herein:

6 **ARTICLE 1. COMPLETE AGREEMENT:**

7 This MOU, including all exhibits and documents incorporated herein and made applicable by
8 reference, constitutes the complete and exclusive statement of the terms and conditions of the MOU
9 between AUTHORITY and AGENCIES concerning the PROJECT and supersedes all prior
10 representations, understandings and communications between the parties. The above-referenced
11 Recitals are true and correct and are incorporated by reference herein. The invalidity in whole or part of
12 any term or condition of this MOU shall not affect the validity of other term(s) or condition(s).

13 **ARTICLE 2. RESPONSIBILITIES OF AUTHORITY:**

14 AUTHORITY agrees to the following responsibilities for PROJECT

15 1. To retain oversight of the PROJECT by establishing PROJECT milestones and
16 overseeing the PROJECT development.

17 2. AUTHORITY shall maintain interface with the AGENCIES and outreach for the
18 PROJECT.

19 3. AUTHORITY shall assist in building consensus among the AGENCIES with respect to
20 the required services for the PROJECT.

21 4. The AGENCIES and AUTHORITY agree that PROJECT signal synchronization efforts
22 shall focus on those peak traffic time periods determined from the data collected during the course
23 of the PROJECT.

24 5. AUTHORITY shall provide and collect all data necessary for the analysis and
25 optimization of traffic signal timing

26 6. AUTHORITY shall develop new timing plans optimized for signal synchronization while

**MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT**

1 maintaining or minimizing impact to newly completed timing within PROJECT limits, concurrent
2 timing projects on crossing arterial corridors, or existing crossing arterial timing and operations. .

3 7. AUTHORITY shall provide on-site support to implement the timing plans as necessary.
4 Timing plans are subject to each AGENCY'S review and approval.

5 8. AUTHORITY shall provide updated timing plans and turning movements to the
6 AGENCIES in Synchro version 7 formats and/or Tru – Traffic TS/PP version 9 upon request.

7 9. AUTHORITY shall endeavor to provide construction items for PROJECT intersections,
8 central systems, and communications systems, including Agency specific operating systems and
9 intersection signal control systems, with the caveat that during the course of construction, better
10 more cost effective methods may be found and/or employed that meet the intent of the required
11 and/or specified operation for the construction items.

12 10. AUTHORITY shall design all aspects of the infrastructure needed to construct and
13 implement PROJECT resulting in final Construction Documentation (PS&E)

14 11. AUTHORITY shall construct AGENCY approved PROJECT infrastructure utilizing
15 PS&E in competitively bid consultant services

16 12. To prepare "before" and "after" studies of the PROJECT conditions. The "before"
17 studies shall be completed by end of spring 2011 and the "after" studies shall be completed by end
18 of fall 2011.

19 13. To designate a technical lead person for liaison among the AGENCIES

20 **ARTICLE 3. RESPONSIBILITES OF AGENCIES:**

21 AGENCIES agrees to the following responsibilities for PROJECT

22 1. To provide AUTHORITY current intersection, local field master, and/or central control
23 system timing plans and related data no later than thirty (30) days subsequent to execution of this
24 MOU, and updates as they occur within 7 days of the event.

25 2. To provide any available or current PS & E documentation for the CONSULTANT to
26 utilize in the construction of PROJECT infrastructure required to implement the desired coordinated

**MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT**

and synchronized systems and operations.

1 3. To review and approve any and all PROJECT infrastructure PS & E

2 4. Authorize and give permission to AUTHORITY to construct PROJECT infrastructure
3 per the PS & E within AGENCY owned Right of Way

4 5. To waive all costs and fees related to any and all AGENCY required encroachment and
5 inspection permits including any payment for work provided or mandated by respective AGENCY
6 forces or employees for the construction phase of the PROJECT

7 6. To provide no cost installation and/or inspection services normally provided or required
8 by AGENCY on Traffic Signal Infrastructure constructed as part of PROJECT

9 7. To give PROJECT related signal and telecommunications equipment a high
10 maintenance priority during the PROJECT.

11 8. To take reasonable steps to keep signal controls, inter – tie, and detection systems and
12 equipment in proper working order during the PROJECT.

13 9. To maintain and repair the signal control inter – tie, detection systems, and local
14 control equipment located within their jurisdiction.

15 10. To work with AUTHORITY to determine which of the AGENCIES shall provide on-site
16 support for timing plan changes and upgrades to all synchronization systems, components,
17 equipment, and infrastructure systems as installed or implemented by this PROJECT. Each
18 AGENCY's Traffic Engineer or authorized designee (which in some cases may be the AUTHORITY)
19 shall be authorized to make changes or adjustments to the signal timing plans when required.

20 11. To perform the changes required at central system, field master control locations,
21 and/or intersection controller assemblies. When AUTHORITY is required to make such changes,
22 AGENCIES shall provide AUTHORITY access to all necessary equipment.

23 12. To designate a technical lead person for liaison among the AGENCIES.

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**MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT**

ARTICLE 4. MUTUAL RESPONSIBILITES OF ALL PARTIES:

AUTHORITY and AGENCIES agrees to the following mutual responsibilities for PROJECT:

1. PROJECT signal synchronization efforts shall focus on those time periods as specified hereinabove, and/or as determined through the course of the PROJECT.

2. To attend and participate in all joint AGENCIES related PROJECT meetings.

3. To cooperate and coordinate with all other AGENCIES, their staff, contractors, CONSULTANTS, vendors, in providing the services and responsibilities required under this MOU to the extent practicable with respect to the performance of the PROJECT.

4. The owning AGENCY shall be responsible for coordinating the construction and/or installation of traffic control elements and other items that are not included in the PROJECT Scope of Work, but by necessity, must be built concurrent, with the PROJECT.

5. To work together in good faith, using reasonable efforts to resolve any unforeseen issues and disputes arising out of the performance of this MOU.

6. This MOU may only be modified or amended upon written mutual consent of all agencies. All modifications, amendments, changes and revisions of this MOU in whole or part, and from time to time, shall be binding upon the agencies, so long as the same shall be in writing and executed by the AGENCIES.

7. This MOU shall be governed by all applicable federal, state and local laws. The AGENCIES warrant that in the performance of this MOU, each shall comply with all applicable federal, state and local laws, statutes and ordinances and all lawful orders, rules and regulations promulgated there under.

8. Each AGENCY agrees to defend, indemnify and hold harmless the other AGENCIES, their Officers, agents, elected officials, and employees, from all liability, claims, losses and demands, including defense costs and reasonable attorneys' fees, whether resulting from court action or otherwise, arising out of the acts or omissions of the defending AGENCY, its officers, agents, or Employees, in the performance of this MOU. When acts or omissions of one AGENCY are directed

**MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT**

1 by another AGENCY, the AGENCY directing the acts or omissions shall owe this defense and
2 indemnity obligation to the AGENCY following the directions. The provisions of this paragraph 8
3 shall survive termination of this MOU.

4 9. Each AGENCY shall be excused from performing its obligations under this MOU during
5 the time and to the extent that it is prevented from performing by an unforeseeable cause beyond its
6 control, including but not limited to: any incidence of fire, flood; acts of God; commandeering of
7 material, products, plants or facilities by federal, state or local government; national fuel shortage; or
8 a material act or omission by any other agency; when satisfactory evidence of such cause is
9 presented to the other agencies, and provided further such nonperformance is unforeseeable,
10 beyond the control and is not due to the fault or negligence of the agency not performing.

11 10. Any notice sent by first class mail, postage paid, to the address and addressee, shall be
12 deemed to have been given when in the ordinary course it would be delivered. The representatives
13 of the agencies who are primarily responsible for the administration of this MOU, and to whom
14 notices, demands and communications shall be given are as detailed in Attachment A.

15 11. This MOU shall continue in full force and effect through December 31, 2012 unless
16 terminated earlier by AUTHORITY. The AGENCIES may elect to extend the term of this MOU for an
17 additional six (6) months commencing January 1, 2013 and ending June 30, 2013.

18 12. The term of this MOU may only be extended upon mutual written MOU by AUTHORITY
19 and AGENCIES.

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MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT

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IN WITNESS WHEREOF, the AGENCIES hereto have caused this Agreement
No. C-1-2648 to be executed on the date hereinabove written.

CITY OF ANAHEIM

ORANGE COUNTY TRANSPORTATION AUTHORITY

By: _____
Tom Tait
Mayor

By: _____
Meena Katakia, Manager
Capital Projects

ATTEST:

By: _____
Linda N Andal, CMC
City Clerk

APPROVED AS TO FORM:

By: _____
Cristina L. Talley
City Attorney

MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT

CITY OF FOUNTAIN VALLEY

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By: _____
Steve Nagel
Mayor

ATTEST:

By: _____
Pat Haley
City Clerk

APPROVED AS TO FORM:

By: _____
Alan R. Bruns
City Attorney

MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT

CITY OF FULLERTON

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By: _____
F. Richard Jones
Mayor

ATTEST:

By: _____
Lucinda Williams
City Clerk

APPROVED AS TO FORM:

By: _____
Richard D. Jones
City Attorney

**MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT**

CITY OF GARDEN GROVE

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By: _____
William Dalton
Mayor

ATTEST:

By: _____
Kathy Builor
City Clerk

MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT

CITY OF HUNTINGTON BEACH

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By: _____
Joe Carchio
Mayor

ATTEST:

By: _____
Joan L Flynn
City Clerk

APPROVED AS TO FORM:

By: _____
Jennifer McGrath
City Attorney

**MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT**

CITY OF STANTON

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By: _____
Brian Donahue
Mayor

ATTEST:

By: _____
Brenda Green
City Clerk

APPROVED AS TO FORM:

By: _____
Ralph Hansen
City Attorney

MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT

CITY OF WESTMINSTER

1
2 By: _____
3 Margie L. Rice
4 Mayor

ATTEST:

5 By: _____
6 Robin Roberts
7 City Clerk

APPROVED AS TO FORM:

8 By: _____
9 Richard Jones
10 City Attorney

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**MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT**

COUNTY OF ORANGE

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By: _____
 Jess Carjal
 Director of Public Works

MEMORANDUM OF UNDERSTANDING
AGREEMENT C-1-2648
MAGNOLIA CORRIDOR
TRAFFIC SIGNAL SYNCHRONIZATION PROJECT

CALIFORNIA DEPARTMENT OF TRANSPORTATION

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2 By: _____
3 James Pinheiro
4 Deputy District Director
5 Operations and Maintenance
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Orange County Transportation Authority

Scope of Work

Magnolia Street

Traffic Signal Synchronization Project

July 10, 2011



1. INTRODUCTION

The Orange County Transportation Authority (OCTA) is leading a Traffic Signal Synchronization (TSS) Project for Magnolia Street to provide Traffic Engineering Services. The scope of the services will support the specific traffic engineering needs of OCTA, primarily to construct and implement signal synchronization.

This Scope of Work is for the Magnolia Street Corridor from Pacific Coast Highway (SR-1) in Huntington Beach to Commonwealth Avenue in the City of Fullerton. Magnolia Street is also known as Magnolia Avenue in some portions of the project limits. For the sake of brevity, this document will refer to the entire project corridor as Magnolia Street. (See Attachment A for a list of participants and contacts)

For clarification, the following acronyms and terms are defined as:

- ◆ ADAPTIVE = Real Time Adaptive Timing Operations
- ◆ AGENCY or AGENCIES = All entities, via MOU, cooperating and participating in the specified project
- ◆ APM = OCTA Project Manager/Principal Traffic Engineer
- ◆ AUTHORITY = Orange County Transportation Authority (OCTA)
- ◆ Caltrans = California Department of Transportation
- ◆ CAMM = Contracts Administration and Materials Management Division of OCTA
- ◆ CA MUTCD = California Manual on Uniform Traffic Control Devices (January, 2010)

- ◆ CONSULTANT = The fully qualified Transportation/Traffic Engineering firm(s) selected to construct this specific PROJECT
- ◆ COOP = Cooperative Agreement
- ◆ County = County of Orange
- ◆ CPM or PM = CONSULTANT Project Manager
- ◆ GPS Unit = Global Positioning Satellite Time Synchronization Resource Unit
- ◆ MOU = Memorandum of Understanding
- ◆ MUTCD = Manual on Uniform Traffic Control Devices (Federal 2009)
- ◆ NTCIP = National Transportation Communications for ITS Protocol
- ◆ OCTA = AUTHORITY (see above)
- ◆ PS&E = Plans, Specifications, Estimates and all related construction design documentation
- ◆ PROJECT = This Magnolia Street Corridor construction and signal timing analysis project
- ◆ TOD/DOW = Time of Day/Day of Week
- ◆ TRO = Real Time Traffic Responsive Operation
- ◆ TSS = Traffic Signal Synchronization

1.1 Project Limits – Corridors

Corridor PROJECT limits are Magnolia Street from Pacific Coast Highway to Commonwealth Avenue. The agencies cooperating in this endeavor are the Cities of Anaheim, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, Stanton, Westminster; the County of Orange; Caltrans; and, OCTA, hereinafter referred to collectively as the AGENCIES. The corridor is known as Magnolia Street from Pacific Coast Highway (SR – 1) in Huntington Beach to Katella Avenue in Garden Grove; and, as Magnolia Avenue from Katella Avenue in Anaheim to Commonwealth Avenue in Fullerton. The corridor is approximately 16 miles in length and has approximately 53 signalized intersections either on Magnolia Street proper or on crossing arterials that have additional signalized intersections that are in close proximity to the corridor and therefore must be operated within the proposed network(s). Included within the 53 intersections are 8 intersections on Magnolia Street from Orangewood Avenue to Mays Avenue in the City of Garden Grove that will have already been optimized. The length of the Garden Grove reach is 6.6 miles

The City of Garden Grove has a project that will either run concurrent or will be finished with new optimized timing on Magnolia Street. The Garden Grove project limits on Magnolia Street are from Orangewood Avenue to Mays Avenue. The City of Garden Grove is also synchronizing signals on Garden Grove Boulevard from Dale Street to Blackbird Street Ped Signal as part of their project. The CONSULTANT shall use this newly implemented timing and integrate it intact into this Magnolia Street PROJECT.

1.2 Minimum Requirements – CONSULTANT

The Contracted CONSULTANT/Engineer, in order to adequately complete the PROJECT per the intent specified in this Scope of Work (SOW) and requirements of the AGENCIES and the OCTA, shall construct the PROJECT to include the following minimum items:

- ◆ Construction Support as required and determined by the APM and approved by the AGENCIES on their respective portions of the PROJECT.
- ◆ Signal Synchronization Studies, Analysis, and Review.
- ◆ Control Systems Studies, Analysis, Review, and Recommended Strategies.
- ◆ Design (PS&E), Furnishing, Modifying, and/or Upgrading including the installation of required Systems and associated communications equipment.
- ◆ Design (PS&E), Furnishing, Modifying, and/or Upgrading including the installation of required system compatible intersection signal controller assemblies, controller units, and communications equipment, including software, firmware, and all required hardware.
- ◆ Design (PS&E), Furnishing, Modifying, and Installing new or upgrades to Traffic Management Systems and Communications Servers, Field Supervisory Traffic Management and Communication Systems, Client Workstations and/or Virtual Private Network (VPN) Client Work Stations, and GPS.
- ◆ Training on all modified or installed equipment and systems (1days minimum).
 - If similar systems are being installed for multiple agencies, training shall be held at a single location and date/time for all AGENCIES.
 - Training shall include Intersection Controller Units, Field Master Units, Computer Server Based Control Systems, and any special specified items that are unique to the PROJECT.
 - Computer Server Based Control Systems training shall be 2 days minimum.
- ◆ Creation of System and Intersection Graphics for Central Master or Closed Loop Coordination Systems for all corridor and integrated intersections. (If not already existing and/or or accounted for on other similar or related projects).
- ◆ Review of all existing systems and traffic patterns and subsequent project report on recommended traffic control zones and modifications of control systems to accomplish those recommendations.

2. BACKGROUND

OCTA's Regional Modeling and Traffic Operations section employees are currently fully engaged and do not have the capacity to meet the anticipated demand for professional traffic engineering services to complete the Magnolia Street Project without additional staff resources. The successful qualified CONSULTANT shall have the ability and expertise to design, operate, maintain, and train all aspects of traffic signal design, operations, and maintenance for all infrastructure and processes specified in this SOW.

3. SERVICES REQUIRED

The scope of work is to provide Professional Traffic Engineering Services for implementation and construction of the PROJECT along the Magnolia Street corridor corresponding with the ongoing signal synchronization efforts at OCTA. This project will be similar to the recent signal synchronization demonstration projects that OCTA conducted on Euclid Street and Oso Parkway/Pacific Park Drive, and the ongoing three year Traffic Light Synchronization Program (TLSP) Projects.

In order to accomplish this, the PROJECT will consist of CONSULTANT:

1. Inventory of existing infrastructure and conditions related to traffic signal operations along the PROJECT limits
2. Designing and specifying new or modified, traffic signal synchronization related, systems infrastructure
3. Procurement of goods and services to facilitate the designed infrastructure
4. Furnish, modify, upgrade and install these goods and services in order to construct the TSS corridor coordination system and related infrastructure
5. Provide a complete analysis and optimized retiming effort for all traffic signalized intersections within or within close proximity or project limits.

This design and construction may consist of but not be limited to the following items:

- ◆ Furnish and install GPS units that synchronize the internal Time of Day/Date clocks integral to every intersection controller unit.
- ◆ New or modified server based or closed loop system interconnected coordination systems and related communications.
 - These units shall be NTCIP compatible unless otherwise approved by the APM and the owning AGENCY.
- ◆ New and/or modified Communications infrastructure.
 - Wireless Technologies
 - Hardwire or Fiber Optic Ethernet
- ◆ Analysis of existing conditions that can be mitigated by minor improvements
- ◆ New Timing plans and operational features based on the created optimized timing for each system and local intersection controller for TOD/DOW operation, and/or TRO or ADAPTIVE if determined that its use is needed and approved by the local AGENCY operating and owning those respective PROJECT signals.
- ◆ Implementation of new Optimized Signal Timing and Fine Tuning of same.
- ◆ Observation and Continued Field Support for minimum nine (9), to optional maximum twelve (12), months.
- ◆ All work performed will be subject to the latest rules, policies, standards, and specifications of Section 86 of the State of California Standard Specifications (SSS) and State of California Standard Plans (SSP) and current AGENCY respective standards and specifications.

This synchronization PROJECT will be combined with AGENCY selected and required signal system upgrades including new compatible systems traffic controller units and/or assemblies, communication modifications and additions, Electrical and Telemetry Service Cans or Pedestals, and installation of newer Server Based Control and Communications systems that are compatible with, and will upgrade and/or enhance, existing legacy systems; and, other project related enhancements as specified herein. All systems to be modified or installed shall be NTCIP compatible, compliant, and/or ready.

As the PROJECT will involve multiple AGENCIES, each of whom separately own, control, and maintain their respective traffic signals, the successful CONSULTANT shall demonstrate a full knowledge of the entire corridor, its problems and needs, and shall propose or suggest possible solutions or mitigations to those defined problems and needs. The following synchronization strategies are anticipated to be essential in this proposed program's implementation of coordinated traffic signals:

3.1 Traffic Signal Synchronization

CONSULTANT shall develop and implement traffic signal synchronization plans for the entire corridor including operations and needs of existing or future crossing corridors and/or intersections in close proximity to the corridor that by necessity is included within the PROJECT limits. OCTA's traffic signal timing projects are multi – agency in nature and require the CONSULTANT to be a consensus builder. An understanding of consensus building on the part of the CONSULTANT will require, at a minimum, the following tasks:

a. Project Management

- ◆ Overall administration of the project
 - Day to day Project Management
 - Meetings
 - Progress Reports
 - Tracking of Schedules
 - Invoicing

b. Data Collection

The CONSULTANT shall collect the following data necessary to thoroughly understand existing traffic conditions for the corridor and be able to develop optimal time-of-day traffic signal coordination plans, as applicable.

- ◆ From each AGENCY, collect existing timing sheets, existing coordination plans, traffic as-built drawings, aerial photos, maps, traffic collision data as available, including collision diagrams for the analysis of existing intersection conditions

and operations, and any Plans, Specifications, Special Provisions for construction of facilities related to this PROJECT (PSS). CONSULTANT, if requested by the involved agency, will provide their own staff to review available records/plans and request copies of needed records/plans with a minimum of disruption to the involved agency.

- ◆ From the AGENCIES, the CONSULTANT shall determine signal timing and signal priority preferences, including, but not limited to, those related to pedestrian and bicycle timing, left-turn phasing and phase sequence rotation such as fully protected lead - lead, lead - lag, lagging, split (opposed) - phased, and protected - permissive left turn (PPLT), and additional coordination functions such as preferred or conditional phase re-service, as well as the AGENCIES preferred timing optimization modeling software packages.
- ◆ The CONSULTANT shall conduct seven-day 24-hour machine counts (ADTs). Data obtained from Saturday and Sunday counts will determine the necessity of weekend signal timing data collection locations, times, and respective analysis for optimization of all new signal timing.
- ◆ The CONSULTANT shall conduct weekday and weekend peak period turning movement counts at all study intersections, including pedestrian and bicycle counts. Weekday counts shall be conducted for two hours of each peak period (AM, mid-day, and PM). If needed, weekend counts shall be conducted for those peak periods determined from the ADTs on both Saturday and Sunday. For intersections with more than two through lanes in any of the approaches, a minimum of two count technicians per intersection shall be required. If alternative approaches, such as video or other electronic data collection methods, as opposed to traditional on - site manual counts are proposed, those methods shall be pre - approved by the APM.
- ◆ The CONSULTANT in conjunction with OCTA and AGENCY Staff shall determine several of the intersections which are representative of Pedestrian and Bicycle activity. These intersections shall have the turning movement and associated pedestrian and bicycle counts performed by electronic video imaging data collection techniques from 6 AM to 12 PM on a Weekday and a Weekend day. The pedestrians shall be counted and also timed for the total time it takes for them to cross the street based on the current Federal MUTCD standards. Bicycles shall be counted and timed for the total time it takes to cross the street based on the current Bicycle Timing Standards in the latest adopted CA MUTCD. Bicycles shall be noted as to whether they crossed the street from a standing stop or whether they were already in motion at the time of the start of the crossing. Three (3) to Five (5) of the total intersections in the project shall have data collected for this requirement.

- ◆ All count data for each location shall be provided to OCTA in one of the two following digital formats: 1) NDS/Southland Car Counters style Excel spreadsheet; or 2) JAMAR comma separated value style text file. The formats can be provided by the APM to the CONSULTANT, if needed. Any count data provided to OCTA shall be consistent with one of these two formats. The data shall then be able to be loaded into the OCTA Roadway Operations and Analysis Database System (ROADS). Any data files containing numeric intersection or node identifiers shall use the same node ID numbers as is stored in the ROADS database. OCTA has provided the intersection node numbers including specified external nodes in Attachment B. Each count data file shall adhere to the following file naming convention:
 - ◆ *Agency_SouthBoundStreetName-EastBoundStreetName_RoadsID.xls (.csv)*. As an example, a turning movement count file for the intersection of Magnolia Street and Hazard Avenue in Westminster would be given the filename *Westminster_Magnolia-Hazard_6077.csv*. Copies of the raw data count sheets shall be provided to each involved agency.
 - ◆ All traffic signal synchronization data collected and compiled by the CONSULTANT for both existing (before) and optimized (after) conditions shall be provided to OCTA in both Synchro version 6 comma separated variables (.csv) UTDF, and version 7 combined data UTDF, and standard Synchro 7 .syn formats. This data shall include the network layout, node, link, lane, volume, timing, and phasing data for all coordinated times. All such data shall be consistent with the OCTA ROADS database. The CONSULTANT shall work with OCTA to identify any needed updates to the ROADS or project data to ensure full compatibility.
 - ◆ CONSULTANT shall collect and utilize existing plans, specifications, and special provisions from each agency for installation and implementation of all traffic signal systems central and local necessary to complete the construction and implementation of each respective TLSP Corridor Project.

c. Field Review

The CONSULTANT shall review the geometric layout, verify and/or inventory existing traffic signal control and telemetry/ITS equipment, and identify any deficiencies for each intersection or road segment along each of the corridors. The review shall include an assessment of the existing intersection lane geometry, link lane geometries (add-drop), traffic conditions, and traffic signal or ITS/telemetry control equipment along the corridor and at each intersection. Techniques utilized shall include but not be limited to visual inspection, available as-built plans, agency consultation, and agency provided aerial photos and PSS. Upon permission from the controlling local agency, CONSULTANT will inspect and inventory the interior of each traffic controller assembly and ITS/telemetry cabinets, identify and report

deficiencies to the agency and the OCTA respective operations staff. Equipment upgrades needed to complete the PROJECT will be noted and included as Construction Support to the existing PSS as part of the PROJECT. Photographic and written inventories shall be submitted to OCTA in electronic format only. If specific locations require a physical photo be provided, the APM will notify the CONSULTANT to provide such documentation. Upon request, the CONSULTANT shall provide electronic copies to the respective responsible AGENCY.

CONSULTANT shall also include an identification of all planned and programmed improvements (widening projects, intersection improvements, etc.) on the study corridor. The identification of these projects shall at least include a list, summarizing all improvements. Key components of the corridor review shall include the following:

Existing corridor/street and lane geometries including lane widths, lengths (pockets and bays only), and configurations, bus stop turn out locations, curb to curb distances, and median dimensions.

Upcoming Channelization or striping improvements to the corridor (i.e. construction and/or delineation modifications);

Traffic signal control and telemetry device information, such as type of device, manufacturer and condition, provide visual documentation (electronic format);

Existing time source equipment and Master zero (T_0) time reference reset;

CONSULTANT shall observe special characteristics such as proximity to adjacent intersections, location of schools, bus stops, driveways, parking prohibitions, unusual traffic generating conditions, and other factors that may impact the efficiency of operation at each intersection.

CONSULTANT shall adhere to each Agency's policy on signal operations and characteristics of signal phasing and rotation or sequence (lead-lead, lead-lag, lag-lag, protected vs. protected/permissive (P/P-LT), bicycle, pedestrian, etc).

CONSULTANT shall note factors that impact or affect signal progression including, but not limited to: intersections with high pedestrian or bicyclist volumes; over-saturated intersections; closely spaced signalized intersections; uneven lane distribution; high volume percentage of trucks and/or buses; high side street volumes at un-signalized intersections or interchanges; and parking maneuvers.

CONSULTANT shall identify any deficiencies of the existing traffic signal control equipment and lane geometries, and other items as determined by the

CONSULTANT. The CONSULTANT shall provide recommendations towards simple, low-cost solutions that may be implemented to correct such deficiencies. CONSULTANT may be required to install recommended modifications.

CONSULTANT shall prepare and submit a report summarizing the findings of the field review. The report shall include a detailed description of the CONSULTANTS approach to the synchronization of the corridor, the methods and equipment to be used, including collected PSS, with detailed construction estimate and PROJECT schedule. The selected CONSULTANT shall provide detailed quotes or estimates from vendors for any goods and services required at the request of the APM or OCTA.

d. Corridor 'Before' Study

The CONSULTANT shall conduct a 'Before' field study report representative of the times and days for which synchronization plans will be developed. The report shall identify Measures of Effectiveness (MOE) to evaluate the effects of the synchronization plans. MOE's will likely include traffic flow, actual real time travel, average speed, number of stops, number of intersections passed on green vs. those stopped for red, fuel consumption reduction, pollution reduction, Green House Gas (GHG) reductions, and other pertinent items. The identified MOE's shall be compiled for the corridor using the floating car method (for instance, GPS interfaced Tru – Traffic TS/PP or PC – Travel runs and from Synchro 7.0. For the 'Before' field study, a minimum of five (5) floating car 'runs' shall be conducted in each direction and during all periods in which synchronization plans shall be developed. If necessary, and if approved by the AGENCIES and the APM, the runs may be broken into logical, contiguous, bi – directional roadway segments.

The report shall address optimization strategies for improved signal synchronization, specifically focusing on how related the corridor: should be operated, end-to-end or in coordinated subsystems (zones or segments).

Special consideration shall be given to existing operations on crossing or interrelated arterial systems.

Ideally, the analysis should include the floating car data and data collected as part of Task 2. However, draft versions of the report may include previously collected traffic, travel time, or other data available. The evaluation report shall provide a very clear and accurate understanding of traffic patterns on the corridor throughout all times of the day and week. The report shall also identify the current Corridor Synchronization Performance Index or CSPI which is the proposed new rating system to be used on all current and future OCTA sponsored Measure M (M1) and Renewed Measure M (M2) TSS projects. The CSPI combines Average Speed, Number of Stops per mile, and Number of Greens per Red. Additive scores from each category are combined into an index from 33 to 109. A CSPI of 70 is

considered the minimum level of acceptable performance. A CSPI under 70 indicates a need for improvement in signal operations or the mitigation of other influences.

Corridor Synchronization Performance Index (CSPI)

| Speed (mph) | Score | Green/ Red | Score | Stops per Mile | Score |
|----------------|-------|---------------|-------|----------------------|-------|
| 34 | 36 | 5.0 | 40 | 0.7 | 33 |
| 32 | 33 | 4.5 | 36 | 0.9 | 31 |
| 30 | 30 | 4.0 | 32 | 1.1 | 29 |
| 28 | 27 | 3.5 | 28 | 1.3 | 27 |
| 26 | 24 | 3.0 | 24 | 1.5 | 25 |
| 24 | 21 | 2.5 | 20 | 1.7 | 23 |
| 22 | 18 | 2.0 | 16 | 1.9 | 21 |
| 20 | 15 | 1.5 | 12 | 2.1 | 19 |
| 15 | 8 | 1.0 | 8 | 2.3 | 17 |

Note: CSPI is the sum of each of the three component scores. Scores shall not exceed highest values for each performance measure.

The CONSULTANT shall prepare a brief memorandum and present the findings to the OCTA and the AGENCIES outlining the findings of the 'Before' field study. The CONSULTANT shall finalize the memorandum based on comments received from the APM and the AGENCIES.

e. Signal Timing Optimization and Implementation

The CONSULTANT shall work with the APM to develop a model of the study area and calibrate the model based on field observations of existing conditions. Signal synchronization optimization shall be conducted in Synchro 7.0. In addition, optimization shall be augmented with the latest release of Tru – Traffic TS/PP. The CONSULTANT shall calibrate the model based on travel time, delay studies, field observations of queue lengths, and saturation flows for heavy movements at key intersections.

If the CONSULTANT elects to use alternative methodologies to augment or replace certain aspects of the Synchro model such as pre – processing of certain data sets or split analysis, and/or other types of processes, the CONSULTANT shall describe

these operations in detail in the report with supporting documentation as to why these processes were used in lieu of or in augmentation to the Synchro model. These methodologies shall also be described in detail in the CONSULTANTS proposal for this PROJECT. However, the CONSULTANT shall supply a completely accurate SYNCHRO 7 Model for both "Before" and "After" Conditions. The CONSULTANT shall supply the scaled layout of the corridor superimposed over GIS, Google Earth, Bit Maps, JPEG or other similar file types recognized by Synchro 7 and Tru – Traffic. This function may be turned on or off by the end user.

The CONSULTANT shall develop an operational microscopic model within SimTraffic. The SimTraffic model will identify those local areas or portions of the PROJECT that need special operational analysis of queue interactions such as starvation or spillback. The operational analysis will be used to understand the effects of planned corridor improvements, fine tune timing plans prior to implementation and to analyze the additional operational improvements as suggested by the CONSULTANT in the Field Review. The entire corridor does not have to be micro – simulated. Only those corridor segments that have queuing, starvation, spillback, or others problems, which can be mitigated by the SimTraffic program shall be analyzed.

The CONSULTANT shall then develop revised optimized signal timings recommending any changes to the signal phasing at each signalized intersection that may improve the efficiency of operations. The recommended signal timing plans shall be reviewed by the APM and local agency staff.

The CONSULTANT shall evaluate signal timing and coordination parameters with consideration for the following:

- ◆ Optimum cycle lengths and offsets to maximize corridor throughput (bandwidth)
- ◆ Harmonic background cycles at minor or major intersections
- ◆ Left-turn phase sequence rotation as deemed appropriate
 - Fully Protected
 - Protected/Permissive
 - Phasing will be lead-lead or lag-lag only
 - FHWA approval the proposed yellow flashing arrow technique is employed when lead – lag phasing is preferred
- ◆ Non – coordinated phase preferred service and/or conditional re-service, by plan, by phase rotation or sequence, by phase and other such techniques;

- ◆ Timing parameters, which fully accommodate pedestrians within the split time. CONSULTANT shall take into consideration the pedestrian timing parameters used and adopted by the local agency on a case by case basis. If the local intersection controller has the ability to modify or ignore the phase coordination split during pedestrian crossing events and can fast – track transition to be in

step with the local coordinator after exceeding the split time, that technique may be utilized where deemed appropriate by CONSULTANT and approved by the respective local agency.

- ◆ CONSULTANT shall analyze the intersection timing with regard to the new rules created by AB 1581 regarding bicycle timing. CONSULTANT shall determine what the AGENCY' s policy is regarding Bicycle Timing Guidelines as specified in the latest version of the CA MUTCD
- ◆ Determine appropriate cycle lengths consistent with the goals of this effort. Additionally, the CONSULTANT shall recommend time-of-day start and stop intervals for the various timing plans based upon ADT Analysis, visual observations, and AGENCY policies.
- ◆ The CONSULTANT shall prepare, at minimum, timing plans that consider the following peak periods: AM PEAK, MID-DAY PEAK, PM PEAK and a WEEKEND PEAK. Timing plans should be in both Synchro format and the preferred timing chart format of each local agency. A complete new timing chart is required for all PROJECT intersections.
- ◆ The City of Garden Grove will have already completed or will be in the process of completing new optimized traffic signal synchronization timings for Magnolia Street within its City Limits. The CONSULTANT shall incorporate all of these timing plans without modification into the development of all new timing plans for this PROJECT. The CONSULTANT shall utilize any existing optimized SYNCHRO Networks developed by or for the City of Garden Grove on this PROJECT. The CONSULTANT shall be required to convert all node numbers on the existing SYNCHRO Network to conform to the ROADS format as specified herein.
- ◆ TRO and ADAPTIVE operations, if proposed or deemed necessary during the course of the analysis stage, shall be developed by the CONSULTANT and approved by the APM and the AGENCY for implementation.

Upon approval of the optimized signal timings by the APM, Caltrans, and the respective AGENCIES, the CONSULTANT shall implement, or assist the local AGENCY staff in the implementation of, new signal timings either through the central or closed loop traffic signal system (if available) or direct implementation at the intersection control system. CONSULTANT shall use new, modified, or existing traffic signal interconnection systems, where they exist. And, because of the inter-jurisdictional nature of the project, shall implement time-based signal coordination techniques between signalized intersections that are controlled by different agencies, as necessary.

In its proposal, the CONSULTANT is required to identify needed improvements in signal systems infrastructure necessary to implement a successful PROJECT. These improvements may include but not be limited to the following items:

- ◆ Provide Design Documents (Plans, Specifications, and Estimates (PS&E)) for all aspects of the project proposed infrastructure including but not limited to:
 - Communication interface devices for Systems Controller Units.
 - Systems Controller Assemblies including cabinet, systems controller unit, communications interface, BIU, MMU, Detection Systems (Video/ILD), and all other appurtenances per agency specifications.
 - Modification of existing Server Based Systems including any licensing agreement modifications between the AGENCY and equipment vendor.
 - Conversion of Legacy Closed Loop Systems to newer Server Based NTCIP Systems
 - System Integration of controllers into new, existing and/or modified systems.
 - New controller units at Freeway Interchange Ramp Signal System intersections with Magnolia Street – Avenue per Caltrans requirements
 - Furnish and install AGENCY approved GPS clock synchronization units
 - Other needs assessed as a result of Construction Support and approved by AGENCIES and APM

The CONSULTANT shall use due diligence with regard to the Magnolia Street – Avenue Project. CONSULTANT shall perform all tasks needed to determine Construction Support and Procurement issues for the construction, installation, and implementation of the project. The report required (see **3.1 Traffic Signal Synchronization**, c: Field Review) for the project listing the items to be procured, furnished, and installed shall include detailed line item estimates which, may or may not be modified or amended, and subsequently approved by the APM, OCTA, and/or the owning AGENCIES.

The need for plans and specifications of this equipment will be determined early in the project by the APM, AGENCIES, and CONSULTANT. The following items are included for clarity:

1. Local agency staff will be responsible for local intersection inspection services on the installation of field work and equipment. CONSULTANT shall be responsible for the inspection and installation of any Server Based System, Field Master, Controller Units or Assemblies and any related communications systems with oversight by the AGENCIES. CONSULTANT shall work under the constraints of construction specifications and standards of each local agency and Caltrans. Unless otherwise directed, Caltrans personnel will be solely responsible for the removal and installation of any Caltrans owned local intersection controller systems.

2. Any permits required by and of the participants in the PROJECT shall be *included* in the firm fixed price for the PROJECT. No additional compensation will be allowed. OCTA shall endeavor to have AGENCY permit requirements and associated fees waived.
3. CONSULTANT shall provide onsite assistance for turn-on of any new or modified equipment. Timing sheets shall be provided by CONSULTANT at time of turn on. Each respective AGENCY shall have pre approved the timing sheets.

As the project will be using time-based signal coordination, the CONSULTANT shall evaluate the current time-referencing of all traffic signal controllers and recommend a corridor-wide strategy (such as GPS units or servers) to ensure that all traffic signal controllers clocks are on a common reference synchronized time base. Upon approval by the AGENCIES, the CONSULTANT shall purchase and install, or assist local AGENCY staff, in installing any devices that are part of the time-referencing strategy. This may include devices installed at the AGENCY TMC or at intersection traffic signal controller assemblies.

The CONSULTANT shall fine-tune, or assist local AGENCY staff in the fine-tuning of, the new settings and timings. The CONSULTANT shall fine-tune timings in the field and record all changes. Fine-tuning shall be conducted during times and days that are representative of the times and days for which coordination plans were developed. To eliminate multiple runs, Video is recommended for use in the fine tuning function; and, to determine and provide mitigation to certain conditions that may have been ignored or gone unnoticed in the process.

f. Corridor 'After' Study

The CONSULTANT shall conduct an 'After' field study representative of the times and days for which synchronization plans will be developed. In order to evaluate the improvements of the synchronization plans, the 'After' study must be conducted in the same manner and contain the same MOE's as the 'Before' study. MOE's should be calculated for the optimized corridor from compiled data using the floating car method (for instance, GPS interfaced Tru – Traffic TS/PP runs) and then from Synchro/Sim Traffic 7.0 Output. For the 'After' field study, the same number of floating car 'runs' during the same time periods as was done in the 'Before' field study shall be conducted in each direction. As an optional task, the CONSULTANT shall provide a synchronized video with the "Before" and "After" travel time runs to augment the study. This video should not cover the entire length of the corridor but shall cover the most congested areas of the corridor around freeways and high density commercial and business uses. The CONSULTANT shall note in his proposal the cost for this optional task and if this task is included in firm fixed price.

The CONSULTANT shall prepare a memorandum detailing the results of the signal timing optimization and implementation, time-referencing system and fine tuning

components, and. comparing the results of the 'Before' and 'After' field study with reference to the specific MOE's. The CONSULTANT shall finalize the memorandum based on comments received from the APM and the AGENCIES.

g. Project Report

The CONSULTANT shall prepare a Final Timings and Evaluation Technical Report with an executive summary. The report shall provide complete documentation of the project, including, but not limited to, project objectives, project locations, project scope, findings, recommendations, implementation schedule, improvements accomplished, and procedures for continuing maintenance, surveillance, and evaluation of the coordinated signal system, work performed, data collected: 'before' and 'after' studies and project benefits achieved in terms of fuel savings, travel timing, travel time, CSPI, and other measurable parameters. The report shall include graphical and table formats for each type of documentation for clarity purposes. The report shall also equate or quantify any savings in travel time, reduction in delay and emissions with type of emissions measured into a monetary figure. All graphs and figures shall represent the measureable parameters bi - directionally, by coordinated operational period, and by coordinated zone. The report shall document all planned, programmed, and constructed improvements on the study corridor as well as recommendations for further infrastructure improvements that would likely improve the corridor signal coordination project results. The CONSULTANT shall submit and present the final report and results of the project to the Board and to any city councils, commissions or committees as requested. Report formats, including style and content of graphs and tables, shall be approved by the APM prior to submission.

The report shall include for each intersection the lane configurations; signal phasing, turning movement data, and cycle lengths for existing and proposed timings for all peak periods. In addition, in a separate binder, all the traffic signal phase sequences, signal timing plans, and pedestrian timings shall be documented. Finally, the report shall provide recommendations with cost and benefit estimates for future improvements to traffic signal infrastructure (signal controllers, vehicle detection, communications, etc.), intersection capacity (appropriate signal phasing, lane geometrics, and alleviation of physical bottlenecks that curtail arterial capacity), and traffic management strategies. These proposed improvements are beyond the scope of this project but should be useful in determining future enhancements to the corridor.

h. As – Built Drawings

The CONSULTANT shall supply As – Built drawings of all systems constructed during the PROJECT. As – Built drawings shall be in the format required by each of

the AGENCIES. As – Built drawings shall be included in the firm fixed price for the PROJECT. No additional compensation will be allowed, therefore.

i. Continuing Signal Timing Support

The CONSULTANT shall provide continuing signal timing support to monitor, observe, fine-tune, and optimize the signal timing and phasing operations of all the intersections for a minimum period of nine (9) to a maximum optional twelve (12) months upon completion of the implementation. During this period, the CONSULTANT shall proactively survey the corridor on a weekly basis, observe the traffic, and fine-tune (or recommend fine-tuning to the AGENCY) the signal timing based on the survey.

List of Contacts

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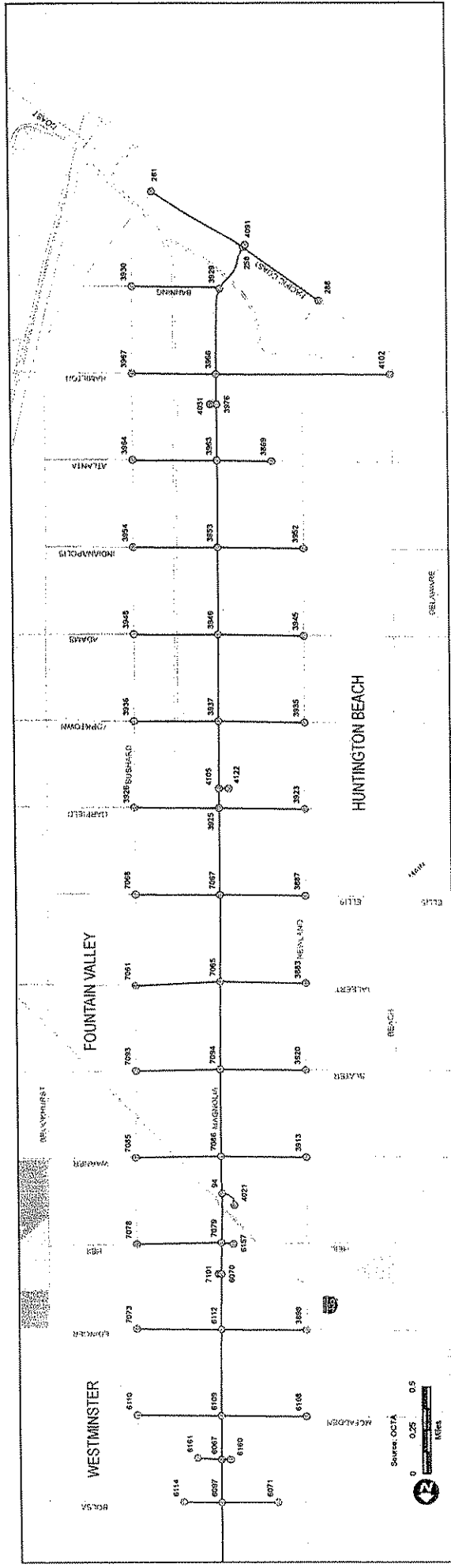
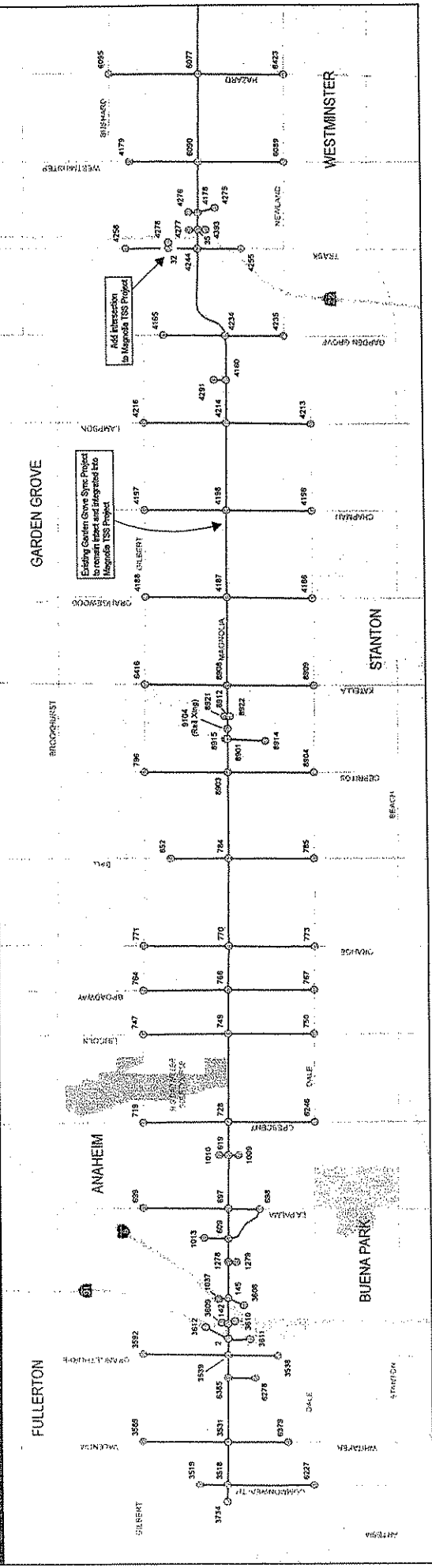
City of Westminster

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Attachment B: Magnolia Street TSS



Source: OCTA
 0 0.25 0.5 Miles