E201910000245

CITY OF FRESNO

NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION

EA No. P19-01469 for

Plan Amendment Application No. P19-01470, Rezone Application No. P19-01470, Planned Development Permit Application No. P19-01259 and Vesting Tentative Tract Map No. 6249.

PROJECT SPONSOR:

Ara Chekerdemian
Lennar Homes of California, Inc.
8080 North Palm Avenue, Suite 110
Fresno, CA 93711

Keith Jolly
Morton & Pitalo Civil Engineering, Inc.
7643 North Ingram Avenue, Suite 105
Fresno, CA 93711

PROJECT LOCATION:

7308 North Thiele Avenue

±24.03 acres of property located on the south side of East Copper Avenue, between North Chestnut and North Willow Avenues

Site Latitude: 39.895102 N

Site Longitude: -119.733074 W

Mount Diablo Base & Meridian, Township 12S, Range 20E

Section 13 – California

Assessor's Parcel Number(s): 578-010-35, 578-010-23S, 578-010-24S, 578-010-47S

Filed with:

FRESNO COUNTY CLERK
2220 Tulare Street, Fresno, CA 93721

FILED
JUL 05 2019 TIME 3:44pm
FRESNO COUNTY CLERK
By Jessica DEPUTY

PROJECT DESCRIPTION:

Morton & Pitalo Engineering, Inc., on behalf of Lennar Homes of California, Inc. filed Plan Amendment Application No. P19-01470, Rezone Application No. P19-01470, Planned Development Permit Application No. P19-01259 and Vesting Tentative Tract Map No. 6249 pertaining to ±24.03 acres of property located on the south side of East Copper Avenue, between North Chestnut and North Willow Avenues. Plan Amendment Application No. P19-01470 proposes to amend the Fresno General Plan and Woodward Community Plan land use designations from Residential, Medium Density (±15.82 acres) and Employment, Business Park (±8.21 acres) to Residential, Medium High Density (±18.85 acres) and Corridor/Center Mixed-Use (±5.18). Rezone Application No. P19-01470 proposes to amend the Official Zoning Map of the City of Fresno to change the subject property from the RS-5 (*Residential Single Family, Medium Density)* (±15.82) and BP (*Business Park*) (±8.21 acres) zone districts to the RM-1 (*Residential Multiple Family, Medium High Density)* (±18.85 acres) and CMX (*Corridor/Center Mixed-Use)* (±5.18 acres) zone districts. Planned Development Permit Application No. P19-01259 proposes to modify the RM-1 (*Residential Multiple Family, Medium High Density*) zone district development standards to allow for reduced setbacks, reduced lot sizes and increased lot coverage for the proposed single family residences. Vesting Tentative Tract Map No. 6249 proposes to subdivide an approximate 18.85 acre portion of the subject property for the purpose of creating a 239-lot single-family attached and detached residential development at a density of approximately 12.68 dwelling units/acre. The proposed applications will be considered by the Fresno City Planning Commission on July 17, 2019 and the

E201910000245

City Council in late August 2019.

The project will also require dedications and/or acquisitions for public street rights-of-way and utility easements as well as the construction of public facilities and infrastructure in accordance with the standards, specifications and policies of the City of Fresno in order to facilitate the future proposed development of the subject property.

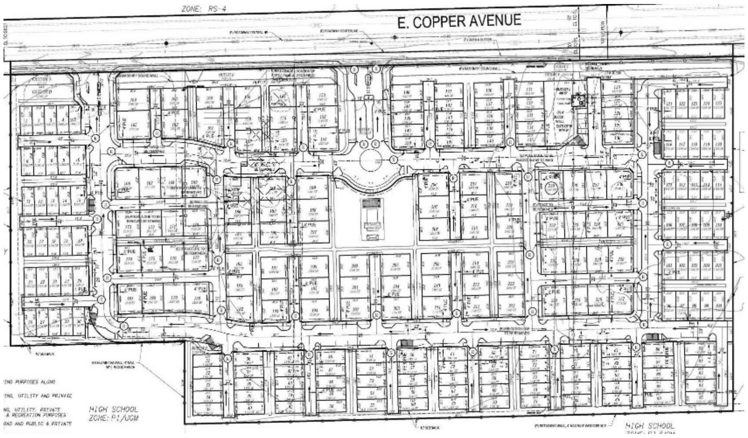
The City of Fresno has conducted an initial study of the above-described project and it has been determined to be a subsequent project that is not fully within the scope of the Master Environmental Impact Report SCH No. 2012111015 (MEIR) prepared for the Fresno General Plan. Therefore, the Development and Resource Management Department proposes to adopt a Mitigated Negative Declaration for this project.

With the project specific mitigation imposed, there is no substantial evidence in the record that this project may have additional significant, direct, indirect or cumulative effects on the environment that are significant and that were not identified and analyzed in the MEIR. After conducting a review of the adequacy of the MEIR pursuant to Public Resources Code, Section 21157.6(b)(1), the Development and Resource Management Department, as lead agency, finds that no substantial changes have occurred with respect to the circumstances under which the MEIR was certified and that no new information, which was not known and could not have been known at the time that the MEIR was certified as complete has become available. The project is not located on a site which is included on any of the lists enumerated under Section 65962.5 of the Government Code including, but not limited to, lists of hazardous waste facilities, land designated as hazardous waste property, hazardous waste disposal sites and others, and the information in the Hazardous Waste and Substances Statement required under subdivision (f) of that Section.

Additional information on the proposed project, including the MEIR proposed environmental finding of a mitigated negative declaration and the initial study may be obtained from the Development and Resource Management Department, Fresno City Hall, 2600 Fresno Street, 3rd Floor, Room 3043, Fresno, California 93721-3604. Please contact Jose Valenzuela at (559) 621-8070 for more information.

ANY INTERESTED PERSON may comment on the proposed environmental finding. Comments must be in writing and must state (1) the commentor's name and address; (2) the commentor's interest in, or relationship to, the project; (3) the environmental determination being commented upon; and (4) the specific reason(s) why the proposed environmental determination should or should not be made. Any comments may be submitted at any time between the publication date of this notice and close of business on July 25, 2019. Please direct comments to Jose Valenzuela, Planner, City of Fresno Development and Resource Management Department, City Hall, 2600 Fresno Street, Room 3043, Fresno, California, 93721-3604; or by email to Jose.Valenzuela@fresno.gov; or comments can be sent by facsimile to (559) 498-1026.

INITIAL STUDY PREPARED BY: Jose Valenzuela, Planner III	SUBMITTED BY: Will Tackett, Supervising Planner CITY OF FRESNO DEVELOPMENT AND RESOURCE MANAGEMENT DEPARTMENT
DATE: July 5, 2019	



INITIAL STUDY / MITIGATED NEGATIVE DECLARATION

Tract 6249 – Single Family Residential

July 2019

PREPARED FOR:

City of Fresno
Development and Resource Management Dept.
2600 Fresno Street
Fresno, CA 93721

PREPARED BY:

Crawford & Bowen Planning, Inc.
113 N. Church Street, Suite 302
Visalia, CA 93291

Initial Study/ Mitigated Negative Declaration

Residential Tract 6249
Single Family Residential Development

Prepared for:

City of Fresno
Development and Resource Management Department
2600 Fresno Street
Fresno, CA 93721
Contact: Bonique Emerson, Planning Manager
(559) 621-8024

Prepared by:

Crawford & Bowen Planning, Inc.
113 N. Church Street, Suite 302
Visalia, CA 93291
(559) 840-4414
Contact: Emily Bowen, LEED AP

July 2019

TABLE OF CONTENTS

CHAPTER ONE - INTRODUCTION

CHAPTER TWO – PROJECT DESCRIPTION

CHAPTER THREE – INITIAL STUDY CHECKLIST

(Contd.)

LIST OF FIGURES

LIST OF TABLES

APPENDICES

Chapter 1

INTRODUCTION

INTRODUCTION

1.1 Project Summary

This document, Environmental Assessment No. P19-01469, is the Initial Study / Mitigated Negative Declaration (IS/MND) on the potential environmental effects of the Tract 6249 Housing Development (Project). The Project consists of a Plan Amendment, Rezone, Vesting Tentative Tract Map and a Planned Development that includes construction and operation of 239 new single family residences on approximately 24.03 net acres. The proposed Project is more fully described in Chapter Two – Project Description.

The City of Fresno will act as the Lead Agency for this project pursuant to the *California Environmental Quality Act (CEQA)* and the *CEQA Guidelines.*

1.2 Document Format

This IS/MND contains five chapters, and appendices. Chapter 1, Introduction, provides an overview of the project and the CEQA environmental documentation process. Chapter 2, Project Description, provides a detailed description of project objectives and components. Chapter 3, Initial Study Checklist, presents the CEQA checklist and environmental analysis for all impact areas, mandatory findings of significance, and feasible mitigation measures. If the proposed project does not have the potential to significantly impact a given issue area, the relevant section provides a brief discussion of the reasons why no impacts are expected. If the project could have a potentially significant impact on a resource, the issue area discussion provides a description of potential impacts, and appropriate mitigation measures and/or permit requirements that would reduce those impacts to a less than significant level. Chapter 4, Mitigation and Monitoring Program provides the list of applicable mitigation measures that must be complied with. There are two mitigation lists: a Project-specific mitigation program and the City's General Plan Master EIR mitigation checklist. Both are applicable to the Project. Chapter 5, List of Preparers, provides a list of key personnel involved in the preparation of the IS/MND.

Environmental impacts are separated into the following categories:

Potentially Significant Impact. This category is applicable if there is substantial evidence that an effect may be significant, and no feasible mitigation measures can be identified to reduce impacts to a less than significant level. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

Less Than Significant After Mitigation Incorporated. This category applies where the incorporation of mitigation measures would reduce an effect from a "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measure(s), and briefly explain how they would reduce the effect to a less than significant level (mitigation measures from earlier analyses may be cross-referenced).

Less Than Significant Impact. This category is identified when the project would result in impacts below the threshold of significance, and no mitigation measures are required.

No Impact. This category applies when a project would not create an impact in the specific environmental issue area. "No Impact" answers do not require a detailed explanation if they are adequately supported by the information sources cited by the lead agency, which show that the impact does not apply to the specific project (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis.)

Regardless of the type of CEQA document that must be prepared, the basic purpose of the CEQA process as set forth in the CEQA Guidelines Section 15002(a) is to:

(1) Inform governmental decision makers and the public about the potential, significant environmental effects of proposed activities.
(2) Identify ways that environmental damage can be avoided or significantly reduced.
(3) Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.
(4) Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

According to Section 15070(b), a Mitigated Negative Declaration is appropriate if it is determined that:

(1) Revisions in the project plans or proposals made by or agreed to by the applicant before a proposed mitigated negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur, and
(2) There is no substantial evidence, in light of the whole record before the agency, that the project as revised may have a significant effect on the environment.

The Initial Study contained in Chapter Three of this document has determined that the proposed Project is a subsequent project identified in the MEIR but that it is not fully within the scope of the MEIR because the proposed project could have a significant effect on the environment that was not examined in the MEIR. However, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. The project specific mitigation measures and all applicable mitigation measures contained in the MEIR Mitigation Measure Monitoring Checklist will be imposed upon the proposed project. A MITIGATED NEGATIVE DECLARATION will be prepared.

Chapter 2

PROJECT DESCRIPTION

Project Description

2.1 Project Background

The proposed project description and actions have been distributed internally to applicable City departments (Planning, Public Works, Police/Fire, etc.) for review. All applicable development requirements have been applied to the project either through project design, conditions of approval, or as mitigation measures outlined in this document.

2.2 Project Location and Setting

The proposed residential development is located on 24.03 acres, south of Copper Avenue between Chestnut and Willow Avenues. The project site spans APN 578-010-35, -23S, -24S, -47S, and -49T and is within the Woodward Park Community Plan. See Figure 1 (Project Vicinity Map).

The proposed site is currently actively farmed with grapes with a residential home. The residence, as well as the associated well, septic tank, shed structures, trees and landscaping, fencing and utility poles and overhead line will be removed as a part of the proposed Project. The immediate vicinity is comprised of the Copper River Country Club to the north, Clovis North High School to the south, rural residences to the west, and the P-R Farms packing facility to the east.

Zoning

RS-5 and Employment Business Park

2.3 Project Description

The proposed Project includes an amendment to the General Plan (Plan), a Zone Change, a Vesting Tentative Tract Map, and a Planned Development for the modifications of RM-1 development standards. Specifically, the project includes:

Plan Amendment Application No. P19-01470 is requesting authorization to amend the general plan for APN 578-010-47S (5.18 acres) from Employment, Business Park to Corridor/Center Mixed-Use planned land use. In addition, APN 578-010-24S will be amended from the Employment, Business Park and Residential, Medium Density (12.11 acres) to the Residential, Medium High Density planned land use. APNs 578-010-35 (3.72 acres) & 578-010-23S (3.02 acres) will be amended from Residential, Medium Density to the Residential, Medium High Density planned land use.

Rezone Application No. P19-01470 is requesting to amend the Official Zoning Map of the city of Fresno to change APN 578-010-47S (5.18 acres) from BP (Business Park) zone district to CMX (Corridor/Center Mixed-Use) zone district. In addition, the proposed rezone will reclassify APN 578-010-24S from BP (Business Park) and RS-5 (Residential Single Family, Medium Density) zone districts to the RM-1 (Residential Multiple Family, Medium High Density) zone district. APNs 578-010-35 & 578-010-23S will be reclassified from the RS-5 (Residential Single Family, Medium Density) zone district to RM-1 (Residential Multiple Family, Medium High Density) zone district. In total, 18.85 acres will be zoned RM-1 (Residential Multiple Family, Medium High Density) and 5.18 acres will be zoned CMX (Corridor/Center Mixed-Use).

Vesting Tentative Tract Map No. 6249 (P19-01469) requests authorization to subdivide APNs 578-010-35, 578-010-23S, 578-010-24S (18.85 acres) for a 239-lot subdivision. The subdivision will allow for a mix of attached and detached single family residences. 9.55 acres will be maintained for mixed use/existing operation designated for private road, public road, landscaping recreational, private walkway, private and public utility, and private communications purposes. Additionally, a six-foot block wall would be constructed around the subdivision perimeter. See Figure 2 – Site Plan.

Planned Development Application No. P19-01259 proposes to modify the RM-1 zone district setback standards to allow for a 0-foot minimum front, side and rear setback. In addition, the planned development application will allow 90% maximum lot coverage. Flexibility of the RM-1 development standards will mostly serve the single-family, attached residences proposed within the tract map.

Infrastructure

The project will be required to tie into existing infrastructure in the area for sewer, water and storm drain. The nearest sanitary sewer main to serve the proposed Project is a 10-inch sewer main located in the intersection of North Chestnut Ave and East Copper Ave. Water mains (including installation of City fire hydrants) will be extended within the proposed tract to provide service to each lot. The project developer will be required to pay for all improvements related to obtaining these facilities to serve the project. This includes constructing appropriately sized water mains that will provide adequate water pressure for fire flow and project water use. Storm water will be controlled through implementation of a Storm Water Management Plan. More detailed descriptions of project infrastructure requirements are included in Chapter Three.

Figure 1
Project Vicinity Map

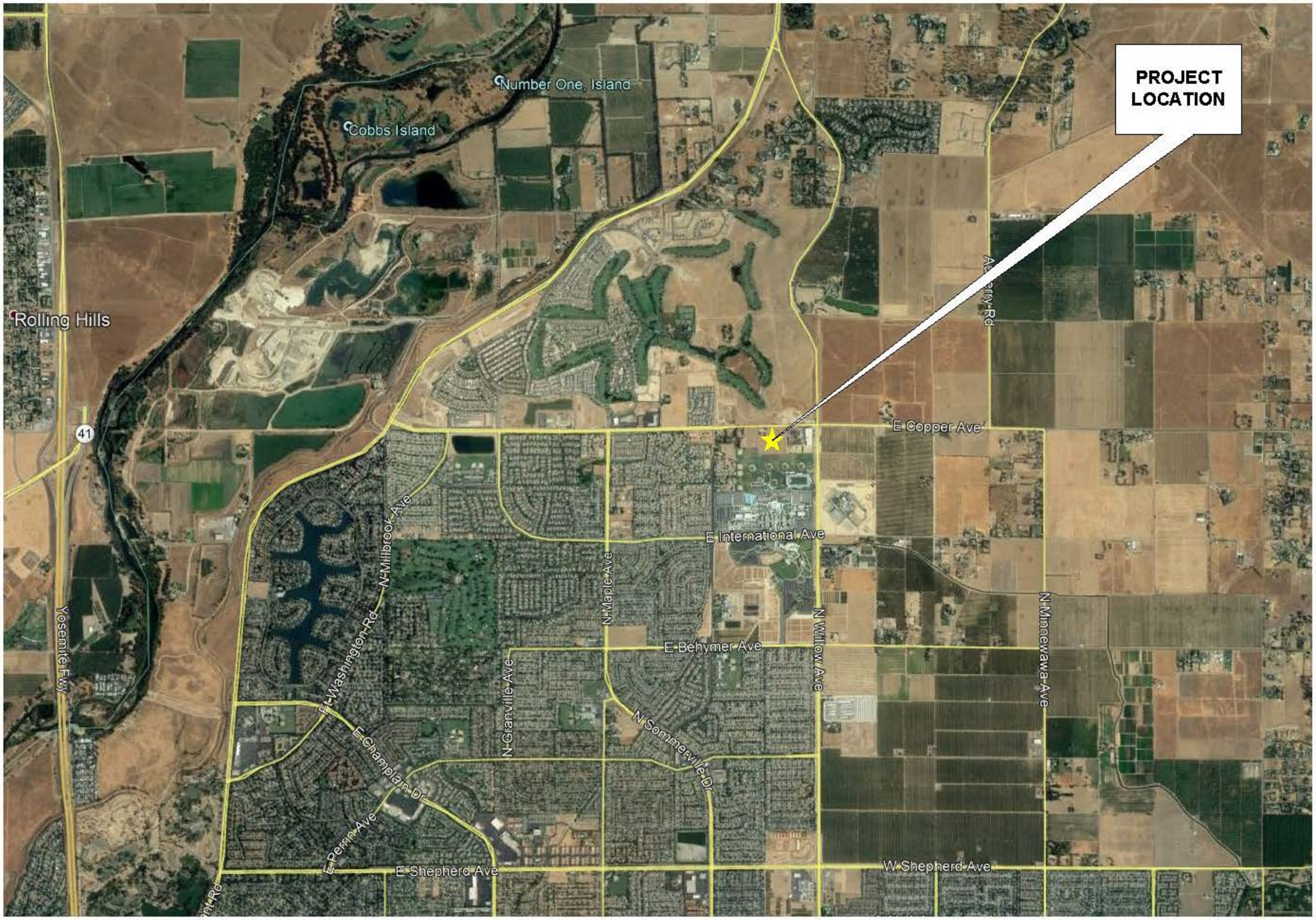
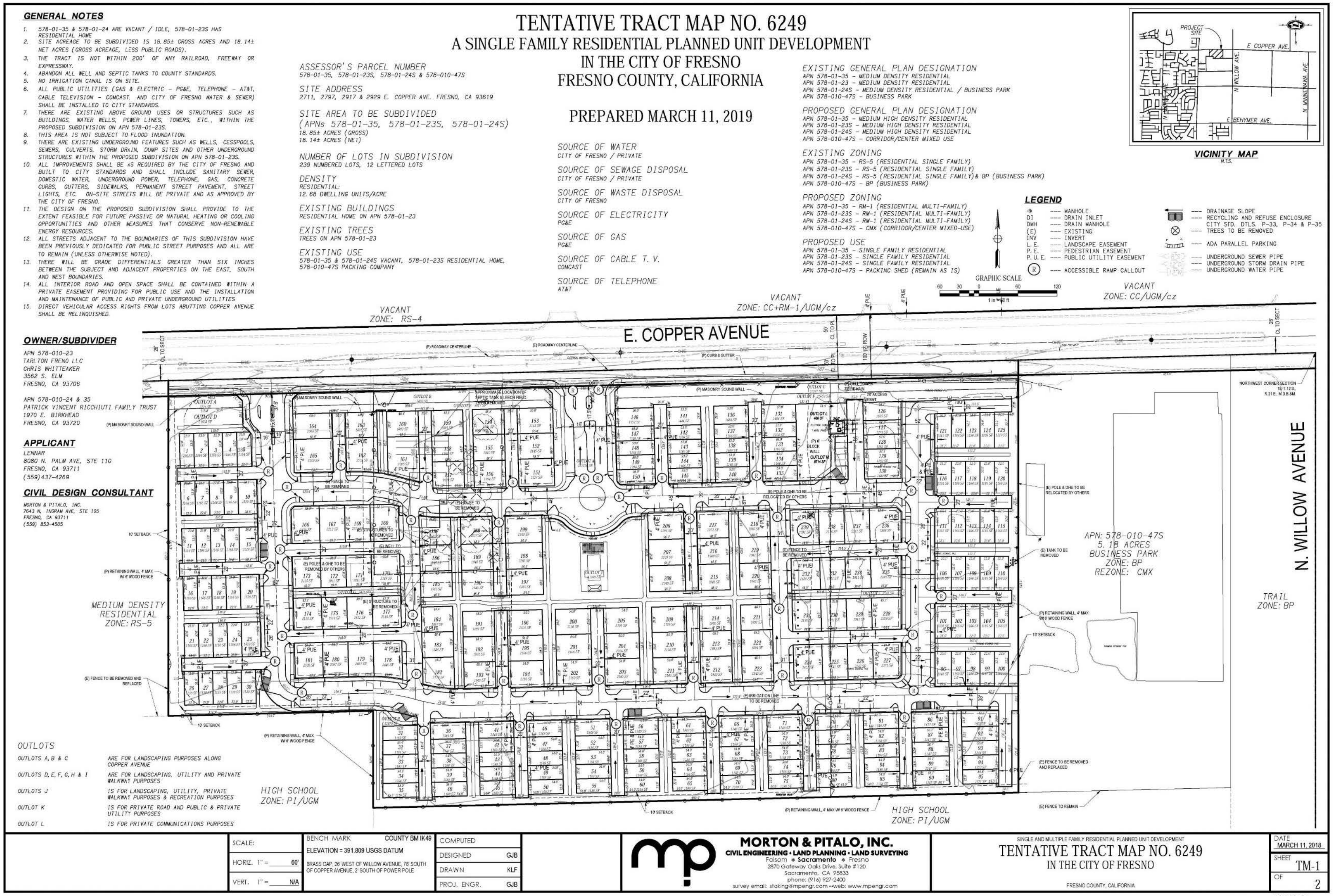


Figure 2
Site Map



GENERAL NOTES

1. 578-01-35 & 578-01-24 ARE VACANT / IDLE, 578-01-23S HAS RESIDENTIAL HOME
2. SITE ACREAGE TO BE SUBDIVIDED IS 18.85± GROSS ACRES AND 18.14± NET ACRES (GROSS ACREAGE, LESS PUBLIC ROADS).
3. THE TRACT IS NOT WITHIN 200' OF ANY RAILROAD, FREEWAY OR EXPRESSWAY.
4. ABANDON ALL WELL AND SEPTIC TANKS TO COUNTY STANDARDS.
5. NO IRRIGATION CANAL IS ON SITE.
6. ALL PUBLIC UTILITIES (GAS & ELECTRIC – PG&E, TELEPHONE – AT&T, CABLE TELEVISION – COMCAST. AND CITY OF FRESNO WATER & SEWER) SHALL BE INSTALLED TO CITY STANDARDS.
7. THERE ARE EXISTING ABOVE GROUND USES OR STRUCTURES SUCH AS BUILDINGS, WATER WELLS, POWER LINES, TOWERS, ETC., WITHIN THE PROPOSED SUBDIVISION ON APN 578-01-23S.
8. THIS AREA IS NOT SUBJECT TO FLOOD INUNDATION.
9. THERE ARE EXISTING UNDERGROUND FEATURES SUCH AS WELLS, CESSPOOLS, SEWERS, CULVERTS, STORM DRAIN, DUMP SITES AND OTHER UNDERGROUND STRUCTURES WITHIN THE PROPOSED SUBDIVISION ON APN 578-01-23S.
10. ALL IMPROVEMENTS SHALL BE AS REQUIRED BY THE CITY OF FRESNO AND BUILT TO CITY STANDARDS AND SHALL INCLUDE SANITARY SEWER, DOMESTIC WATER, UNDERGROUND POWER, TELEPHONE, GAS, CONCRETE CURBS, GUTTERS, SIDEWALKS, PERMANENT STREET PAVEMENT, STREET LIGHTS, ETC. ON-SITE STREETS WILL BE PRIVATE AND AS APPROVED BY THE CITY OF FRESNO.
11. THE DESIGN ON THE PROPOSED SUBDIVISION SHALL PROVIDE TO THE EXTENT FEASIBLE FOR FUTURE PASSIVE OR NATURAL HEATING OR COOLING OPPORTUNITIES AND OTHER MEASURES THAT CONSERVE NON-RENEWABLE ENERGY RESOURCES.
12. ALL STREETS ADJACENT TO THE BOUNDARIES OF THIS SUBDIVISION HAVE BEEN PREVIOUSLY DEDICATED FOR PUBLIC STREET PURPOSES AND ALL ARE TO REMAIN (UNLESS OTHERWISE NOTED).
13. THERE WILL BE GRADE DIFFERENTIALS GREATER THAN SIX INCHES BETWEEN THE SUBJECT AND ADJACENT PROPERTIES ON THE EAST, SOUTH AND WEST BOUNDARIES.
14. ALL INTERIOR ROAD AND OPEN SPACE SHALL BE CONTAINED WITHIN A PRIVATE EASEMENT PROVIDING FOR PUBLIC USE AND THE INSTALLATION AND MAINTENANCE OF PUBLIC AND PRIVATE UNDERGROUND UTILITIES
15. DIRECT VEHICULAR ACCESS RIGHTS FROM LOTS ABUTTING COPPER AVENUE SHALL BE RELINQUISHED.

OWNER/SUBDIVIDER

APN 578-010-23
TARLTON FRENO LLC
CHRIS WHITTEAKER
3562 S. ELM
FRESNO, CA 93706

APN 578-010-24 & 35
PATRICK VINCENT RICCHIUTI FAMILY TRUST
1970 E. BIRKHEAD
FRESNO, CA 93720

APPLICANT

LENNAR
8080 N. PALM AVE, STE 110
FRESNO, CA 93711
(559) 437-4269

CIVIL DESIGN CONSULTANT

MORTON & PITALO, INC.
7643 N, INGRAM AVE, STE 105
FRESNO, CA 93711
(559) 853-4505

ASSESSOR'S PARCEL NUMBER
578-01-35, 578-01-23S, 578-01-24S & 578-010-47S

SITE ADDRESS
2711, 2797, 2917 & 2929 E. COPPER AVE. FRESNO, CA 93619

SITE AREA TO BE SUBDIVIDED
(APNs 578-01-35, 578-01-23S, 578-01-24S)
18.85± ACRES (GROSS)
18.14± ACRES (NET)

NUMBER OF LOTS IN SUBDIVISION
239 NUMBERED LOTS, 12 LETTERED LOTS

DENSITY
RESIDENTIAL:
12.68 DWELLING UNITS/ACRE

EXISTING BUILDINGS
RESIDENTIAL HOME ON APN 578-01-23

EXISTING TREES
TREES ON APN 578-01-23

EXISTING USE
578-01-35 & 578-01-24S VACANT, 578-01-23S RESIDENTIAL HOME, 578-010-47S PACKING COMPANY

SOURCE OF WATER
CITY OF FRESNO / PRIVATE

SOURCE OF SEWAGE DISPOSAL
CITY OF FRESNO / PRIVATE

SOURCE OF WASTE DISPOSAL
CITY OF FRESNO

SOURCE OF ELECTRICITY
PG&E

SOURCE OF GAS
PG&E

SOURCE OF CABLE T.V.
COMCAST

SOURCE OF TELEPHONE
AT&T

EXISTING GENERAL PLAN DESIGNATION
APN 578-01-35 – MEDIUM DENSITY RESIDENTIAL
APN 578-01-23 – MEDIUM DENSITY RESIDENTIAL
APN 578-01-24S – MEDIUM DENSITY RESIDENTIAL / BUSINESS PARK
APN 578-010-47S – BUSINESS PARK

PROPOSED GENERAL PLAN DESIGNATION
APN 578-01-35 – MEDIUM HIGH DENSITY RESIDENTIAL
APN 578-01-23S – MEDIUM HIGH DENSITY RESIDENTIAL
APN 578-01-24S – MEDIUM HIGH DENSITY RESIDENTIAL
APN 578-010-47S – CORRIDOR/CENTER MIXED USE

EXISTING ZONING
APN 578-01-35 – RS-5 (RESIDENTIAL SINGLE FAMILY)
APN 578-01-23S – RS-5 (RESIDENTIAL SINGLE FAMILY)
APN 578-01-24S – RS-5 (RESIDENTIAL SINGLE FAMILY) & BP (BUSINESS PARK)
APN 578-010-47S – BP (BUSINESS PARK)

PROPOSED ZONING
APN 578-01-35 – RM-1 (RESIDENTIAL MULTI-FAMILY)
APN 578-01-23S – RM-1 (RESIDENTIAL MULTI-FAMILY)
APN 578-01-24S – RM-1 (RESIDENTIAL MULTI-FAMILY)
APN 578-010-47S – CMX (CORRIDOR/CENTER MIXED-USE)

PROPOSED USE
APN 578-01-35 – SINGLE FAMILY RESIDENTIAL
APN 578-01-23S – SINGLE FAMILY RESIDENTIAL
APN 578-01-24S – SINGLE FAMILY RESIDENTIAL
APN 578-010-47S – PACKING SHED (REMAIN AS IS)

LEGEND

DI ---- DRAIN INLET
DMH ---- DRAIN MANHOLE
(E) ---- EXISTING
INV ---- INVERT
L.E. ---- LANDSCAPE EASEMENT
P.E. ---- PEDESTRIAN EASEMENT
P.U.E. ---- PUBLIC UTILITY EASEMENT
Ⓡ ---- ACCESSIBLE RAMP CALLOUT
--- DRAINAGE SLOPE
--- RECYCLING AND REFUSE ENCLOSURE CITY STD. DTLS. P-33, P-34 & P-35
⊗ --- TREES TO BE REMOVED
--- ADA PARALLEL PARKING
--- UNDERGROUND SEWER PIPE
--- UNDERGROUND STORM DRAIN PIPE
--- UNDERGROUND WATER PIPE

OUTLOTS

OUTLOTS A, B & C	ARE FOR LANDSCAPING PURPOSES ALONG COPPER AVENUE
OUTLOTS D, E, F, G, H & I	ARE FOR LANDSCAPING, UTILITY AND PRIVATE WALKWAY PURPOSES
OUTLOTS J	IS FOR LANDSCAPING, UTILITY, PRIVATE WALKWAY PURPOSES & RECREATION PURPOSES
OUTLOT K	IS FOR PRIVATE ROAD AND PUBLIC & PRIVATE UTILITY PURPOSES
OUTLOT L	IS FOR PRIVATE COMMUNICATIONS PURPOSES

SCALE:	BENCH MARK COUNTY BM IK49	COMPUTED		
HORIZ. 1" = 60'	ELEVATION = 391.809 USGS DATUM	DESIGNED	GJB	
VERT. 1" = N/A	BRASS CAP, 26' WEST OF WILLOW AVENUE, 78' SOUTH OF COPPER AVENUE, 2' SOUTH OF POWER POLE	DRAWN	KLF	
		PROJ. ENGR.	GJB	

MORTON & PITALO, INC.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Folsom * Sacramento * Fresno
2870 Gateway Oaks Drive, Suite #120
Sacramento, CA 95833
phone: (916) 927-2400
survey email: staking@mpengr.com ••web: www.mpengr.com

SINGLE AND MULTIPLE FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT
TENTATIVE TRACT MAP NO. 6249
IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

DATE MARCH 11, 2018
SHEET TM-1
OF 2

The project has been reviewed by City of Fresno Public Works and specifications pertaining to project financial responsibilities for accessing City-provided services have been made conditions of project approval.

Project Schedule

The project developer intends to begin construction in 2019.

Entitlements

The project will require the following entitlements from the City of Fresno:

- General Plan Amendment
- Zone Change
- Tentative Tract Approval
- Planned Development
- Grading and building permits

2.4 Other Required Approvals

The proposed Project would include, but not be limited to, the following regulatory requirements:

- The adoption of this Mitigated Negative Declaration by the City of Fresno.
- Compliance with other federal, state and local requirements such as the San Joaquin Valley Air Pollution Control District for a dust control plan and the Regional Water Quality Control Board for a Stormwater Pollution Prevention Plan.
- City of Fresno Department of Public Utilities

Chapter 3

IMPACT ANALYSIS

Initial Study Checklist

3.1 Environmental Checklist Form

Project title: Tract 6249 – Single Family Residential

Lead agency name and address:

City of Fresno
Development and Resource Management Department
2600 Fresno Street, Room 3065
Fresno, CA 93721

Contact person and phone number:

Bonique Emerson
City of Fresno
(559) 621-8024

Project location:

Tract #6249 will be located on the following lots; Assessor's Parcel Number 578-010-35, 578-010-23S, 578-010-24S and 578-010-47S. These lots consist of currently vacant land, with the exception of APN 578-01-23S, which is occupied by a residence. The parcels are on the south side of East Copper Avenue in north Fresno, California. The proposed 239-lot single-family residential subdivision will be located on a gross acreage of 18.86 acres and a net area of 18.14 acres.

See Figure 1 (Project Vicinity Map) and Figure 2 (Site Plan).

Project sponsor's name/address:

<u>Subdivider</u>
Ara Chekerdemian
Lennar Homes of California
8080 North Palm Avenue, Suite 110
Fresno, CA 93711

<u>Engineer</u>
Keith Jolly
Morton & Pitalo Civil Engineering, Inc.
7643 North Ingram Avenue, Suite 105
Fresno, CA 93711

General plan designation:

APN 578-010-47S is designated by the City of Fresno General Plan as Business Park. APN 578-010-23S and 578-010-35 are designated as Medium Density Residential (5.0 – 12 D.U./acre). APN 578-010-24S is designated Medium Density Residential and Business Park.

Zoning:

APN 578-010-47S is zoned BP (Business Park). APN 578-010-23S and 578-010-35 are zoned RS-5 (Residential Single Family, Medium Density). APN 578-010-24S is designated BP and RS-5.

Description of project:

The Project consists of a Plan Amendment, Rezone, Planned Development and Vesting Tentative Tract Map to allow for the construction and operation of a new 239-unit single-family residential development and associated improvements. (See Section 2.3 for a full description).

Surrounding land uses/setting:

APN 578-010-35 and 578-010-24S are vacant. APN 578-010-47S is currently developed with a packing facility. APN 578-010-23S is occupied by a single-family residence. The project site is located within the Woodward Park Community Plan, which is a mostly single-family residential area in the northern portion of the City of Fresno. The immediate vicinity is comprised of single-family tract homes to the west, vacant land to the north, agriculture to the east and the Clovis North High School campus lies directly south. Clovis Community College is also to the south, on the opposite side of East International Avenue.

California Native American Tribal Consultation:

Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, has consultation begun or is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

In accordance with Assembly Bill (AB) 52 and Senate Bill (SB) 18, potentially affected Tribes were formally notified of this Project March 26, 2019, and were given the opportunity to request consultation on the Project. The City contacted the Native American Heritage Commission, requesting a contact list of applicable Native American Tribes, which was provided to the City. The City provided letters to the listed Tribes, notifying them of the Project and requesting consultation, if desired. The City did not receive any responses from the tribes contacted. Refer to Section XVIII – Tribal Cultural Resources for more information.

Other public agencies whose approval or consultation is required (e.g., permits, financing approval, participation agreements):

- The adoption of this Mitigated Negative Declaration by the City of Fresno.
- Compliance with other federal, state and local requirements such as the San Joaquin Valley Air Pollution Control District for a dust control plan and the Regional Water Quality Control Board for a Stormwater Pollution Prevention Plan.
- City of Fresno Department of Public Utilities

3.2 Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a “Potentially Significant Impact” as indicated by the checklist on the following pages.

☒ Aesthetics
☒ Biological Resources
☒ Geology / Soils
☒ Hydrology / Water Quality
☐ Noise
☐ Recreation
☒ Utilities / Service Systems

☐ Agriculture Resources and Forest Resources
☒ Cultural Resources
☐ Greenhouse Gas Emissions
☐ Land Use / Planning
☐ Population / Housing
☐ Transportation
☐ Wildfire

☐ Air Quality
☐ Energy
☐ Hazards & Hazardous Materials
☐ Mineral Resources
☐ Public Services
☐ Tribal Cultural Resources
☒ Mandatory Findings of Significance

3.3 Determination

On the basis of this initial evaluation:

___ I find that the proposed project is a subsequent project identified in the MEIR and that it is fully within the scope of the MEIR because it would have no additional significant effects that were not examined in the MEIR such that no new additional mitigation measures or alternatives may be required. All applicable mitigation measures contained in the Mitigation Measure Monitoring Checklist shall be imposed upon the proposed project. A FINDING OF CONFORMITY will be prepared.

X I find that the proposed project is a subsequent project identified in the MEIR but that it is not fully within the scope of the MEIR because the proposed project could have a significant effect on the environment that was not examined in the MEIR. However, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. The project specific mitigation measures and all applicable mitigation measures contained in the MEIR Mitigation Measure Monitoring Checklist will be imposed upon the proposed project. A MITIGATED NEGATIVE DECLARATION will be prepared.

___ I find that the proposed project is a subsequent project identified in the MEIR but that it MAY have a significant effect on the environment that was not examined in the MEIR, and an ENVIRONMENTAL IMPACT REPORT is required to analyze the potentially significant effects not examined in the MEIR pursuant to Public Resources Code Section 21157.1(d) and CEQA Guidelines 15178(a).

______________________________ ______________

Bonique Emerson, Planning Manager Date

EVALUATION OF ADDITIONAL ENVIRONMENTAL IMPACTS NOT ASSESSED IN THE MEIR:

1. For purposes of this MEIR Initial Study, the following answers have the corresponding meanings:

   a. "No Impact" means the subsequent project will not cause any additional significant effect related to the threshold under consideration which was not previously examined in the MEIR.

   b. "Less Than Significant Impact" means there is an impact related to the threshold under consideration that was not previously examined in the MEIR, but that impact is less than significant;

   c. "Less Than Significant with Mitigation Incorporation" means there is a potentially significant impact related to the threshold under consideration that was not previously examined in the MEIR, however, with the mitigation incorporated into the project, the impact is less than significant.

   d. "Potentially Significant Impact" means there is an additional potentially significant effect related to the threshold under consideration that was not previously examined in the MEIR.

2. A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question.

A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

3. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

4. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

5. A "Finding of Conformity" is a determination based on an initial study that the proposed project is a subsequent project identified in the MEIR and that it is fully within the scope of the MEIR because it would have no additional significant effects that were not examined in the MEIR.

6. "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section XVII, "Earlier Analyses," may be cross-referenced).

7. Earlier analyses may be used where, pursuant to the tiering, program EIR or MEIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a. Earlier Analysis Used. Identify and state where they are available for review.

   b. Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in the MEIR or another earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   c. Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

8. Lead agencies are encouraged to incorporate into the checklist references to information sources for

potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

9. Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

10. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

11. The explanation of each issue should identify:

    a. The significance criteria or threshold, if any, used to evaluate each question; and

    b. The mitigation measure identified, if any, to reduce the impact to less than significant.

I. AESTHETICS

Except as provided in Public Resources Code Section 21099, would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and regulations governing scenic quality?	☐	☐	☒	☐
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☒	☐	☐

AFFECTED ENVIRONMENT

The Project is located within a primarily residential area in the northern portion of Fresno. The site is generally flat with unobstructed views of the surrounding residential homes, Clovis North High School's athletic fields, row crops, and vacant land across the road. The parcels are situated on the south side of East Copper Avenue. North Chestnut Avenue runs perpendicular to the west and North Willow Avenue runs perpendicular to the east. East International Avenue runs parallel with East Copper Avenue, further to the south, below the Clovis North High School campus.

The existing visual character of the majority of the site consists of vacant parcels with minimal vegetation, with the exception of the residential home and trees situated on APN 578-010-23S.

Views of the proposed site are visible from East Copper Avenue.

RESPONSES

a. Have a substantial adverse effect on a scenic vista?

b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. A scenic vista is defined as a viewpoint that provides expansive views of highly valued landscape for the benefit of the general public. The Sierra Nevada Mountains are the only natural and visual resource in the Project area. Views of these distant mountains are afforded only during clear conditions due to poor air quality in the valley. Distant views of the Sierra Nevada Mountains would largely be unaffected by the development of the Project because of the nature of the Project, distance and limited visibility of these features. The City of Fresno does not identify views of these features as required to be "protected."

The Project site is within an urbanized area of Fresno. There are no scenic vistas or other protected scenic resources on or near the site. Visual character of the site is addressed further in Response C. below.

There are no scenic highways near the proposed site.

Therefore, the Project has ***no impact*** on scenic vistas or designated scenic resources or highways.

Mitigation Measures: None are required.

c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and regulations governing scenic quality?

Less Than Significant Impact. The proposed Project would alter the existing visual character of public views of the site from vacant land and one rural residential home to fully developed with single-family tract homes. The Project design is subject to the City's Design Guidelines adopted for the City's General Plan which apply to site layout, building design, landscaping, interior street design, lighting, parking and signage. Detailed architectural plans, color palettes and building materials as well as landscaping plans will be submitted by the Project developer to the City of Fresno Development and Resource Management Department. The plans shall be required prior to issuance of any building permits. The review shall be substantially based on the building plans and elevations illustrated within this document.

The Project will require removal of minimal vegetation on the vacant parcels. However, there are trees located on the existing residential parcel (APN 578-01-23S) which will require removal as well. Landscaping easements and a masonry sound wall will run along East Copper Avenue. Additional landscaping, fences and a trail are incorporated into the project design. The tract will be a gated community.

The improvements such as those proposed by the Project are typical of large City urban areas and are generally expected from residents of the City. These improvements would not substantially degrade the visual character of the area and would not diminish the visual quality of the area, as they would be consistent with the existing visual setting. The Project itself is not visually imposing against the scale of the existing adjacent residential buildings and nature of the surrounding area.

Therefore, the Project would have ***less than significant impacts*** on the visual character of the area.

Mitigation Measures: None are required.

d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less Than Significant Impact With Mitigation.

The subject site currently has no on-site sources of lighting, with the exception of any outdoor lighting utilized by the single residential home. The project will introduce new lighting that will be typical of residential developments, such as street lights, residential lights and vehicle lights. Additional night lighting sources on the Project site, especially any unshielded light, could result in spillover light that could impact surrounding adjacent residential uses. This would create new sources of light that could potentially have a significant impact on nighttime light levels in the area. During the entitlement process, staff will ensure that lights are located in areas that will minimize light sources to the neighboring properties. Further, Mitigation Measures (MM) AES-1 through MM AES-3 from the General Plan MEIR require lighting systems to be shielded to direct light to ground surfaces and orient light away from adjacent properties. In addition, MM AES – 5 requires use of non-reflective building materials to reduce glare impacts.

In addition, a condition of approval will require that lighting, where provided for public streets, shall be hooded and so arranged and controlled so as not to cause a nuisance either to traffic or to the living environment. The amount of light shall be provided according to the standards of the Department of Public Works. As a result, the Project will implement the necessary mitigation measures and will have a ***less than significant impact*** on aesthetics.

Mitigation Measures: General Plan MEIR Mitigation Measures AES – 1, AES – 2, AES – 3 and AES – 5. See attached MEIR Mitigation Measure Monitoring Checklist. In conclusion, with MEIR mitigation measures, the Project will not result in any aesthetic impacts beyond those analyzed in MEIR SCH No. 2012111015 prepared for the Fresno General Plan.

II. AGRICULTURE AND FOREST RESOURCES

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

AFFECTED ENVIRONMENT

The city of Fresno is located in Fresno County, which is a nationally-leading agricultural producer. The City's General Plan contains several policies intended to protect agricultural resources. The Project site, however, does not contain any agricultural resource and therefore, the City's policies are not applicable. Row crops less than 0.5 miles to the east are the nearest agricultural areas.

RESPONSES

a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?

c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

d. Result in the loss of forest land or conversion of forest land to non-forest use?

e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. There are no agricultural resources or forest lands present on the Project site, which currently consists of primarily "Medium Density Land." Medium Density Land is intended for development of 5 to 12 units per acre, for predominantly single-family units. Since the majority of the site falls under this designation, the proposed Project would not conflict with the City of Fresno's land use classifications. There are no existing agricultural uses or operations within the Project boundaries. The proposed Project would not convert prime farmland, conflict with an existing agricultural use, or result in the conversion of existing farmland. Additionally, no Williamson Act contracted lands would be impacted due to the Project.

The proposed Project does not conflict with any forest land or Timberland Production or result in any loss of forest land. The proposed Project does not include any changes which will affect the existing environment. Therefore, the Project has ***no impact*** on agricultural and forest resources.

Mitigation Measures: None are required.

In conclusion, the Project will not result in any agriculture or forestry impacts beyond those analyzed in MEIR SCH No. 2012111015 prepared for the Fresno General Plan.

III. AIR QUALITY

Would the project:

	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d. Result in other emissions (such as those leading to odors or adversely affecting a substantial number of people)?	☐	☐	☒	☐

AFFECTED ENVIRONMENT

The climate of the City of Fresno and the San Joaquin Valley is characterized by long, hot summers and stagnant, foggy winters. Precipitation is low and temperature inversions are common. These characteristics are conducive to the formation and retention of air pollutants and are in part influenced by the surrounding mountains which intercept precipitation and act as a barrier to the passage of cold air and air pollutants.

The proposed Project lies within the San Joaquin Valley Air Basin, which is managed by the San Joaquin Valley Air Pollution Control District (SJVAPCD or Air District). National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) have been established for the following criteria pollutants: carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb). The CAAQS also set standards for sulfates, hydrogen sulfide, and visibility.

Air quality plans or attainment plans are used to bring the applicable air basin into attainment with all state and federal ambient air quality standards designed to protect the health and safety of residents within that air basin. Areas are classified under the Federal Clean Air Act as either "attainment", "non-attainment", or "extreme non-attainment" areas for each criteria pollutant based on whether the NAAQS have been achieved or not. Attainment relative to the State standards is determined by the California Air Resources Board (CARB). The San Joaquin Valley is designated as a State and Federal extreme non-attainment area for O3, a State and Federal non-attainment area for PM2.5, a State non-attainment area for PM10, and Federal and State attainment area for CO, SO2, NO2, and Pb.

Standards and attainment status for listed pollutants in the Air District can be found in Table 1. Note that both state and federal standards are presented.

Table 1
Standards and Attainment Status for Listed Pollutants in the Air District

	Federal Standard	California Standard
Ozone	0.075 ppm (8-hr avg)	0.07 ppm (8-hr avg) 0.09 ppm (1-hr avg)
Carbon Monoxide	9.0 ppm (8-hr avg) 35.0 ppm (1-hr avg)	9.0 ppm (8-hr avg) 20.0 ppm (1-hr avg)
Nitrogen Dioxide	0.053 ppm (annual avg)	0.30 ppm (annual avg) 0.18 ppm (1-hr avg)
Sulfur Dioxide	0.03 ppm (annual avg) 0.14 ppm (24-hr avg) 0.5 ppm (3-hr avg)	0.04 ppm (24-hr avg) 0.25 ppm (1hr avg)
Lead	1.5 µg/m3 (calendar quarter) 0.15 µg/m3 (rolling 3-month avg)	1.5 µg/m3 (30-day avg)
Particulate Matter (PM10)	150 µg/m3 (24-hr avg)	20 µg/m3 (annual avg) 50 µg/m3 (24-hr avg)
Particulate Matter (PM2.5)	15 µg/m3 (annual avg)	35 µg/m3 (24-hr avg) 12 µg/m3 (annual avg)

µg/m3 = micrograms per cubic meter

Additional State regulations include:

CARB Portable Equipment Registration Program – This program was designed to allow owners and operators of portable engines and other common construction or farming equipment to register their equipment under a statewide program so they may operate it statewide without the need to obtain a permit from the local air district.

U.S. EPA/CARB Off-Road Mobile Sources Emission Reduction Program – The California Clean Air Act (CCAA) requires CARB to achieve a maximum degree of emissions reductions from off-road mobile sources to attain State Ambient Air Quality Standards (SAAQS); off- road mobile sources include most construction equipment. Tier 1 standards for large compression-ignition engines used in off-road mobile sources went into effect in California in 1996. These standards, along with ongoing rulemaking, address emissions of nitrogen oxides (NOX) and toxic particulate matter from diesel engines. CARB is currently developing a control measure to reduce diesel PM and NOX emissions from existing off-road diesel equipment throughout the state.

California Global Warming Solutions Act – Established in 2006, Assembly Bill 32 (AB 32) requires that California's GHG emissions be reduced to 1990 levels by the year 2020. This will be implemented through a statewide cap on GHG emissions, which will be phased in beginning in 2012. AB 32 requires CARB to develop regulations and a mandatory reporting system to monitor global warming emissions levels.

The Master Environmental Impact Report (MEIR) prepared for the Fresno General Plan and Policy RC-4-c of the Fresno General Plan require that computer models used by the SJVAPCD be used to analyze development projects and estimate future air pollutant emissions that can be expected to be generated from operational emissions (vehicular traffic associated with the project), area-wide emissions (sources such as ongoing maintenance activities and use of appliances), and construction activities.

CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and greenhouse gas emissions associated with both construction and operations from a variety of land use projects. The model quantifies direct emissions from construction and operations (including vehicle and off-road equipment use), as well as indirect emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. Further, the model identifies mitigation measures to reduce criteria pollutant and GHG emissions along with calculating the benefits achieved from measures chosen by the user. The GHG mitigation measures were developed and adopted by the California Air Pollution Control Officers Association (CAPCOA).

In addition to the above-mentioned factors, the CalEEMod computer model evaluates the following emissions: ozone precursors (Reactive Organic Gases (ROG)) and NOX; CO, SOX, both regulated categories of particulate matter, and the greenhouse gas carbon dioxide (CO2). The model incorporates geographically-customized data on local vehicles, weather, and SJVAPCD Rules.

CalEEMod Version 2016.3.2, was used to estimate construction and operational (vehicle trips) emissions resulting from the proposed Project.

RESPONSES

a. Conflict with or obstruct implementation of the applicable air quality plan?

b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

c. Expose sensitive receptors to substantial pollutant concentrations?

Less Than Significant Impact. The proposed Project lies within the San Joaquin Valley Air Basin (SJVAB). At the Federal level, the SJVAB is designated as extreme nonattainment for the 8-hour ozone standard, attainment for PM_{10} and CO, and nonattainment fort $PM_{2.5}$. At the State level, the SJVAB is designated as nonattainment for the 8-hour ozone, PM_{10}, and $PM_{2.5}$ standards. Although the Federal 1-hour ozone standard was revoked in 2005, areas must still attain this standard, and the SJVAPCD recently requested an EPA finding that the SJVAB has attained the standard based on 2011-2013 data[1]. To meet Federal Clean Air Act (CAA) requirements, the SJVAPCD has multiple air quality attainment plan (AQAP) documents, including:

- Extreme Ozone Attainment Demonstration Plan (EOADP) for attainment of the 1-hour ozone standard (2004);
- 2007 Ozone Plan for attainment of the 8-hour ozone standard;
- 2007 PM_{10} Maintenance Plan and Request for Redesignation; and
- 2008 $PM_{2.5}$ Plan.

Because of the region's non-attainment status for ozone, $PM_{2.5}$, and PM_{10}, if the Project-generated emissions of either of the ozone precursor pollutants (ROG or NOx), PM_{10}, or $PM_{2.5}$ were to exceed the SJVAPCD's significance thresholds, then the project uses would be considered to conflict with the attainment plans. In addition, if the project uses were to result in a change in land use and corresponding increases in vehicle miles traveled, they may result in an increase in vehicle miles traveled that is unaccounted for in regional emissions inventories contained in regional air quality control plans.

The annual significance thresholds to be used for the Project for construction and operational emissions are as follows[2]:

- 10 tons per year ROG;
- 10 tons per year NOx;
- 15 tons per year PM_{10}; and
- 15 tons per year $PM_{2.5}$.

The Project will result in both construction emissions and operational emissions as described below.

Short-Term (Construction) Emissions

---

[1] San Joaquin Valley Air Pollution Control District. Guide to Assessing and Mitigating Air Quality Impacts. March 19, 2015. Page 28. http://www.valleyair.org/transportation/GAMAQI_3-19-15.pdf. Accessed June 2019.

[2] San Joaquin Valley Air Control District – Air Quality Threshold of Significance – Criteria Pollutants. http://www.valleyair.org/transportation/0714-GAMAQI-Criteria-Pollutant-Thresholds-of-Significance.pdf. Accessed June 2019.

Site preparation and Project construction would involve excavation, grading, hauling, and various activities needed to construct the Project. During construction, the Project could generate pollutants such as hydrocarbons, oxides of nitrogen, carbon monoxide, and suspended PM. A major source of PM would be windblown dust generated during construction activities. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Vehicles leaving the site could deposit dirt and mud on local streets, which could be an additional source of airborne dust after it dries. PM10 emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM10 emissions would depend on soil moisture, the silt content of soil, wind speed, and the amount of operating equipment. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site. These emissions would be temporary and limited to the immediate area surrounding the construction site.

Operational Emissions

Operational emissions would primarily be generated from vehicles traveling to and from the residential homes. According to the Trip Generation Analysis (see Appendix A) prepared for the Project, Tract 6249 will generate a maximum of 2,256 trips per day. There are no substantial stationary emission generators associated with the Project.

Total Project Emissions

The estimated annual construction and operational emissions are shown below. The California Emissions Estimator (CalEEMod), Version 2016.3.2, was used to estimate construction and operational (vehicle trips) emissions resulting from the proposed Project. The modeling is based on the 239 single family residential units, and associated Project trip generation (see traffic section of this document for Project trip generation information). Modeling results are provided in Table 2 and the CalEEMod output files are provided in Appendix A.

Table 2
Proposed Project Construction and Operation Emissions

	VOC (ROG)	NO_x (tons/yea	PM_{10} (tons/year	$PM_{2.5}$ (tons/year)	Total CO2 (MT/yr)
Years 2019 Construction	0.2060	2.0879	0.3665	0.2124	234.88
Year 2020 Construction	0.3388	2.9603	0.2619	0.1708	476.26
Year 2021 Construction	4.1280	0.8019	0.0689	0.0445	140.25
Year 2022 Operation	2.9614	8.4028	1.6302	0.4855	3,137.37
Threshold of Significance	10	10	15	15	N/A
Significant?	No	No	No	No	N/A

Source: CalEEMod results (Appendix A). Crawford & Bowen Planning, Inc. (2019)

As demonstrated in Table 2, estimated construction and operational emissions would not exceed the SJVAPCD's significance thresholds for ROG, NOx, PM_{10}, and $PM_{2.5}$. As a result, the Project uses would not conflict with emissions inventories contained in regional air quality attainment plans, and would not result in a significant contribution to the region's air quality non-attainment status[3].

Localized high levels of CO are associated with traffic congestion and idling or slow-moving vehicles. The SJVAPCD provides screening criteria to determine when to quantify local CO concentrations based on impacts to the level of service (LOS) of roadways in the Project vicinity.

As further discussed in the Transportation/Traffic checklist evaluation, the Project will generate more than 1,000 trips per day. However, mitigation will ensure that the Project would not reduce the level of service on local roadways. Therefore, the Project would not significantly contribute to an exceedance that would exceed state or federal CO standards. Additionally, as the estimated construction and operational emissions are below SJVAPCD thresholds, any cumulative considerable increase in criteria pollutants would be less than significant.

As described above, the Project will not occur at a scale or scope with potential to contribute substantially or cumulatively to existing or projected air quality violations, impacts, or increases of criteria pollutants for which the San Joaquin Valley region is under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors). The proposed Project will comply with all applicable air quality plans. Therefore, no violations of air quality standards will occur and no net increase of pollutants will occur, thus the impact is ***less than significant.***

Mitigation Measures: None are required.

d. Result in other emissions (such as those leading to odors adversely affecting a substantial number of people?

Less Than Significant Impact. During construction, the various diesel-powered vehicles and equipment in use on-site could create localized odors. These odors would be temporary and are not likely to be noticeable for extended periods of time beyond the Project site. In addition, once the Project is operational, there would be no source of odors from the Project. Therefore, the impact is ***less than significant.***

---

[3] San Joaquin Valley Air Pollution Control District. Guide to Assessing and Mitigating Air Quality Impacts. March 19, 2015. Page 65. http://www.valleyair.org/transportation/GAMAQI_3-19-15.pdf. Accessed June 2019.

Mitigation Measures: None are required.

In conclusion, the Project will not result in any air quality impacts beyond those analyzed in MEIR SCH No. 2012111015 prepared for the Fresno General Plan.

IV. BIOLOGICAL RESOURCES

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒

IV. BIOLOGICAL RESOURCES

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

AFFECTED ENVIRONMENT

The proposed Project site is located in a portion of the central San Joaquin Valley that has, for decades, experienced intensive agricultural and urban disturbances. Like most of California, Fresno and the Central San Joaquin Valley experiences a Mediterranean climate. Warm dry summers are followed by cool moist winters. Summer temperatures usually exceed 90 degrees Fahrenheit, and the relative humidity is generally very low. Winter temperatures rarely raise much above 70 degrees Fahrenheit, with daytime highs often below 60 degrees Fahrenheit. Annual precipitation within the proposed Project site is about 10 inches, almost 85% of which falls between the months of October and March. Nearly all precipitation falls in the form of rain and storm-water readily infiltrates the soils of the surrounding the sites.

Native plant and animal species once abundant in the region have become locally extirpated or have experienced large reductions in their populations due to conversion of upland, riparian, and aquatic habitats to agricultural and urban uses. Remaining native habitats are particularly valuable to native wildlife species including special status species that still persist in the region.

Over the years, the Fresno area has been substantially disturbed by agricultural and residential activities, with lands within the City itself having primarily been converted to urban development.

The Project area is level (nearly flat) and has two predominate habitat types: landscape and ruderal.

The potential ground-disturbance areas associated with the Project consist of fallowed agricultural fields void of substantial vegetation and one residential home with minimal landscaping. The site is completely surrounded by similar vacant land and residential developments, plus Clovis North High School to the south.

RESPONSES

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Less Than Significant Impact With Mitigation. The Project area and immediate vicinity consist of land developed with residences, a high school and agriculture. Existing development has altered the natural landscape by introducing non-native plant species and removing potentially suitable natural habitat for sensitive plant or animal species within the Project area. The vegetation found within and along the Project area consists of species that provide little or no biological importance and value.

The California Natural Diversity Database (CNDDB) was examined to determine if any species identified as a candidate, sensitive, or special status species were located in or near the Proposed Project Area. The CNDDB did not identify any species within the Proposed Project area or site. There are no reported records of special status species (which included both listed species and species of concern or of statewide importance).

However, both raptors and migratory birds and their nests are protected under the Migratory Bird Treaty Act 16 U.S.C. §§ 703–712 (MBTA). Species with some likelihood to occur (at least for foraging) at the Project site include, but are not limited to, the following: red-tailed hawk (*Buteo jamaicensis*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipter cooperii*), and American kestrel (*Falco sparverius*). While the life histories of these species vary, overlapping nesting and foraging similarities allow for their concurrent discussion. Impacts to nesting birds is potentially significant; however, implementation of Mitigation Measure BIO-4 from the General Plan MEIR would reduce this impact to a ***less-than-significant*** level. This mitigation measure consists of preconstruction surveys and timing of construction in relation to potential nesting birds in the Project area.

Mitigation Measures: General Plan MEIR Mitigation Measure BIO – 4. See attached MEIR Mitigation Measure Monitoring Checklist.

b. <u>Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?</u>

No Impact. The Proposed Project site is located in an urban area that is primarily surrounded by residential land, the Copper River Country Club, vacant land, plus Clovis North High School. The site is not located within an established fish or wildlife migratory corridor. Therefore, ***no impacts*** to the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites would occur as a result of this Project.

Mitigation Measures: None are required.

c. <u>Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?</u>

No Impact. The United States Army Corps of Engineers (USACE) regulates the dredge and fill of "Waters of the U.S." through Section 404 of the Clean Water Act (CWA). This proposed Project site and area are urbanized and does not contain federally protected waters or wetlands. Therefore, no impacts would occur on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means as a result of this Proposed Project. As such, there would be ***no impacts*** associated with the proposed improvements.

Mitigation Measures: None are required.

d. <u>Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?</u>

No Impact. The Proposed Project site is located in an urban area that is primarily surrounded by residential land uses, and agricultural and vacant and. The site is not located within an established fish or wildlife migratory corridor. Therefore, ***no impacts*** to the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites would occur as a result of this Project.

Mitigation Measures: None are required.

e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Less Than Significant. The City's General Plan Parks, Open Space and Schools Element contains several objectives and policies pertaining to the protection of biological resources. Most of the policies pertain to general long-term protection and preservation of biological resources including providing buffers for natural areas, implementing habitat restoration where applicable, protection/enhancement of the San Joaquin River area, and other similar policies. Since the Project is located in a highly disturbed area with minimal biological resources and does not include significant impacts to protected plant or animal species, the Project does not conflict with any adopted policies pertaining to biological resources. The Project is also required to implement Municipal Code Chapter 13 Article 3 – Street Trees and Parkways pertaining to tree removal and replacement. Therefore, there is a ***less than significant impact.***

Mitigation Measures: None are required.

f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No Impact. The Project site is not subject to any adopted habitat conservation plan, natural community conservation plan or other conservation plan, as there are no adopted plans. Therefore, there is ***no impact***.

Mitigation Measures: None are required.

In conclusion, with MEIR mitigation measures included, the Project will not result in any biological impacts beyond those analyzed in MEIR SCH No. 2012111015 prepared for the Fresno General Plan.

V. CULTURAL RESOURCES

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☐	☒
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c. Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

AFFECTED ENVIRONMENT

Archaeological resources are places where human activity has measurably altered the earth or left deposits of physical remains. Archaeological resources may be either prehistoric (before the introduction of writing in a particular area) or historic (after the introduction of writing). The majority of such places in this region are associated with either Native American or Euroamerican occupation of the area. The most frequently encountered prehistoric and early historic Native American archaeological sites are village settlements with residential areas and sometimes cemeteries; temporary camps where food and raw materials were collected; smaller, briefly occupied sites where tools were manufactured or repaired; and special-use areas like caves, rock shelters, and sites of rock art. Historic archaeological sites may include foundations or features such as privies, corrals, and trash dumps.

The City of Fresno lies at the intersection of where ethnographers generally recognize three cultural-geographical divisions of Yokuts: Foothills, Northern Valley, and Southern Valley. The Foothill Yokuts included about 15 named tribes, representing the eastern third of the 40 to 50 recorded Yokuts tribes. The immediate Project vicinity consists of intense urban uses.

The prehistoric and historic site records and literature search was completed by the California Historical Resources Information System, Southern San Joaquin Valley Information Center (CHRIS/SSJVIC), California State University Bakersfield. Specialized listings for cultural resources consulted by the SSJVIC include the Historic Properties Directory for Fresno County with the most recent updates of the National Register of Historic Places, California Historical Landmarks, and California Points of Historical Interest as well as other evaluations of properties reviewed by the State of California Office of Historic Preservation. Other sources consulted by the SSJVIC include California Inventory of Historic Resources, California Points of Historical Interest, and California Register. In addition, The California History Plan and Five Views: An Ethnic Sites Survey for California, Historic Properties Directory and available local and regional surveys/inventories/historic maps were consulted.

The records search found no recorded cultural resources (including archaeological sites and architectural properties) located within or adjacent to the proposed Project site. This review included cultural resources listed in the National Register of Historic Places, California Register of Historical Resources, California State Landmarks, and the California Points of Historical Interest. None of the archaeological compliance reports on file at the CHRIS/SSJVIC include the Project. The review of the Sacred Lands Inventory by the Native American Heritage Commission (NAHC) was negative.

No additional archaeological or historic resources were identified within or near the Project site.

RESPONSES

a. <u>Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?</u>

No Impact. As discussed above, no historic resources were identified within or near the Project site. Therefore, there is ***no impact***.

Mitigation Measures: None are required.

b. <u>Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?</u>

c. <u>Disturb any human remains, including those interred outside of formal cemeteries?</u>

Less Than Significant Impact With Mitigation. The Project area is highly disturbed, consisting of vacant land and one residential home. There are no known or visible cultural or archaeological resources, paleontological resources, or human remains that exist on the surface of the Project area. Therefore, it is determined that the Project has low potential to impact any sensitive resources and no further cultural resources work is required unless Project plans change to include work not currently identified in the Project description.

Although no cultural or archaeological resources, paleontological resources or human remains have been identified in the Project area, the possibility exists that such resources or remains may be discovered during Project site preparation, excavation and/or grading activities. The General Plan MEIR contains mitigation measures CUL – 1 and CUL – 2 pertaining to protection of cultural resources if they are discovered during construction and will be implemented to ensure that Project will result in ***less than significant impacts with mitigation***.

Mitigation Measures: General Plan MEIR Mitigation Measures CUL – 1 and CUL - 2. See attached MEIR Mitigation Measure Monitoring Checklist.

In conclusion, with MEIR mitigation measures incorporated, the Project will not result in any cultural or historical resource impacts beyond those analyzed in MEIR SCH No. 2012111015.

VI. ENERGY

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

AFFECTED ENVIRONMENT

California's total energy consumption is second-highest in the nation, but, in 2016, the state's per capita energy consumption ranked 48th, due in part to its mild climate and its energy efficiency programs. In 2017, California ranked second in the nation in conventional hydroelectric generation and first as a producer of electricity from solar, geothermal, and biomass resources while also in 2017, solar PV and solar thermal installations provided about 16% of California's net electricity generation.[4]

Energy usage is typically quantified using the British thermal unit (BTU). As a point of reference, the approximately amounts of energy contained in common energy sources are as follows:

Energy Source	**BTUs**[5]
Gasoline	120,429 per gallon
Natural Gas	1,037 per cubic foot
Electricity	3,412 per kilowatt-hour

---

[4] U.S. Energy Information Administration. Independent Statistics and Analysis. California Profile Overview. https://www.eia.gov/state/?sid=CA#tabs-1. Accessed June 2019.

[5] U.S. Energy Information Administration. Energy Units and Calculators Explained. https://www.eia.gov/energyexplained/index.php?page=about_energy_units. Accessed June 2019.

California electrical consumption in 2016 was 7,830.8 trillion BTU[6], as provided in Table 3, while total electrical consumption by Fresno County in 2017 was 25.457 trillion BTU.[7]

Table 3 – 2016 California Energy Consumption[8]

End User	BTU of energy consumed (in trillions)	Percentage of total consumption
Residential	1,384.4	17.7
Commercial	1,477.2	18.9
Industrial	1,854.3	23.7
Transportation	3,114.9	39.8
Total	**7,830.8**	--

The California Department of Transportation (Caltrans) reports that approximately 25.1 million automobiles, 5.7 million trucks, and 889,024 motorcycles were registered in the state in 2017, resulting in a total estimated 339.8 billion vehicles miles traveled (VMT).[9] Within Fresno County, an estimated 8.2 million vehicle miles were traveled in 2017 for an average of 22,556 per day.[10]

Applicable Regulations

California Energy Code (Title 24, Part 6, Building Energy Efficiency Standards)

California Code of Regulations Title 24, Part 6 comprises the California Energy Code, which was adopted to ensure that building construction, system design and installation achieve energy efficiency. The California Energy Code was first established in 1978 by the CEC in response to a legislative mandate to reduce California's energy consumption, and apply to energy consumed for heating, cooling, ventilation, water heating, and lighting in new residential and non-residential buildings. The standards are updated periodically to increase the baseline energy efficiency requirements. The 2016 Building Energy Efficiency Standards focus on several key areas to improve the energy efficiency of newly constructed buildings and additions and alterations to existing buildings and include requirements to enable both demand reductions during critical peak periods and future solar electric and thermal system installations. Although it was not originally intended to reduce greenhouse gas (GHG) emissions, electricity production

---

[6] U.S. Energy Information Administration. Independent Statistics and Analysis. California Profile Overview. https://www.eia.gov/state/?sid=CA#tabs-1. Accessed June 2019.

[7] California Energy Commission. Electricity Consumption by County. http://ecdms.energy.ca.gov/elecbycounty.aspx. Accessed June 2019.

[8] U.S. Energy Information Administration. Independent Statistics and Analysis. California Profile Overview. https://www.eia.gov/state/?sid=CA#tabs-1. Accessed June 2019.

[9] Caltrans. 2017. California Transportation Quick Facts. http://www.dot.ca.gov/drisi/library/qf/qf2017.pdf. Accessed June 2019

[10] Caltrans. 2017. Fresno County Transportation Quick Facts. http://www.dot.ca.gov/drisi/library/qfco/fre/fre2017.pdf. Accessed June 2019.

by fossil fuels results in GHG emissions and energy efficient buildings require less electricity. Therefore, increased energy efficiency results in decreased GHG emissions.

California Green Building Standards Code (Title 24, Part II, CALGreen)

The California Building Standards Commission adopted the California Green Buildings Standards Code (CALGreen in Part 11 of the Title 24 Building Standards Code) for all new construction statewide on July 17, 2008. Originally a volunteer measure, the code became mandatory in 2010 and the most recent update (2019) will go into effect on January 1, 2020. CALGreen sets targets for energy efficiency, water consumption, dual plumbing systems for potable and recyclable water, diversion of construction waste from landfills, and use of environmentally sensitive materials in construction and design, including eco-friendly flooring, carpeting, paint, coatings, thermal insulation, and acoustical wall and ceiling panels. The 2019 CALGreen Code includes mandatory measures for non-residential development related to site development; water use; weather resistance and moisture management; construction waste reduction, disposal, and recycling; building maintenance and operation; pollutant control; indoor air quality; environmental comfort; and outdoor air quality. Mandatory measures for residential development pertain to green building; planning and design; energy efficiency; water efficiency and conservation; material conservation and resource efficiency; environmental quality; and installer and special inspector qualifications.

Clean Energy and Pollution Reduction Act (SB 350)

The Clean Energy and Pollution Reduction Act (SB 350) was passed by California Governor Brown on October 7, 2015, and establishes new clean energy, clean air, and greenhouse gas reduction goals for the year 2030 and beyond. SB 350 establishes a greenhouse gas reduction target of 40 percent below 1990 levels for the State of California, further enhancing the ability for the state to meet the goal of reducing greenhouse gas emissions by 80 percent below 1990 levels by the year 2050.

Renewable Portfolio Standard (SB 1078 and SB 107)

Established in 2002 under SB 1078, the state’s Renewables Portfolio Standard (RPS) was amended under SB 107 to require accelerated energy reduction goals by requiring that by the year 2010, 20 percent of electricity sales in the state be served by renewable energy resources. In years following its adoption, Executive Order S-14-08 was signed, requiring electricity retail sellers to provide 33 percent of their service loads with renewable energy by the year 2020. In 2011, SB X1-2 was signed, aligning the RPS target with the 33 percent requirement by the year 2020. This new RPS applied to all state electricity retailers, including publicly owned utilities, investor-owned utilities, electrical service providers, and community choice aggregators. All entities included under the RPS were required to adopt the RPS 20 percent by year 2020 reduction goal by the end of 2013, adopt a reduction goal of 25 percent by the end of 2016, and meet the 33 percent reduction goal by the end of 2020. In addition, the Air Resources Board, under Executive Order S-21-09, was required to adopt regulations consistent with these 33 percent renewable energy targets.

RESPONSES

a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Less Than Significant Impact. The proposed Project includes construction and operation of a 239-unit single-family residential tract, on 18.86 gross acres. The Project would introduce energy usage on a site that is currently demanding little energy, by the single residential home currently on the Project site. At buildout, the Project would consume energy in both the short-term during Project construction and in the long-term during Project operation.

During construction, the Project would consume energy in two general forms: (1) the fuel energy consumed by construction vehicles and equipment; and (2) bound energy in construction materials, such as asphalt, steel, concrete, pipes, and manufactured or processed materials such as lumber and glass. Title 24 Building Energy Efficiency Standards provide guidance on construction techniques to maximize energy conservation and it is expected that contractors and owners have a strong financial incentive to use recycled materials and products originating from nearby sources in order to reduce materials costs. As such, it is anticipated that materials used in construction and construction vehicle fuel energy would not involve the wasteful, inefficient, or unnecessary consumption of energy.

Operational Project energy consumption would occur for multiple purposes, including but not limited to, building heating and cooling, refrigeration, lighting and electronics. Operational energy would also be consumed during each vehicle trip associated with the proposed use. CalEEMod was utilized to generate the estimated energy demand of the proposed Project, and the results are provided in Table 4 and in Appendix A.

Table 4 – Annual Project Energy Consumption

Land Use	Electricity Use in kWh/year	Natural Gas Use in kBTU/year	Annual Energy Consumption (in Million BTU)
Single Family Residential	1,520,380	4,748,220	9,936.0

The proposed Project would be required to comply with Title 24 Building Energy Efficiency Standards, which provide minimum efficiency standards related to various building features, including appliances, water and space heating and cooling equipment, building insulation and roofing, and lighting. Implementation of Title 24 standards significantly increases energy savings, and it is generally assumed that compliance with Title 24 ensures projects will not result in the inefficient, wasteful, or unnecessary consumption of energy.

As discussed in Impact XVII – Transportation/Traffic, the proposed Project would generate approximately 2,256 daily vehicle trips. The length of these trips and the individual vehicle fuel efficiencies are not known; therefore, the resulting energy consumption cannot be accurately calculated. Adopted federal vehicle fuel standards have continually improved since their original adoption in 1975 and assists in avoiding the inefficient, wasteful, and unnecessary use of energy by vehicles.

As discussed previously, the proposed Project would be required to implement and be consistent with existing energy design standards at the local and state level. The Project would be subject to energy conservation requirements in the California Energy Code and CALGreen. Adherence to state code requirements would ensure that the Project would not result in wasteful and inefficient use of non-renewable resources due to building operation.

Therefore, any impacts are ***less than significant***.

Mitigation Measures: None are required.

VII. GEOLOGY AND SOILS

Would the project:

	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii. Strong seismic ground shaking?	☐	☐	☒	☐
iii. Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv. Landslides?	☐	☐	☒	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☒	☐	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the most recently	☐	☒	☐	☐

VII. GEOLOGY AND SOILS

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
adopted Uniform Building Code creating substantial direct or indirect risks to life or property?				
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐

AFFECTED ENVIRONMENT

The Project site is located within the San Joaquin Valley structural basin, bounded to the east by the Sierra Nevada Mountain Range and to the west by the Coastal Ranges. The Project area is located on the high alluvial fan of the San Joaquin River. The site has an elevation of approximately 390 feet above sea level in an area of intense urban uses. The Project site is mapped as containing soils classified as San Joaquin Sandy Loam, shallow, 0-3 percent slopes.[11]

RESPONSES

a-i. <u>Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area</u>

---

[11] Natural Resource Conservation Service, Soil Survey of Fresno County. https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/california/CA653/0/fresno.pdf. Accessed June 2019

or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

a-ii. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

a-iii. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

a-iv. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

Less Than Significant Impact. The proposed Project site is not located in an earthquake fault zone as delineated by the 1972 Alquist-Priolo Earthquake Fault Zoning Map Act. The nearest known potentially active fault is the Clovis Fault, located about 2 miles northeast of the site. No active faults have been mapped within the Project boundaries, so there is no potential for fault rupture. It is anticipated that the proposed Project site would be subject to some ground acceleration and ground shaking associated with seismic activity during its design life. The Project site would be engineered and constructed in strict accordance with the earthquake resistant design requirements contained in the latest edition of the California Building Code (CBC) for seismic zone III, as well as Title 24 of the California Administrative Code, and therefore would avoid potential seismically induced hazards on planned structures. The impact of seismic hazards on the Project would be ***less than significant.***

Mitigation Measures: None are required.

b. Result in substantial soil erosion or the loss of topsoil?

Less Than Significant Impact With Mitigation. Construction activities associated with the Project involves ground preparation work for the new housing development and associated improvements. These activities could expose barren soils to sources of wind or water, resulting in the potential for erosion and sedimentation on and off the Project site. During construction, nuisance flow caused by minor rain could flow off-site. The City and/or contractor would be required to employ appropriate sediment and erosion control BMPs as part of a Stormwater Pollution Prevention Plan (SWPPP) that would be required in the California National Pollution Discharge Elimination System (NPDES). In addition, soil erosion and loss of topsoil would be minimized through implementation of the SVJAPCD fugitive dust control measures (See Section III). Once construction is complete, the Project would not result in soil erosion or loss of topsoil. Mitigation Measure GEO – 1 (requirement to prepare a SWPPP) will ensure that impacts remain ***less than significant.***

Mitigation Measures: Project-specific Mitigation Measures GEO – 1. See attached Project-specific Mitigation Measure Monitoring Checklist.

c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

d. Be located on expansive soil, as defined in Table 18-1-B of the most recently adopted Uniform Building Code creating substantial risks to life or property?

Less Than Significant Impact With Mitigation. See Section VIa. above. The site is not at significant risk from earthquakes, ground shaking, liquefaction, or landslide and is otherwise considered geologically stable. Subsidence is typically related to over-extraction of groundwater from certain types of geologic formations where the water is partly responsible for supporting the ground surface. However, the site may be subject to soil hazards including existing fills and settlement potential that could adversely impact proposed structures. Mitigation Measure GEO – 2 (requirement for a design level geotechnical analysis) will reduce impacts to a ***less than significant*** level.

Mitigation Measures: Project-specific Mitigation Measures GEO – 2. See attached Project-specific Mitigation Measure Monitoring Checklist.

e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No Impact. The Project does not include the construction, replacement, or disturbance of septic tanks or alternative wastewater disposal systems. The existing on-site septic system being utilized by the single residence will be abandoned and appropriately dealt with. The Project will be required to tie into existing sewer services (See Utilities section for more details). Therefore, there is ***no impact.***

Mitigation Measures: None are required.

f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less Than Significant Impact. As identified in the previous cultural studies perform for the Project site, there are no known paleontological resources on or near the site. (See Section V. for more details). Mitigation measures have been added that will protect unknown (buried) resources during construction, including paleontological resources. In addition, the site is substantially developed with the remainder a dirt lot that has been graded. There are no unique geological features on site or in the area. Therefore, there is a ***less than significant impact.***

Mitigation Measures: None are required.

In conclusion, with Project-specific mitigation measures incorporated, the Project will not result in any geological impacts beyond those analyzed in MEIR SCH No. 2012111015.

VIII. GREENHOUSE GAS EMISSIONS

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

AFFECTED ENVIRONMENT

Various gases in the earth's atmosphere play an important role in moderating the earth's surface temperature. Solar radiation enters earth's atmosphere from space and a portion of the radiation is absorbed by the earth's surface. The earth emits this radiation back toward space, but the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation. GHGs are transparent to solar radiation, but are effective in absorbing infrared radiation. Consequently, radiation that would otherwise escape back into space is retained, resulting in a warming of the earth's atmosphere. This phenomenon is known as the greenhouse effect. Scientific research to date indicates that some of the observed climate change is a result of increased GHG emissions associated with human activity. Among the GHGs contributing to the greenhouse effect are water vapor, carbon dioxide (CO_2), methane (CH_4), ozone, Nitrous Oxide (NO_x), and chlorofluorocarbons. Human-caused emissions of these GHGs in excess of natural ambient concentrations are considered responsible for enhancing the greenhouse effect. GHG emissions contributing to global climate change are attributable, in large part, to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors.

In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation. Global climate change is, indeed, a global issue. GHGs are global pollutants, unlike criteria pollutants and TACs (which are pollutants of regional and/or local concern). Global climate change, if it occurs, could potentially affect water resources in California. Rising temperatures could be anticipated to result in sea-level rise (as polar ice caps melt) and possibly change the timing and amount of precipitation, which could alter water quality. According to some, climate change could result in more extreme weather patterns; both heavier precipitation that could lead to flooding, as well as more extended drought periods. There is uncertainty regarding the timing, magnitude, and nature of the potential changes to water resources as a result of climate change; however, several trends are evident.

Snowpack and snowmelt may also be affected by climate change. Much of California's precipitation falls as snow in the Sierra Nevada and southern Cascades, and snowpack represents approximately 35 percent of the state's useable annual water supply. The snowmelt typically occurs from April through July; it provides natural water flow to streams and reservoirs after the annual rainy season has ended. As air temperatures increase due to climate change, the water stored in California's snowpack could be affected by increasing temperatures resulting in: (1) decreased snowfall, and (2) earlier snowmelt.

RESPONSES

a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less Than Significant Impact. The U.S. Environmental Protection Agency published a rule for the mandatory reporting of greenhouse gases from sources that in general emit 25,000 metric tons or more of carbon dioxide (CO2) per year. Proposed Project construction emissions were amortized over a 20-year period and added to the annual operational CO2 emissions for a total of 3,179.94 metric tons per year (see Table 2 and Appendix A). This represents approximately 12 percent of the reporting threshold.

The City of Fresno prepared a Greenhouse Gas Reduction Plan (Appendix F-2 of the General Plan MEIR) as part of the General Plan Update, which included an emission reduction target for demonstrating consistency with State greenhouse gas reduction targets. The General Plan contains several policies designed to reduce greenhouse gas emissions. Due to its proposed location on a vacant / underutilized parcel, the Project is consistent with the following policies:

Policy LU-2-a: Infill Development and Redevelopment. Promote development of vacant, underdeveloped, and re-developable land within the City Limits where urban services are available by considering the establishment and implementation of supportive regulations and programs.

Policy MT-2-c: Reduce VMT through Infill Development. Provide incentives for infill development that would provide jobs and services closer to housing and multi-modal transportation corridors, and vice versa, in order to reduce citywide vehicle miles travelled.

Policy RC-2-a Link Land Use to Transportation. Promote mixed-use, higher density infill development in multi-modal corridors. Support land use patterns that make more efficient use of the transportation system and plan future transportation investments in areas of higher-intensity development. Discourage investment in infrastructure that would not meet these criteria.

Policy RC-8-a Existing Standards and Programs. Continue existing beneficial energy conservation programs, including adhering to the California Energy Code in new construction and major renovations.

In addition, the proposed Project will comply with the following City of Fresno GHG Reduction Plan strategies:

- Energy Efficiency in New Buildings: the Project will meet or exceed Title 24 Energy Efficiency Standards.
- Water Conservation: The Project will implement the City of Fresno Water Conservation Program, including implementation of the State's Water Efficient Landscape Ordinance. The California Water Conservation Act mandates a 20 percent reduction in water usage by 2020. The City has a reduction target of per capita water usage in the City's water service area to 230 gpd per capita (25 percent below the current consumption rate) in 2035. The City will meet the reduction target with measures applicable to new and existing development. Reductions beyond the state mandated 20 percent are possible with the use of building and landscaping water conservation features. The reductions from buildings can be achieved with high efficiency toilets, low-flow faucets, and water-efficient appliances such as dishwashers. Water savings from landscaping would be achieved primarily through the use of drought-tolerant landscaping or xeriscaping.
- Compact and Infill Development: The Project will make use of an existing underutilized space where similar facilities are located and public transit is available. More intense commercial development increases opportunities for walking, bicycling and transit use for some trips, thereby reducing vehicle trips.

The proposed Project is consistent with the City's General Plan policies pertaining to greenhouse gases, and implements greenhouse gas reduction features included in the City's GHG Reduction Plan.

Construction emissions

Emissions from construction are temporary in nature. The SJVAPCD has implemented a guidance policy for development projects within their jurisdiction. This policy, "Guidance for Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA," approved by the Board on

December 17, 2009, does not address temporary GHG emissions from construction, nor does this policy establish numeric thresholds for ongoing GHG emissions. Therefore, construction-generated GHGs are ***less than significant.***

Mitigation Measures: None are required.

In conclusion, the Project will not result in any greenhouse gas impacts beyond those analyzed in MEIR SCH No. 2012111015.

IX. HAZARDS AND HAZARDOUS MATERIALS

Would the project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a.	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b.	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c.	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d.	Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e.	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f.	Impair implementation of or physically interfere with an adopted emergency	☐	☐	☒	☐

IX. HAZARDS AND HAZARDOUS MATERIALS **Would the project:**	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
response plan or emergency evacuation plan?				
g. Expose people or structures either directly or indirectly to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒

AFFECTED ENVIRONMENT

Hazardous materials refer generally to hazardous substances that exhibit corrosive, poisonous, flammable, and/or reactive properties and have the potential to harm human health and/or the environment. There are no known hazardous material producing facilities in the vicinity of the Project. Clovis North High School is within 0.25 mile and the Project site is not within two miles of any airports.

RESPONSES

a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Less Than Significant Impact. Construction of the Project would require the use and transport of hazardous materials, including fuels, oils, and other chemicals (e.g., paints, lead, adhesives, etc.) typically used during construction. It is likely that these hazardous materials and vehicles would be stored by the contractor(s) on-site during construction activities. Improper use and transportation of hazardous materials could result in accidental releases or spills, potentially posing health risks to workers, the public, and the environment. However, all materials used during construction would be contained, stored, and handled in compliance with applicable standards and regulations established by the Department of Toxic Substances Control (DTSC), the U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA). In addition, a Storm Water Pollution

Prevention Plan (SWPPP) is required for the Project (see Mitigation Measure GEO – 1) and shall include emergency procedures for incidental hazardous materials releases. The SWPPP also includes Best Management Practices which includes requirements for hazardous materials storage.

The use of hazardous materials would be confined to the Project construction period. The Project itself, once constructed, will not contain, use or produce any hazardous materials. Any impacts are ***less than significant.***

Mitigation Measures: None are required.

c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Less Than Significant Impact. Clovis North High School is located within 0.25 mile of the Project site and Clovis Community College is 0.5 miles to the south. The proposed Project includes the development of a gated residential community, which would not emit hazardous emissions or handle hazardous materials, substances, or waste. Any impacts would be ***less than significant***.

Mitigation Measures: None are required.

d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact. A database search was conducted to identify recorded hazardous materials incidents in the Project area. The search included recorded incidents on the National Priorities List (NPL), State Priority List (SPL), the Superfund Comprehensive Environmental Response Compensation and Liability Information System List (CERLIS), the EPA's emergency response notification system list (ERNS), and other federal, state, and local agency databases. The Project site was not listed in any of the databases searched. See also Response b. Pursuant to Mitigation Measure HAZ – 1, the Project proponent will be required to prepare a Phase 1 Environmental Site Assessment. There would be ***no impact***.

Mitigation Measures: None are required.

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

No Impact. According to the Fresno County *Airport Land Use Compatibility Plan*[12] (adopted December 2018), the proposed Project site is outside the airport land use plan area for the Fresno Yosemite International Airport, which is the closest airport located approximately 7.6 miles south of the site. The next closest airport, Sierra Sky Park, lies 8.2 miles to the southwest***. No impact*** would occur.

Mitigation Measures: None are required.

f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Less Than Significant Impact.

The City has consulted with its police, fire and ambulance service providers to determine that the proposed Project provides adequate emergency access to the Project site and surrounding areas. The City will also provide specific construction schedules and pertinent Project information so that adequate access is maintained at all times. Therefore, the Project will have ***a less than significant impact.***

Mitigation Measures: None are required.

g. Expose people or structures either directly or indirectly to a significant risk of loss, injury or death involving wildland fires?

No Impact. Implementation of the Project would not change the degree of exposure to wildfires because there are no wildlands in the Project vicinity, thus precluding the possibility of wildfires. Therefore, there is ***no impact.***

Mitigation Measures: None are required.

In conclusion, with mitigation incorporated, the Project will not result in any hazards or hazardous materials impacts beyond those analyzed in MEIR SCH No. 2012111015.

---

[12] Fresno County Land Use Compatibility Plan. https://www.fresnocog.org/wp-content/uploads/2019/01/fresno-final-alucp-113018-r_part2.pdf. Accessed March 2019

X. HYDROLOGY AND WATER QUALITY

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☒	☐	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i. Result in substantial erosion or siltation on- or off- site;	☐	☒	☐	☐
ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☒	☐	☐
iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☒	☐	☐
iv. impede or redirect flood flows?	☐	☒	☐	☐

X. HYDROLOGY AND WATER QUALITY

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

AFFECTED ENVIRONMENT

According to the City's adopted Urban Water Management Plan (2015), the City's existing water system consists of about 1,799 miles of transmission and distribution pipelines, 260 active municipal groundwater wells, 224 of which registered flows in the past year, 2 surface water treatment facilities of rated capacities of 2 and 30 mgd, 3 water storage facilities, and 4 booster pump facilities. The distribution system was previously divided into four quasi-pressure zones to help regulate and optimize system pressures as there is an approximate 120 feet of elevation decrease running across the city from the northeast to the southwest.

The City of Fresno will provide water to the residential development, however, the Project will be required to tie into the City's existing water service infrastructure.

RESPONSES

a. <u>Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?</u>

Less Than Significant Impact. The Project has the potential to impact water quality standards and/or waste discharge requirements during construction (temporary impacts) and operation. Impacts are discussed below.

Construction

Although the proposed Project site is relatively small in scale, grading, excavation, removal of vegetation cover, and loading activities associated with construction activities could temporarily increase runoff, erosion, and sedimentation. Construction activities also could result in soil compaction and wind erosion effects that could adversely affect soils and reduce the revegetation potential at construction sites and staging areas.

Three general sources of potential short-term construction-related stormwater pollution associated with the proposed Project are: 1) the handling, storage, and disposal of construction materials containing pollutants; 2) the maintenance and operation of construction equipment; and 3) earth moving activities which, when not controlled, may generate soil erosion and transportation, via storm runoff or mechanical equipment. Generally, routine safety precautions for handling and storing construction materials may effectively mitigate the potential pollution of stormwater by these materials. These same types of common sense, "good housekeeping" procedures can be extended to non-hazardous stormwater pollutants such as sawdust and other solid wastes.

Poorly maintained vehicles and heavy equipment leaking fuel, oil, antifreeze, or other fluids on the construction site are also common sources of stormwater pollution and soil contamination. In addition, grading activities can greatly increase erosion processes. Two general strategies are recommended to prevent construction silt from entering local storm drains. First, erosion control procedures should be implemented for those areas that must be exposed. Secondly, the area should be secured to control offsite migration of pollutants. These Best Management Practices (BMPs) would be required in the Stormwater Pollution Prevention Plan (SWPPP) to be prepared prior to commencement of Project construction. When properly designed and implemented, these "good-housekeeping" practices are expected to reduce short-term construction-related impacts to less than significant.

In accordance with the National Pollution Discharge Elimination System (NPDES) Stormwater Program, as discussed in Section 3.5 Geology and Soils the Project will be required to comply with existing regulatory requirements to prepare a SWPPP designed to control erosion and the loss of topsoil to the extent practicable using BMPs that the Regional Water Quality Control Board (RWQCB) has deemed effective in controlling erosion, sedimentation, runoff during construction activities. The specific controls are subject to the review and approval by the RWQCB and are an existing regulatory requirement.

b. <u>Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?</u>

Less Than Significant Impact With Mitigation. See Response XIX. Utilities and Services, Section b.

c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i. result in substantial erosion or siltation on- or offsite;

ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;

iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

iv. impede or redirect flood flows?

Less Than Significant Impact With Mitigation. The Project includes minor changes to the existing stormwater drainage pattern of the area through the installation of asphalt, residences, driveways, landscaping, curb, gutter and sidewalks. Therefore, as a condition of approval, the Project applicant will be required to mitigate the impacts of increased runoff from the proposed residential development and parking areas. The Project has been reviewed by the Fresno Metropolitan Flood Control District and conditions and requirements of the Project pertaining to storm drain facilities have been provided to the Project developer. The Project developer will be required to prepare a drainage / grading plan as identified in Mitigation Measure HYD – 2 (preparation of a drainage / grading plan). Therefore, with mitigation, the Project will have a ***less than significant impact.***

Mitigation Measures: Project-specific Mitigation Measures HYD – 2. See attached Project-specific Mitigation Measure Monitoring Checklist.

d. In flood hazard, tsunami or seiche zones, risk release of pollutants due to project inundation?

e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

No Impact. The Project is not within a regulatory floodway or within a base floodplain (100 year) elevation. In addition, the Project does not include any housing or structures that would be subject to flooding either from a watercourse or from dam inundation. There are no bodies of water near the site that would create a potential risk of hazards from seiche, tsunami or mudflow. The Project will not conflict with any water quality control plans or sustainable groundwater management plan. Therefore, there are ***no impacts.***

Mitigation Measures: None are required.

In conclusion, with mitigation incorporated, the Project will not result in any hydrologic impacts beyond those analyzed in MEIR SCH No. 2012111015.

XI. LAND USE AND PLANNING

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Physically divide an established community?	☐	☐	☒	☐
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

AFFECTED ENVIRONMENT

The Project is located within a primarily residential area in the northern portion of Fresno. The parcels are situated on the south side of East Copper Avenue. East International Avenue runs parallel 0.5 miles the south, North Chestnut Avenue runs perpendicular to the west and North Willow Avenue runs perpendicular to the east.

RESPONSES

a. <u>Physically divide an established community?</u>

b. <u>Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?</u>

Less Than Significant Impact. The immediate vicinity of the proposed project site is comprised of other residential neighborhoods, vacant land, two schools within a mile of the site and agriculture to the east. The proposed Project will not divide an existing community. Pedestrian, bicycle and vehicle access will be provided, creating continuous thoroughfares in between the neighborhoods west of North Chestnut Avenue. The area is highly disturbed with urban uses.

Zoning

> APN 578-010-47S is zoned BP (Business Park) by the City of Fresno. APN 578-01-23S and 578-01-35 are zoned RS-5 (Residential Single Family). APN 578-01-24S is designated BP and RS-5.

The Project includes 239 single-family residential units on 18.86 gross acres. The Project has no characteristics that would physically divide the City of Fresno. Access to the existing surrounding areas will be improved.

The developer is requesting authorization from the City of Fresno to amend the zoning of APN 578-010-47S from Business Park to Corridor/ Center Mixed-Use planned land use. This re-zoning would allow for the trail and open space landscaping to be established. Additionally, APN 578-010-24S would be amended from Business Park/ Medium density Residential to Medium High Density Residential. APN 578-010-35 and 578-010-23S would also be amended from Medium Density Residential to Medium High Density Residential planned land use.

Based upon compliance with the goals, objectives and policies referenced herein below, the proposed project is determined to be consistent with the Fresno General Plan goals and objectives related to land use and the urban form:

Goal No. 1 of the Fresno General Plan: Increase opportunity, economic development, business and job creation.

The project will provide temporary construction jobs and will provide housing for the growing local work force.

Goal No. 7 of the Fresno General Plan: Provide for a diversity of districts, neighborhoods, housing types (including affordable housing), residential densities, job opportunities, recreation, open space, and educational venues that appeal to a broad range of people throughout the City.

This Goal contributes to the establishment of a comprehensive city-wide land use planning strategy to meet economic development objectives, achieve efficient and equitable use of resources and infrastructure, and create an attractive living environment in accordance with Objective LU-1 of the Fresno General Plan.

Goal No. 8 of the Fresno General Plan: Develop Complete Neighborhoods and districts with an efficient and diverse mix of residential densities, building types, and affordability which are designed to be healthy, attractive, and centered by schools, parks, and public and commercial services to provide a sense of place and that provide as many services as possible within walking distance.

The project includes a trail, is near public schools, and is in an area planned for additional residential development.

Goal No. 12 of the Fresno General Plan: Resolve existing public infrastructure and service deficiencies, make full use of existing infrastructure, and invest in improvements to increase competitiveness and promote economic growth.

The project will tie into existing infrastructure (water, sewer and storm water) located in the project vicinity.

Implementing Policies LU-1-a and LU-2-a of the Fresno General Plan promote development of vacant, underdeveloped, and re-developable land within the within the Existing City Limits as of December 31, 2012 where urban services are available.

The proposed project will be constructed in an area planned for residential development where existing infrastructure is available.

Implementing Policy LU-5-c of the Fresno General Plan promotes medium density residential uses to maximize efficient use of residential property through a wide range of densities.

The proposed project is located in an area that is planned for intense residential development.

The project will not conflict with any conservation plans since it is not located within any conservation plan areas.

Therefore, it is determined that the proposed project is consistent with respective general plan objectives and policies and will not significantly conflict with applicable land use plans, policies or regulations of the City of Fresno. Furthermore, the proposed project, including the design and improvement of the subject property, is found; (1) To be consistent with the goals, objectives and policies of the applicable Fresno General Plan; (2) To be suitable for the type and density of development; (3) To be safe from potential cause or introduction of serious public health problems; and, (4) To not conflict with any public interests in the subject property or adjacent lands. The authorization request for the proposed plan amendments regarding re-zoning is expected to be approved.

There are no aspects of this project that will result in impacts to land use and planning beyond those analyzed in the MEIR SCH No. 2012111015 for the Fresno General Plan.

Fresno County Airport Land Use Compatibility Plan

On December 3, 2018, the Airport Land Use Commission (ALUC) adopted the Fresno County Airport Land Use Compatibility Plan. The proposed Project is not within the Airport Influence Area of the nearest airport, Fresno Yosemite International Airport, thus review by the ALUC is not necessary.

The project would have ***less than significant impact****.*

Mitigation Measures: None are required.

XII. MINERAL RESOURCES

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

RESPONSES

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. There are no known mineral resources in the Project area and none are identified in the City's General Plan near the Project site. Therefore, there is ***no impact***.

Mitigation Measures: None are required.

In conclusion, with mitigation incorporated, the Project will not result in any mineral resource impacts beyond those analyzed in MEIR SCH No. 2012111015.

XIII. NOISE

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b. Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

AFFECTED ENVIRONMENT

Noise is most often described as unwanted sound. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. The City of Fresno is impacted by a multitude of noise sources. Mobile sources of noise, especially cars and trucks, are the most common and significant sources of noise in most communities, and they are predominant sources of noise in the City. Commercial, industrial, and institutional land uses throughout the City (i.e., schools, fire stations, utilities) also generate stationary-source noise. The Project is located in an area with a mix of uses. The predominant noise sources in the Project area include traffic on local roadways, residential noise (lawn movers, audio equipment, voices, etc.) and noise from the nearby schools. Agricultural noise is unlikely but possible. Sensitive receptors in the area include the residential housing near the project areas. Noise-reduction measures are incorporated into the Project plan to reduce the exposure of the proposed residences to road noise, including but not limited to the construction of a sound wall along East Copper Avenue to provide acoustical shielding to outdoor activity areas and first-floor receivers in homes. Mechanical ventilation and air conditioning will be provided in all homes to ensure that windows and doors can be closed to insulate against outdoor noise, if necessary. Additionally, acoustic baffles will be installed on the interior side of the gable vents that face towards East Copper Avenue, which will provide further noise reduction.

RESPONSES

a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b. Generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact.

Short-term (Construction) Noise Impacts

Proposed Project construction related activities will involve temporary noise sources and are anticipated to begin in 2019 through 2021. Typical construction related equipment include graders, trenchers, small tractors and excavators. During the proposed Project construction, noise from construction related activities will contribute to the noise environment in the immediate vicinity. Activities involved in construction will generate maximum noise levels, as indicated in Table 5, ranging from 79 to 91 dBA at a distance of 50 feet, without feasible noise control (e.g., mufflers) and ranging from 75 to 80 dBA at a distance of 50 feet, with feasible noise controls.

Table 5
Typical Construction Noise Levels

Type of Equipment	dBA at 50 ft	
	Without Feasible Noise Control	With Feasible Noise Control
Dozer or Tractor	80	75
Excavator	88	80
Scraper	88	80
Front End Loader	79	75
Backhoe	85	75
Grader	85	75
Truck	91	75

The distinction between short-term construction noise impacts and long-term operational noise impacts is a typical one in both CEQA documents and local noise ordinances, which generally recognize the reality that short-term noise from construction is inevitable and cannot be mitigated beyond a certain level. Thus, local agencies frequently tolerate short-term noise at levels that they would not accept for permanent noise sources. A more severe approach would be impractical and might preclude the kind of construction activities that are to be expected from time to time in urban environments. Most residents of urban areas recognize this reality and expect to hear construction activities on occasion.

In addition, construction activities would not occur between the hours of 10:00 PM and 7:00 AM, Monday through Saturday, and not at all on Sundays, in accordance with Fresno Municipal Code Section 10-109, which limits work hours “to between the hours of 7 AM and 10 PM on any day except Sunday.” Further restrictions on construction noise may be placed on the Project as determined through the Conditional Use permit process.

Long-term (Operational) Noise Impacts

The primary source of on-going noise from the Project will be from vehicles traveling to and from the site and from traffic traveling along Copper and Willow Avenues. As part of the Project, a six-foot wall will be constructed around the perimeter of the development, to reduce vehicular noise to the future residential units. The Project will result in an increase in traffic on some roadways in the Project area. However, the relatively low number of new trips associated with the Project is not likely to increase the ambient noise levels by a significant amount. Policy H-1-b of the City’s Noise Element addresses significant Project- related increases in ambient noise levels for evaluation of noise impacts. A significant increase is assumed to occur if a project causes the ambient noise level to increase by the following amounts:

Where ambient noise levels are <60 dB : an increase of 5 dB or more

Where ambient noise levels are 60-65 dB: an increase of 3 dB or more

Where ambient noise levels are >65 dB : an increase of 1.5 dB or more

Given the amount of existing vehicular activity in the Project area, the moderate increase in traffic associated with the new residential development (2,256 daily trips), is not expected to increase ambient noise levels by more than 1 dB. The area is active with vehicles, schools, residential housing and agricultural operations and the proposed project will not introduce a new significant source of noise that isn’t already occurring in the area. Therefore, the impact is considered ***less than significant.***

Mitigation Measures: None are required.

c. For a project located within the vicinity of a private airstrip or an airport land use plan, or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The Project is not located within an airport land use plan. Therefore, there is ***no impact***.

Mitigation Measures: None are required.

In conclusion, with mitigation incorporated, the Project will not result in any noise impacts beyond those analyzed in MEIR SCH No. 2012111015.

XIV. POPULATION AND HOUSING

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☒	☐

AFFECTED ENVIRONMENT

The current status of the Project site is vacant land, with the exception of APN 578-01-23S which is occupied by a single-family residence. New housing associated with the Project includes 239 single-family homes.

RESPONSES

a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

Less Than Significant Impact. The median household size according to the City's Housing Element[13] is 3.07 persons per unit. Using this ratio, the project will accommodate approximately 734

---

[13] Fresno County Multi-Jurisdictional Housing Element. https://www.fresnocog.org/multi-jurisdictional-housing- element/ Accessed June 2019.

persons. This relatively small population will not affect any regional population, housing or employment projections anticipated by City policy documents. There is a ***less than significant impact***.

Mitigation Measures: None are required.

In conclusion, with mitigation incorporated, the Project will not result in any population or housing impacts beyond those analyzed in MEIR SCH No. 2012111015.

XV. PUBLIC SERVICES

Would the project:

	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☒	☐	☐
Police protection?	☐	☒	☐	☐
Schools?	☐	☒	☐	☐
Parks?	☐	☒	☐	☐
Other public facilities?	☐	☒	☐	☐

AFFECTED ENVIRONMENT

The Project site is located in a single- family residential area in the northern portion of the City of Fresno. The immediate vicinity is comprised of single-family tract homes to the west, vacant land to the north, a school to the south and agriculture to the east of the site. In addition to Clovis North High School, Clovis Community College campus is also less than a mile away to the south of the Project site. The area is served by City of Fresno Police, Fire, the Fresno Unified School District and other public facilities.

RESPONSES

a. <u>Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:</u>

Police Protection?

Fire protection?

Schools?

Parks?

Other public facilities?

Less Than Significant Impact with Mitigation.

The Project includes construction of 239 single-family residential units which will accommodate approximately 734 persons.

Police Protection: Protection services would be provided to the Project site from the existing Northeast Policing District, which is approximately 2.8 miles from the Project site at 1450 East Teague Avenue, Fresno. The Fresno Police Department provides a full range of police services including uniformed patrol response to calls for service, crime prevention, tactical crime and enforcement (including gang and violent crime suppression), and traffic enforcement/accident prevention. The Project site is located in an area currently served by the Police Department; the Department would not need to expand its existing service area or construct a new facility to serve the Project site.

Fire Protection: The City of Fresno Fire Department (Fire Department) offers a full range of services including fire prevention, suppression, emergency medical care, hazardous materials, urban search, and rescue response, as well as emergency preparedness planning and public education coordination within the Fresno City limit, in addition to having mutual aid agreements with the Fresno County Fire Protection District, and the City of Clovis Fire Departments.

The City of Fresno Fire Department operates its facilities under the guidance set by the National Fire Protection Association in NFPA 1710, the Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operation to the Public by Career Fire Departments. NFPA 1710 sets standards for turnout time, travel time, and total response time for fire and emergency medical incidents, as well as other standards for operation and fire service. The Fire Department has established the objectives set forth in NFPA 1710 as department objectives to ensure the public health, safety, and welfare.

According to Fire Department, the proposed Project would be served by the current Fire Station 17, which is located at 10512 North Maple Avenue, Fresno, approximately 0.8 miles from the Project site. After reviewing the Project, the Fire Department has determined that the Project can be adequately serviced by the current local Fire Facilities and Personnel, consistent with National Fire Protection Association 1710 Objectives.

The Fresno General Plan contains the following objectives and policies:

- E-25 Objective: Ensure that fire protection, emergency medical and all emergency services are provided in an adequate, efficient and cost-effective manner.
- E-26 Objective: Ensure that the Fire Department's staffing and equipment resources are sufficient to implement all requests for fire and emergency services from the citizens of Fresno.
- E-16-a. Policy: Use adopted general and specific plans, the city's GIS database, and the fire station location program to achieve optimum siting of future stations. For those station sites identified by the 2025 General Land Use and Circulation Map but not yet acquired by the city, the underlying alternative land uses shown on Table 5 shall be applied. The siting of any additional new station locations to serve future development such as the North and Southeast Growth Areas shall occur through the applicable community or specific plan adoption/amendment process.

The Project would be required to comply with all applicable fire and building safety codes (California Building Code and Uniform Fire Code) to ensure fire safety elements are incorporated into final Project design, including the providing designated fire lanes marked as such. Proposed interior streets will be required to provide appropriate widths and turning radii to safely accommodate emergency response and the transport of emergency/public safety vehicles. The Project will also be designed to meet Fire Department requirements regarding water flow, water storage requirements, hydrant spacing, infrastructure sizing, and emergency access, in addition to providing Fire X-1 gate hardware and click-2-enter radio frequency gate opening hardware. As a result, appropriate fire safety considerations will be included as part of the final design of the Project.

Schools: Educational services for the proposed Project will be provided by the Central Unified School District (CUSD).

Parks: The proposed Project does not include any parkland or recreational facilities. However, the Project will be facilitating the construction of a trail and selected open spaces. The Project will be required to pay City park facility impact fees.

Other Public Facilities: Development of the Project will increase the demand for other public services. However, the relatively small increase in demand will not in and of itself require construction of additional facilities. As such, implementation of MEIR mitigation measures (PS-1 through PS-5) and General Plan Objectives and Policies, as identified above would ensure adequate public services can be provided.

The City has determined that it can accommodate the Project with existing facilities and personnel. The Project Applicant will be required to pay development impact fees for fire protection, police protection, schools, parks or other public facilities as determined by the City to receive such services. Therefore, there is a ***less than significant impact with mitigation.***

Mitigation Measures: Project-specific Mitigation Measures PUB – 1. See attached Project- specific Mitigation Measure Monitoring Checklist.

In conclusion, with mitigation incorporated, the Project will not result in any public services impacts beyond those analyzed in MEIR SCH No. 2012111015.

XVI. RECREATION

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

AFFECTED ENVIRONMENT

Copper River Park lies 1.4 miles west of the Project site and Todd Beamer Park lies 1.4 miles to the southwest. Selma Layne Park is just 2.2 miles further to the south.

RESPONSES

a. <u>Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?</u>

b. <u>Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?</u>

No Impact. The Project does not include any parks or recreational facilities. The increase of 734 persons resulting from the Project would have a relatively small impact on existing recreational facilities. The City has established Park Facilities Fees. In order to implement the goals and objectives of the City's General Plan, and to mitigate the impacts caused by future development in the City, park facilities must be constructed. The City Council has determined that a Park Facilities Fee is needed in order to finance these public facilities and to pay for each development's fair share of the construction and acquisition costs. The Project Applicant will be required to pay development impact fees as determined by the City of Park Facilities Fees.

In addition, the Project will be incorporating and facilitating the completion of a bicycle/pedestrian trail within the proposed site's footprint. The project will still be required to pay City park facility impact fees, as required by mitigation measure PUB-1. Therefore, there is ***no impact***.

Mitigation Measures: None are required.

In conclusion, with mitigation incorporated, the Project will not result in any recreation impacts beyond those analyzed in MEIR SCH No. 2012111015.

XVII. TRANSPORTATION/ TRAFFIC

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☒	☐	☐
b. Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☒	☐	☐
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☒	☐	☐
d. Result in inadequate emergency access?	☐	☒	☐	☐

AFFECTED ENVIRONMENT

The Project includes 239 single-family residential homes. The immediate vicinity is comprised of surrounding residential homes, Clovis North High School's athletic fields, row crops, vacant land across the road and the Copper River Country Club further north. The parcels are situated on the south side of East Copper Avenue. North Chestnut Avenue runs perpendicular to the west and North Willow Avenue runs perpendicular to the east. East International Avenue runs parallel with East Copper Avenue, further to the south, below the Clovis North High School campus.

A Trip Generation Analysis for the Project was prepared by KD Anderson & Associates (See Appendix B).

RESPONSES

a. Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

b. Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

d. Result in inadequate emergency access?

Less Than Significant Impact with Mitigation.

The "Mobility and Transportation" element of the City of Fresno General Plan 2035 breaks down the City of Fresno into four Traffic Impact Zones (TIZ's) on General Plan Figure MT-4. The Project lies within TIZ-III, which represents areas near or outside the City Limits. To encourage infill development and minimize upfront infrastructure cost, the peak hour Level of Service (LOS) shall be maintained at LOS D or better for all intersections and roadway segments. The trigger for requiring a Traffic Impact Study (TIS) for all development within the TIZ-III is when a project is anticipated to generate 100 or more new peak hour trips. The project will result in more than 100 peak hour trips and thus a full TIS is warranted. The Traffic Impact Analysis (TIA) evaluated the impacts of the Project by looking at four intersections within the City of Fresno, one location on the Clovis-Fresno border, and one intersection outside the sphere of influence of the City of Fresno during the AM and PM peak hours.

Trip Generation Analysis

According to the Institute of Transportation Engineers, Trip Generation (Tenth Edition), the Project will generate approximately 2,256 daily trips and is anticipated to have 177 AM peak hour trips and 237 PM peak hour trips (See Table 6 below).

Table 6
Proposed Project Trip Generation

Project Component	Total Daily Trips	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour In	PM Peak Hour Out
Single Family Detached (201)	2,256	44	133	149	88
		Total: 177		Total: 237	

The TIS analysis shows that development of Tract 6249 will cause significant traffic delays at two specific intersections without mitigation. However, installation of a traffic signal at E. Copper Avenue / N. Chestnut Avenue and E. Copper Avenue / N. Willow Avenue, with associated left turn lanes and protected signal phasing, will subject these intersections to operation of LOS D or better. The Project Applicant will be charged with installation of these components with applicable fee credits.

The Project Applicant will be required to pay traffic impact fees as determined by the City as outlined in the Project Specific Mitigation Measure Monitoring Checklist. The proposed Project will also make the improvements necessary to maintain right-of-way and public easement dedications along public streets and within the site, as outlined by the City of Fresno standards and requirements.

The City of Fresno also prepared an Active Transportation Plan (ATP) in 2016, which envisions a complete, safe and comfortable network of trails, sidewalks and bikeways that serves all residents of Fresno. The Class I bicycle/pedestrian trail provided by the proposed Project will provide sidewalks for pedestrians constructed to Public Works Standard P-5 and will not otherwise conflict with any policies or programs included in the ATP.

Therefore, the impact is ***less than significant with mitigation incorporation.***

Mitigation Measures: See attached MEIR and Project Specific Mitigation Measure Monitoring Checklist.

In conclusion, with mitigation incorporated, the Project will not result in any transportation impacts beyond those analyzed in MEIR SCH No. 2012111015.

XVIII. TRIBAL CULTURAL RESOURCES

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☒	☐
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☒	☐

RESPONSES

a). Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or

ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Less Than Significant Impact. In accordance with Assembly Bill (AB) 52 and Senate Bill (SB) 18, potentially affected Tribes were formally notified of this Project and were given the opportunity to request consultation on the Project. The City contacted the Native American Heritage Commission, requesting a contact list of applicable Native American Tribes, which was provided to the City. The City provided letters to the listed Tribes on March 26, 2019, notifying them of the Project and requesting consultation, if desired. The City did not receive any responses from the tribes contacted. Therefore, there is a ***less than significant impact***.

Mitigation Measures: None are required.

XIX. UTILITIES AND SERVICE SYSTEMS

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☒	☐	☐
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☒	☐	☐
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

AFFECTED ENVIRONMENT

The Project will be required to connect to water, sewer, stormwater and wastewater services provided by the City of Fresno and may be subject to water use fees and/or development fees to be provided such service. In addition, the Project will require solid waste disposal services.

The City of Fresno also provides solid waste, recycling, and green waste collection services to residential customers within the city limits.

RESPONSES

a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Less Than Significant Impact With Mitigation.

The Project has been reviewed by the Fresno Metropolitan Flood Control District and conditions and requirements of the Project pertaining to storm drain facilities have been provided to the Project developer. See Section X. Hydrology and Water Quality. The Project developer will be required to prepare a drainage / grading plan as identified in Mitigation Measure HYD – 2 (preparation of a drainage / grading plan).

The proposed Project will not result in the construction of new facilities to meet electric power, natural gas or telecommunication needs presented by the addition of the Project.

Therefore, with mitigation, the Project will have a ***less than significant impact.***

Mitigation Measures:	Project-specific Mitigation Measures HYD – 2. See attached Project-specific Mitigation Measure Monitoring Checklist.

b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Less Than Significant Impact With Mitigation. Water service would be provided to the Project by the City of Fresno and the City of Fresno Department of Public Utilities Water Division has determined that no new or expanded water supply facilities are necessary to serve the Project. Project water demand will be determined using the City’s adopted 2015 Urban Water Management Plan (UWMP) methodologies and will be calculated on the basis of the following assumptions:

- Residential: 239 single-family units; historic water usages per capita adjusted for City Urban Water Management Plan assumptions regarding water conservation usage effects.
- 239 dwelling units X 3.07 persons per dwelling unit = 734 persons X 247 GPCD = 181,298 total gallons per day X 365 days per year = 66,173,770 gallons per year (or ~203 acre/feet/year)

While the Project would increase demand for water resources beyond current levels, the Project would utilize less water than the water demand projections contained in the 2015 UWMP with respect to development of this site. Based on the assumptions in the City's UWMP, the Project would not negatively impact water supplies or otherwise deplete groundwater supplies. Moreover, the proposed Project is not anticipated to interfere with groundwater recharge efforts being implemented by the City. The City's UWMP contains a detailed evaluation of existing sources of water supply, anticipated future water demand, extensive conservation measures, and the development of new water supplies (recycled water, increased recharge, surface water treatment, etc.). Measures contained in the UWMP as well as the City's General Plan are intended to reduce demands on groundwater resources by augmenting supply and introducing conservation measures and other mitigation strategies. The proposed Project will implement Mitigation Measure HYD – 1 which includes water use reduction measures.

In addition to adequate water supply, the Project is also subject to minimum water pressure requirements. The City of Fresno Municipal Code Section 6-501 states that estimated peak hour water demands shall be based on 2.12 gallons per minute for single-family residential units. The Fire Protection Water Demand shall be added to the overall Project water demands at 1,500 gallons per minute. The sum of the Peak Hour Water Demands and Fire Protection Demands (in gpm) shall establish the total instantaneous water supply flow required for the project, inclusive of fire protection. The Project Applicant will be required to adhere to these standards and maintain them in perpetuity.

The proposed Project would not require new or expanded water entitlements and there is sufficient water supply for the Project. Therefore, the impact is ***less than significant.***

Mitigation Measures: Project-specific Mitigation Measures HYD – 1. See attached Project-specific Mitigation Measure Monitoring Checklist.

c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Less Than Significant Impact. The Project will result in wastewater from residential units that will be discharged into the City's existing wastewater treatment system. The wastewater will be typical of other urban/residential developments consisting of bathrooms, kitchen drains and other similar features. The project will not discharge any unusual or atypical wastewater that would violate the City's waste discharge requirements. The City of Fresno Public Works Department has reviewed the Project and determined that it can accommodate the wastewater generated from the project. Therefore, the impact is ***less than significant.***

Mitigation Measures: None are required.

d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Less Than Significant Impact. The City of Fresno's solid waste is primarily landfilled at the American Avenue Landfill in Tranquility. The landfill is permitted to accept 2,200 tons per day and has a permitted capacity of 29.3 million cubic yards. The original closure date was 2031; however, due to enhanced recycling efforts, particularly on the part of the City of Fresno, the closure date has been extended to 2050. The proposed Project's impact on solid waste will be ***less than significant.***

Mitigation Measures: None are required.

In conclusion, with mitigation incorporated, the Project will not result in any utility or service system impacts beyond those analyzed in MEIR SCH No. 2012111015.

XX. WILDFIRE

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☒	☐
d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☒	☐

AFFECTED ENVIRONMENT

Although the City of Fresno is proximate to high and very high fire hazard designated areas, the City itself is largely categorized as little or no threat or moderate fire hazard, which is largely attributed to paved areas.[14] Some small areas along the San Joaquin River Bluff in the northern portion of the City of Fresno are prone to wildfire due to the relatively steep terrain and vegetation and are classified as having a high fire hazard. The City does have an adopted Emergency Operations Plan (EOP); however, the EOP does not designate evacuation routes, which may not be necessary since Fresno does not face any expected natural hazards from likely sources or locations.[15]

The proposed Project site's elevation is approximately 392 feet above sea level in an area of intense urban uses. The Project site is located on adjacent parcels south of East Copper Avenue in northern Fresno, California. The immediate vicinity is comprised of single-family tract homes to the west, vacant land to the north, a business park to the east and North Point High School to the south of the site. Agricultural areas exist nearby further to the east.

RESPONSES

a. Substantially impair an adopted emergency response plan or emergency evacuation plan?

b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

Less Than Significant Impact. The proposed Project is located in the center of a highly urbanized area (buildings, roads, etc.) which precludes the risk of wildfire. The area is flat in nature which would limit the risk of downslope flooding and landslides, and limit any wildfire spread.

---

[14] City of Fresno. General Plan and Development Code Update. Master Environmental Impact Report. Page 5.13-4. https://www.fresno.gov/darm/wp-content/uploads/sites/10/2016/11/Sec-05-13-Public-Services-Fresno-MEIR.pdf. Accessed June 2019.

[15] City of Fresno General Plan. December 2014. Page 9-36. https://www.fresno.gov/darm/wp-content/uploads/sites/10/2016/11/GP9NoiseandSafety.pdf. Accessed June 2019

To receive building permits, the proposed Project would be required to be in compliance with the adopted emergency response plan. As such, any wildfire risk to the Project structures or people would be ***less than significant.***

Mitigation Measures: None are required.

XXI. MANDATORY FINDINGS OF SIGNIFICANCE

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

RESPONSES

a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Less than Significant Impact With Mitigation. The analyses of environmental issues contained in this Initial Study indicate that the proposed Project is not expected to have substantial impact on the environment or on any resources identified in the Initial Study. Mitigation measures have been incorporated as described in each impact area to reduce all potentially significant impacts to ***less than significant***.

b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

Less than Significant Impact. CEQA Guidelines Section 15064(i) states that a Lead Agency shall consider whether the cumulative impact of a project is significant and whether the effects of the project are cumulatively considerable. The assessment of the significance of the cumulative effects of a project must, therefore, be conducted in connection with the effects of past projects, other current projects, and probable future projects. Due to the nature of the Project and consistency with environmental policies, incremental contributions to impacts are considered less than cumulatively considerable. All Project-related impacts were determined to be either less than significant, or less than significant after mitigation. The proposed Project would not contribute substantially to adverse cumulative conditions, or create any substantial indirect impacts (i.e., increase in population could lead to an increase need for housing, increase in traffic, air pollutants, etc.). Due to buildout of the area and existing land constraints, it is not anticipated that further substantial commercial or residential development will occur in the area. As such, Project impacts are not considered to be cumulatively considerable given the lack of proposed new development in the area and the insignificance of Project-induced impacts. The impact is therefore ***less than significant***.

c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Less than Significant Impact With Mitigation. The analyses of environmental issues contained in this Initial Study indicate that the Project is not expected to have substantial impact on human beings, either directly or indirectly. Mitigation measures have been incorporated as described in each specific impact area which will reduce all potentially significant impacts to ***less than significant.***

Chapter 4

MITIGATION MONITORING & REPORTING PROGRAM

Project Specific Mitigation Measure Monitoring Checklist

This Project Specific Mitigation Monitoring Checklist has been formulated based upon the findings of the Initial Study/Mitigated Negative Declaration (IS/MND) for VTTM #6249 – Residential Development. These Project Specific Mitigation Measures are in addition to the applicable mitigation measures from the City of Fresno MEIR.

Mitigation Measure	Party responsible for Implementing Mitigation	Timing	Party responsible for Monitoring	Verification (name/ date)
Aesthetics				
Mitigation Measure AES – 1: Lighting systems for street and parking areas shall include shields to direct light to the roadway surfaces and parking areas. Vertical shields on the light fixtures shall also be used to direct light away from adjacent light sensitive land uses such as residences.	Project Applicant	Prior to occupancy	City of Fresno	
Mitigation Measure AES – 2: Lighting systems for public facilities such as active play areas shall provide adequate illumination for the activity; however, low intensity light fixtures and shields shall be used to minimize spillover light onto adjacent properties.	Project Applicant	Prior to occupancy	City of Fresno	
Mitigation Measure AES – 3: Lighting systems for non-residential uses, not including public facilities, shall provide shields on the light fixtures and orient the lighting system away from adjacent properties. Low intensity light fixtures shall also be used if excessive spillover light onto adjacent properties will occur.	Project Applicant	Prior to occupancy	City of Fresno	
Mitigation Measure AES – 5: Materials used on building facades shall be non-reflective.	Project Applicant	Prior to occupancy	City of Fresno	
Biology				
Mitigation Measure BIO - 4: Proposed projects within the Planning Area should avoid, if possible, construction within the general nesting season of February through August for avian species protected under Fish and Game Code 3500 and the Migratory Bird Treaty Act (MTBA), if it is determined that suitable nesting habitat occurs on a project site. If	Project Applicant	Prior to ground disturbing activities	City of Fresno	

Mitigation Measure	Party responsible for Implementing Mitigation	Timing	Party responsible for Monitoring	Verification (name/ date)
construction cannot avoid the nesting season, a pre-construction clearance survey must be conducted to determine if any nesting birds or nesting activity is observed on or within 500-feet of a project site. If an active nest is observed during the survey, a biological monitor must be on site to ensure that no proposed project activities would impact the active nest. A suitable buffer will be established around the active nest until the nestlings have fledged and the nest is no longer active. Project activities may continue in the vicinity of the nest only at the discretion of the biological monitor. Any project-related information required by the Service or questions concerning the above conditions or their implementation may be directed in writing to the U.S. Fish and Wildlife Service at: Endangered Species Division 2800 Cottage Way, Suite W2605 Sacramento, California 95825-1846 (916) 414-66200 or (916) 414-6600				
Cultural Resources				
Mitigation Measure CUL - 1: If previously unknown resources are encountered before or during grading activities, construction shall stop in the immediate vicinity of the find and a qualified historical resources specialist shall be consulted to determine whether the resource requires further study. The qualified historical resources specialist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in	Project Applicant	Prior to ground disturbing activities	City of Fresno	

Mitigation Measure	Party responsible for Implementing Mitigation	Timing	Party responsible for Monitoring	Verification (name/ date)
accordance with Section 15064.5 of the CEQA Guidelines and the City's Historic Preservation Ordinance. If the resources are determined to be unique historical resources as defined under Section 15064.5 of the CEQA Guidelines, measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks or open space, or data recovery of the excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any historical artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.				
Mitigation Measure CUL – 2: Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for prehistoric archaeological resources shall be conducted. The following procedures shall be followed. If prehistoric resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that buried or prehistoric archaeological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified archaeologist shall be consulted to determine whether the resource requires further study. The qualified archaeologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines. If the resources are determined to be unique prehistoric archaeological	Project Applicant	Prior to ground disturbing activities	City of Fresno	

Mitigation Measure	Party responsible for Implementing Mitigation	Timing	Party responsible for Monitoring	Verification (name/ date)
resources as defined under Section 15064.5 of the CEQA Guidelines, mitigation measures shall be identified by the monitor and recommend to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks or open space, or data recovery of the excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any prehistoric archaeological artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study. If prehistoric resources are found during the field survey or literature review, the resources shall be inventoried using appropriate State record forms and submit the forms to the Southern San Joaquin Valley Information Center. The resources shall be evaluated for significance. If found to be significant, measures shall be identified by the qualified archaeologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance of capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the resources found during the field survey or literature review shall include an archaeological monitor. The monitoring period shall be determined by the qualified archaeologist. If additional prehistoric archaeological resources are found during excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed.				
Geology and Soils				

Mitigation Measure	Party responsible for Implementing Mitigation	Timing	Party responsible for Monitoring	Verification (name/ date)
Mitigation Measure GEO – 1: In order to reduce on-site erosion due to project construction and operation, an erosion control plan and Storm Water Pollution Prevention Plan (SWPPP) shall be prepared for the site preparation, construction, and post-construction periods by a registered civil engineer or certified professional. The erosion control plan shall incorporate best management practices consistent with the requirements of the National Pollution Discharge Elimination System (NPDES). The erosion component of the plan must at least meet the requirements of the SWPPP required by the California State Water Resources Control Board. If earth disturbing activities are proposed between October 15 and April 15, these activities shall be limited to the extent feasible to minimize potential erosion related impacts. Additional erosion control measures shall be implemented in consultation with the City of Fresno. Prior to the issuance of any permit, the project proponent shall submit detailed plans to the satisfaction of the City of Fresno. The components of the erosion control plan and SWPPP shall be monitored for effectiveness by City of Fresno. Erosion control measures may include, but not be limited to, the following: a. Limit disturbance of soils and vegetation disturbance removal to the minimum area necessary for access and construction; b. Confine all vehicular traffic associated with construction to the right-of-way of designated access roads; c. Adhere to construction schedules designed to avoid periods of heavy precipitation or high winds; d. Ensure that all exposed soil is provided with temporary drainage and soil protection when construction activity is shut down during the winter periods; and	Project Applicant	Prior to issuance of building permits	City of Fresno	

Mitigation Measure	Party responsible for Implementing Mitigation	Timing	Party responsible for Monitoring	Verification (name/ date)
e. Inform construction personnel prior to construction and periodically during construction activities of environmental concerns, pertinent laws and regulations, and elements of the proposed erosion control measures.				
Mitigation Measure GEO – 2: The project proponent shall retain a registered geotechnical engineer to prepare a design level geotechnical analysis prior to the issuance of any grading and/or building permit. The design-level analysis shall address site preparation measures and foundation design requirements of the project. The design-level analysis shall be prepared to the satisfaction of the City of Fresno. Final design-level project plans shall be designed in accordance with the approved geotechnical analysis. This shall include certification of engineered fills and subgrade preparation through monitoring of earthwork and compaction testing by a geotechnical engineer during construction.	Project Applicant	Prior to issuance of grading or building permit	City of Fresno	
Hydrology and Water Quality				
Mitigation Measure HYD – 1 The project proponent shall retain a qualified consultant to prepare a drainage / grading plan prior to the issuance of any grading and/or building permit. The design-level analysis shall be prepared to the satisfaction of the City of Fresno. The developer may either make improvements to the existing pipeline system to provide additional capacity or may use some type of	Project Applicant	Prior to issuance of building permits	City of Fresno	

Mitigation Measure	Party responsible for Implementing Mitigation	Timing	Party responsible for Monitoring	Verification (name/ date)
permanent peak reducing facility in order to eliminate adverse impacts on the existing storm drain system.				
Mitigation Measure HYD-2: The City shall continue to be an active participant in the Kings Water Authority and the implementation of the Kings Basin IRWMP.	Project Applicant	Prior to issuance of building permits	City of Fresno	
Public Services				
Mitigation Measure PUB-1: The Project Applicant shall pay development impact fees for police, fire and other public services as determined by the City of Fresno.	Project Applicant	Prior to issuance of building permits	City of Fresno	
Traffic				
Mitigation Measure TR-1: The project shall pay into applicable transportation fee programs. These include a Fresno Major Street Impact Fee (FMSI), a Traffic Signal Mitigation Impact Fee (TSMI) and a Regional Transportation Mitigation Fee (RTMF). The FMSI Fee will be calculated and assessed during the building permit process. The RTMF will be calculated and assessed by Fresno COG.	Project Applicant	Prior to issuance of building permits	City of Fresno	

MEIR Mitigation Measure Monitoring Checklist for VTTM #6249 – Residential Development

July 2019

INCORPORATING MEASURES FROM THE MASTER ENVIRONMENTAL IMPACT REPORT (MEIR) CERTIFIED FOR THE CITY OF FRESNO GENERAL PLAN UPDATE (SCH No. 2012111015)

This mitigation measure monitoring and reporting checklist was prepared pursuant to California Environmental Quality Act (CEQA) Guidelines Section 15097 and Section 21081.6 of the Public Resources Code (PRC). It was certified as part of the Fresno City Council's approval of the MEIR for the Fresno General Plan update (Fresno City Council Resolution 2014-225, adopted December 18, 2014).

Letter designations to the right of each MEIR mitigation measure listed in this Exhibit note how the mitigation measure relates to the environmental assessment of the above-listed project, according to the key found at right and at the bottoms of the following pages:

A - Incorporated into Project
B - Mitigated
C - Mitigation in Progress
D - Responsible Agency Contacted
E - Part of City-wide Program
F - Not Applicable

The timing of implementing each mitigation measure is identified in in the checklist, as well as identifies the entity responsible for verifying that the mitigation measures applied to a project are performed. Project applicants are responsible for providing evidence that mitigation measures are implemented. As lead agency, the City of Fresno is responsible for verifying that mitigation is performed/completed.

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Aesthetics:								
AES-1. Lighting systems for street and parking areas shall include shields to direct light to the roadway surfaces and parking areas. Vertical shields on the light fixtures shall also be used to direct light away from adjacent light sensitive land uses such as residences. **Verification comments:**	Prior to issuance of building permits	Public Works Department (PW) and Development & Resource Management Dept. (DARM)	X				X	

Aesthetics *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
AES-2: Lighting systems for public facilities such as active play areas shall provide adequate illumination for the activity; however, low intensity light fixtures and shields shall be used to minimize spillover light onto adjacent properties. **Verification comments:**	Prior to issuance of building permits	DARM	X					X
AES-3: Lighting systems for non-residential uses, not including public facilities, shall provide shields on the light fixtures and orient the lighting system away from adjacent properties. Low intensity light fixtures shall also be used if excessive spillover light onto adjacent properties will occur. **Verification comments:**	Prior to issuance of building permits	DARM	X					X
AES-4: Lighting systems for freestanding signs shall not exceed 100 foot Lamberts (FT-L) when adjacent to streets which have an average light intensity of less than 2.0 horizontal footcandles and shall not exceed 500 FT-L when adjacent to streets which have an average light intensity of 2.0 horizontal footcandles or greater. **Verification comments:**	Prior to issuance of building permits	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Aesthetics *(continued)*:

AES-5: Materials used on building facades shall be non-reflective. **Verification comments:**	Prior to development project approval	DARM	X					X

Air Quality:

AIR-1: Projects that include five or more heavy-duty truck deliveries per day with sensitive receptors located within 300 feet of the truck loading area shall provide a screening analysis to determine if the project has the potential to exceed criteria pollutant concentration based standards and thresholds for NO2 and PM2.5. If projects exceed screening criteria, refined dispersion modeling and health risk assessment shall be accomplished and if needed, mitigation measures to reduce impacts shall be included in the project to reduce the impacts to the extent feasible. Mitigation measures include but are not limited to: • Locate loading docks and truck access routes as far from sensitive receptors as reasonably possible considering site design limitations to comply with other City design standards. • Post signs requiring drivers to limit idling to 5 minutes or less. **Verification comments:**	Prior to development project approval	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Air Quality *(continued)*:

AIR-2: Projects that result in an increased cancer risk of 10 in a million or exceed criteria pollutant ambient air quality standards shall implement site-specific measures that reduce toxic air contaminant (TAC) exposure to reduce excess cancer risk to less than 10 in a million. Possible control measures include but are not limited to: • Locate loading docks and truck access routes as far from sensitive receptors as reasonably possible considering site design limitations to comply with other City design standards. • Post signs requiring drivers to limit idling to 5 minutes or less • Construct block walls to reduce the flow of emissions toward sensitive receptors • Install a vegetative barrier downwind from the TAC source that can absorb a portion of the diesel PM emissions • For projects proposing to locate a new building containing sensitive receptors near existing sources of TAC emissions, install HEPA filters in HVAC systems to reduce TAC emission levels exceeding risk thresholds. • Install heating and cooling services at truck stops to eliminate the need for idling during overnight stops to run onboard systems. *(continued on next page)*	Prior to development project approval	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Air Quality *(continued)***:**

AIR-2 *(continued from previous page)* • For large distribution centers where the owner controls the vehicle fleet, provide facilities to support alternative fueled trucks powered by fuels such as natural gas or bio-diesel • Utilize electric powered material handling equipment where feasible for the weight and volume of material to be moved. **Verification comments:**	*[see previous page]*	*[see previous page]*						
AIR-3: Require developers proposing projects on ARB's list of projects in its Air Quality and Land Use Handbook (Handbook) warranting special consideration to prepare a cumulative health risk assessment when sensitive receptors are located within the distance screening criteria of the facility as listed in the ARB Handbook. **Verification comments:**	Prior to development project approval	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Air Quality *(continued)***:**								
AIR-4: Require developers of projects containing sensitive receptors to provide a cumulative health risk assessment at project locations exceeding ARB Land Use Handbook distance screening criteria or newer criteria that may be developed by the San Joaquin Valley Air Pollution Control District (SJVAPCD). **Verification comments:**	Prior to development project approval	DARM						**X**
AIR-5: Require developers of projects with the potential to generate significant odor impacts as determined through review of SJVAPCD odor complaint history for similar facilities and consultation with the SJVAPCD to prepare an odor impact assessment and to implement odor control measures recommended by the SJVAPCD or the City to the extent needed to reduce the impact to less than significant. **Verification comments:**	Prior to development project approval	DARM						**X**

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources:

BIO-1: Construction of a proposed project should avoid, where possible, vegetation communities that provide suitable habitat for a special-status species known to occur within the Planning Area. If construction within potentially suitable habitat must occur, the presence/absence of any special-status plant or wildlife species must be determined prior to construction, to determine if the habitat supports any special-status species. If special-status species are determined to occupy any portion of a project site, avoidance and minimization measures shall be incorporated into the construction phase of a project to avoid direct or incidental take of a listed species to the greatest extent feasible. **Verification comments:**	Prior to development project approval	DARM					X	
BIO-2: Direct or incidental take of any state or federally listed species should be avoided to the greatest extent feasible. If construction of a proposed project will result in the direct or incidental take of a listed species, consultation with the resources agencies and/or additional permitting may be required. Agency consultation through the California Department of Fish and Wildlife (CDFW) 2081 and U.S. Fish and Wildlife Service (USFWS) Section 7 or Section 10 permitting processes must take place prior to any action that *(continued on next page)*	Prior to development project approval	DARM					X	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)*:

			A	B	C	D	E	F
BIO-2 *(continued from previous page)* may result in the direct or incidental take of a listed species. Specific mitigation measures for direct or incidental impacts to a listed species will be determined on a case-by-case basis through agency consultation. **Verification comments:**	*[see previous page]*	*[see previous page]*						
BIO-3: Development within the Planning Area should avoid, where possible, special-status natural communities and vegetation communities that provide suitable habitat for special-status species. If a proposed project will result in the loss of a special-status natural community or suitable habitat for special-status species, compensatory habitat-based mitigation is required under CEQA and the California Endangered Species Act (CESA). Mitigation will consist of preserving on-site habitat, restoring similar habitat or purchasing off-site credits from an approved mitigation bank. Compensatory mitigation will be determined through consultation with the City and/or resource agencies. An appropriate mitigation strategy and ratio will be agreed upon by the developer and lead agency to reduce project impacts to special-status natural communities to a less than significant *(continued on next page)*	Prior to development project approval	DARM					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Biological Resources *(continued)***:**								
BIO-3 *(continued from previous page)***:** level. Agreed-upon mitigation ratios will depend on the quality of the habitat and presence/absence of a special-status species. The specific mitigation for project level impacts will be determined on a case-by-case basis. **Verification comments:**	*[see previous page]*	*[see previous page]*						
BIO-4: Proposed projects within the Planning Area should avoid, if possible, construction within the general nesting season of February through August for avian species protected under Fish and Game Code 3500 and the Migratory Bird Treaty Act (MBTA), if it is determined that suitable nesting habitat occurs on a project site. If construction cannot avoid the nesting season, a pre-construction clearance survey must be conducted to determine if any nesting birds or nesting activity is observed on or within 500-feet of a project site. If an active nest is observed during the survey, a biological monitor must be on site to ensure that no proposed project activities would impact the active nest. A suitable buffer will be established around the active nest until the nestlings have fledged and the nest is no longer active. Project activities *(continued on next page)*	Prior to development project approval and during construction activities	DARM	X				X	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Biological Resources *(continued)*:								
BIO-4 *(continued from previous page)*: may continue in the vicinity of the nest only at the discretion of the biological monitor. **Verification comments:**	*[see previous page]*	*[see previous page]*						
BIO-5: If a proposed project will result in the removal or impact to any riparian habitat and/or a special-status natural community with potential to occur in the Planning Area, compensatory habitat-based mitigation shall be required to reduce project impacts. Compensatory mitigation must involve the preservation or restoration or the purchase of off-site mitigation credits for impacts to riparian habitat and/or a special-status natural community. Mitigation must be conducted in-kind or within an approved mitigation bank in the region. The specific mitigation ratio for habitat-based mitigation will be determined through consultation with the appropriate agency (*i.e.*, CDFW or USFWS) on a case-by-case basis. **Verification comments:**	Prior to development project approval	DARM						**X**

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
BIO-6: Project impacts that occur to riparian habitat may also result in significant impacts to streambeds or waterways protected under Section 1600 of Fish and Wildlife Code and Section 404 of the CWA. CDFW and/or USACE consultation, determination of mitigation strategy, and regulatory permitting to reduce impacts, as required for projects that remove riparian habitat and/or alter a streambed or waterway, shall be implemented. **Verification comments:**	Prior to development project approval	DARM						X
BIO-7: Project-related impacts to riparian habitat or a special-status natural community may result in direct or incidental impacts to special-status species associated with riparian or wetland habitats. Project impacts to special-status species associated with riparian habitat shall be mitigated through agency consultation, development of a mitigation strategy, and/or issuing incidental take permits for the specific special-status species, as determined by the CDFW and/or USFWS. **Verification comments:**	Prior to development project approval	DARM						X

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)*:

BIO-8: If a proposed project will result in the significant alteration or fill of a federally protected wetland, a formal wetland delineation conducted according to U.S. Army Corps of Engineers (USACE) accepted methodology is required for each project to determine the extent of wetlands on a project site. The delineation shall be used to determine if federal permitting and mitigation strategy are required to reduce project impacts. Acquisition of permits from USACE for the fill of wetlands and USACE approval of a wetland mitigation plan would ensure a "no net loss" of wetland habitat within the Planning Area. Appropriate wetland mitigation/creation shall be implemented in a ratio according to the size of the impacted wetland. **Verification comments:**	Prior to development project approval	DARM						X
BIO-9: In addition to regulatory agency permitting, Best Management Practices (BMPs) identified from a list provided by the USACE shall be incorporated into the design and construction phase of the project to ensure that no pollutants or siltation drain into a federally protected wetland. Project design features such as fencing, appropriate drainage and *(continued on next page)*	Prior to development project approval; but for long-term operational BMPs, prior to issuance of occupancy	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)***:**

BIO-9 *(continued from previous page)***:** incorporating detention basins shall assist in ensuring project-related impacts to wetland habitat are minimized to the greatest extent feasible. **Verification comments:**	*[see previous page]*	*[see previous page]*						

Cultural Resources:

CUL-1: If previously unknown resources are encountered before or during grading activities, construction shall stop in the immediate vicinity of the find and a qualified historical resources specialist shall be consulted to determine whether the resource requires further study. The qualified historical resources specialist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines and the City's Historic Preservation Ordinance. If the resources are determined to be unique historical resources as defined under Section 15064.5 of the CEQA Guidelines, measures shall be identified by the monitor and *(continued on next page)*	Prior to commencement of, and during, construction activities	DARM	**X**				**X**	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Cultural Resources *(continued)*:

CUL-1 *(continued from previous page)* recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these. Any historical artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-germ preservation to allow future scientific study. **Verification comments:**	*[see previous page]*	*[see previous page]*						
CUL-2: Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for prehistoric archaeological resources shall be conducted. The following procedures shall be followed. If prehistoric resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that buried prehistoric *(continued on next page)*	Prior to commencement of, and during, construction activities	DARM	X				X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Cultural Resources *(continued)***:**

CUL-2 *(continued from previous page)* archaeological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified archaeologist shall be consulted to determine whether the resource requires further study. The qualified archaeologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with CEQA Guidelines Section 15064.5. If the resources are determined to be unique prehistoric archaeological resources as defined under Section 15064.5 of the CEQA Guidelines, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any prehistoric archaeological artifacts recovered as a result of mitigation shall be provided *(continued on next page)*	*[see previous page]*	*[see previous page]*	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Cultural Resources *(continued)*:

CUL-2 *(further continued from previous two pages)* to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study. If prehistoric resources are found during the field survey or literature review, the resources shall be inventoried using appropriate State record forms and submit the forms to the Southern San Joaquin Valley Information Center. The resources shall be evaluated for significance. If the resources are found to be significant, measures shall be identified by the qualified archaeologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the resources found during the field survey or literature review shall include an archaeological monitor. The monitoring period shall be determined by the qualified archaeologist. If additional prehistoric archaeological resources are found during *(continued on next page)*	*[see Page 14]*	*[see Page 14]*						

Cultural Resources *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
CUL-2 *(further continued from previous three pages)* excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed. **Verification comments:**	*[see Page 14]*	*[see Page 14]*						
CUL-3: Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for unique paleontological/geological resources shall be conducted. The following procedures shall be followed: If unique paleontological/geological resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that unique paleontological/geological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified paleontologist shall be consulted to determine whether the resource requires further study. The qualified paleontologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered *(continued on next page)*	Prior to commencement of, and during, construction activities	DARM	X				X	

A - Incorporated into Project
B - Mitigated

C - Mitigation in Process
D - Responsible Agency Contacted

E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
CUL-3 *(continued from previous page)* resources, including but not limited to, excavation of the finds and evaluation of the finds. If the resources are determined to be significant, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any paleontological/geological resources recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study. If unique paleontological/geological resources are found during the field survey or literature review, the resources shall be inventoried and evaluated for significance. If the resources are found to be significant, mitigation measures shall be identified by the qualified paleontologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the *(continued on next page)*	*[see previous page]*	*[see previous page]*						

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Cultural Resources *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
CUL-3 *(further continued from previous two pages)* resources found during the field survey or literature review shall include a paleontological monitor. The monitoring period shall be determined by the qualified paleontologist. If additional paleontological/geological resources are found during excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed. **Verification comments:**	*[see Page 17]*	*[see Page 17]*						
CUL-4: In the event that human remains are unearthed during excavation and grading activities of any future development project, all activity shall cease immediately. Pursuant to Health and Safety Code (HSC) Section 7050.5, no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98(a). If the remains are determined to be of Native American descent, the coroner shall within 24 hours notify the Native American Heritage Commission (NAHC). The NAHC shall then contact the most *(continued on next page)*	Prior to commencement of, and during, construction activities	DARM	X				X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Cultural Resources *(continued)*:

CUL-4 *(continued from previous page)* likely descendent of the deceased Native American, who shall then serve as the consultant on how to proceed with the remains. Pursuant to PRC Section 5097.98(b), upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendants regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment. **Verification comments:**	*[see previous page]*	*[see previous page]*	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hazards and Hazardous Materials

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
HAZ-1: Re-designate the existing vacant land proposed for low density residential located northwest of the intersection of East Garland Avenue and North Dearing Avenue and located within Fresno Yosemite International Airport Zone 1-RPZ, to Open Space. **Verification comments:**	Prior to development approvals	DARM						X
HAZ-2: Limit the proposed low density residential (1 to 3 dwelling units per acre) located northwest of the airport, and located within Fresno Yosemite International Airport Zone 3-Inner Turning Area, to 2 dwelling units per acre or less. **Verification comments:**	Prior to development approvals	DARM						X
HAZ-3: Re-designate the current area within Fresno Yosemite International Airport Zone 5-Sideline located northeast of the airport to Public Facilities-Airport or Open Space. **Verification comments:**	Prior to development approvals	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hazards and Hazardous Materials *(continued)*:

HAZ-4: Re-designate the current vacant lots at the northeast corner of Kearney Boulevard and South Thorne Avenue to Public Facilities-Airport or Open Space. **Verification comments:**	Prior to development approvals	DARM						X
HAZ-5: Prohibit residential uses within Safety Zone 1 northwest of the Hawes Avenue and South Thorne Avenue intersection. **Verification comments:**	Prior to development approvals	DARM						X
HAZ-6: Establish an alternative Emergency Operations Center in the event the current Emergency Operations Center is under redevelopment or blocked. **Verification comments:**	Prior to redevelopment of the current Emergency Operations Center	Fresno Fire Department and Mayor/ City Manager's Office						X

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality

HYD-1: The City shall develop and implement water conservation measures to reduce the per capita water use to 215 gallons per capita per day. **Verification comments:**	Prior to water demand exceeding water supply	Department of Public Utilities (DPU)	X				X	
HYD-2: The City shall continue to be an active participant in the Kings Water Authority and the implementation of the Kings Basin IRWMP. **Verification comments:**	Ongoing	DPU	X				X	
HYD-5.1: The City and partnering agencies shall implement the following measures to reduce the impacts on the capacity of existing or planned storm drainage Master Plan collection systems to less than significant. • Implement the existing Storm Drainage Master Plan (SDMP) for collection systems in drainage areas where the amount of imperviousness is unaffected by the change in land uses. *(continued on next page)*	Prior to exceedance of capacity of existing stormwater drainage facilities	Fresno Metropolitan Flood Control District (FMFCD), DARM, and PW						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality *(continued)***:**

HYD-5.1 *(continued from previous page)* • Update the SDMP in those drainage areas where the amount of imperviousness increased due to the change in land uses to determine the changes in the collection systems that would need to occur to provide adequate capacity for the stormwater runoff from the increased imperviousness. • Implement the updated SDMP to provide stormwater collection systems that have sufficient capacity to convey the peak runoff rates from the areas of increased imperviousness. Require developments that increase site imperviousness to install, operate, and maintain FMFCD approved on-site detention systems to reduce the peak runoff rates resulting from the increased imperviousness to the peak runoff rates that will not exceed the capacity of the existing stormwater collection systems. **Verification comments:**	*[see previous page]*	*[see previous page]*						

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality *(continued)***:**

HYD-5.2: The City and partnering agencies shall implement the following measures to reduce the impacts on the capacity of existing or planned storm drainage Master Plan retention basins to less than significant: Consult the SDMP to analyze the impacts to existing and planned retention basins to determine remedial measures required to reduce the impact on retention basin capacity to less than significant. Remedial measures would include: • Increase the size of the retention basin through the purchase of more land or deepening the basin or a combination for planned retention basins. • Increase the size of the emergency relief pump capacity required to pump excess runoff volume out of the basin and into adjacent canal that convey the stormwater to a disposal facility for existing retention basins. • Require developments that increase runoff volume to install, operate, and maintain, Low Impact Development (LID) measures to reduce runoff volume to the runoff volume that will not exceed the capacity of the existing retention basins. **Verification comments:**	Prior to exceedance of capacity of existing retention basin facilities	FMFCD, DARM, and PW						X

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality *(continued)***:**

HYD-5.3: The City and partnering agencies shall implement the following measures to reduce the impacts on the capacity of existing or planned storm drainage Master Plan urban detention (stormwater quality) basins to less than significant. Consult the SDMP to determine the impacts to the urban detention basin weir overflow rates and determine remedial measures required to reduce the impact on the detention basin capacity to less than significant. Remedial measures would include: • Modify overflow weir to maintain the suspended solids removal rates adopted by the FMFCD Board of Directors. • Increase the size of the urban detention basin to increase residence time by purchasing more land. The existing detention basins are already at the adopted design depth. • Require developments that increase runoff volume to install, operate, and maintain, Low Impact Development (LID) measures to reduce peak runoff rates and runoff volume to the runoff rates and volumes that will not exceed the weir overflow rates of the existing urban detention basins. **Verification comments:**	Prior to exceedance of capacity of existing urban detention basin (stormwater quality) facilities	FMFCD, DARM, and PW						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Hydrology and Water Quality *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
HYD-5.4: The City shall implement the following measures to reduce the impacts on the capacity of existing or planned storm drainage Master Plan pump disposal systems to less than significant. • Consult the SDMP to determine the extent and degree to which the capacity of the existing pump system will be exceeded. • Require new developments to install, operate, and maintain FMFCD design standard on-site detention facilities to reduce peak stormwater runoff rates to existing planned peak runoff rates. • Provide additional pump system capacity to maximum allowed by existing permitting to increase the capacity to match or exceed the peak runoff rates determined by the SDMP. **Verification comments:**	Prior to exceedance of capacity of existing pump disposal systems	FMFCD, DARM, and PW						X

A - Incorporated into Project
B - Mitigated

C - Mitigation in Process
D - Responsible Agency Contacted

E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality *(continued)***:**

• **HYD-5.5:** The City shall work with FMFCD to develop and adopt an update to the SDMP for the Southeast Development Area that would be adequately designed to collect, convey and dispose of runoff at the rates and volumes which would be generated by the planned land uses in that area. **Verification comments:**	Prior to development approvals in the Southeast Development Area	FMFCD, DARM, and PW						X

Public Services:

PS-1: As future fire facilities are planned, the fire department shall evaluate if specific environmental effects would occur. Typical impacts from fire facilities include noise, traffic, and lighting. Typical mitigation to reduce these impacts includes: • *Noise:* Barriers and setbacks on the fire department sites. • *Traffic:* Traffic devices for circulation and a “keep clear zone” during emergency responses. • *Lighting:* Provision of hoods and deflectors on lighting fixtures on the fire department sites. **Verification comments:**	During the planning process for future fire department facilities	DARM	X				X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Public Services *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
PS-2: As future police facilities are planned, the police department shall evaluate if specific environmental effects would occur. Typical impacts from police facilities include noise, traffic, and lighting. Typical mitigation to reduce potential impacts from police department facilities includes: • *Noise:* Barriers and setbacks on the police department sites. • *Traffic:* Traffic devices for circulation. • *Lighting:* Provision of hoods and deflectors on lighting fixtures on the police department sites. **Verification comments:**	During the planning process for future Police Department facilities	DARM	X				X	
PS-3: As future public and private school facilities are planned, school districts shall evaluate if specific environmental effects would occur with regard to public schools, and DARM shall evaluate other school facilities. Typical impacts from school facilities include noise, traffic, and lighting. Typical mitigation to reduce potential impacts from school facilities includes: *(continued on next page)*	During the planning process for future school facilities	DARM, local school districts, and the Division of the State Architect	X				X	

Public Services *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
PS-3 *(continued from previous page)* • *Noise*: Barriers and setbacks placed on school sites. • *Traffic*: Traffic devices for circulation. • *Lighting*: Provision of hoods and deflectors on lighting fixtures for stadium lights. **Verification comments:**	*[see previous page]*	*[see previous page]*						
PS-4: As future parks and recreational facilities are planned, the City shall evaluate if specific environmental effects would occur. Typical impacts from school facilities include noise, traffic, and lighting. Typical mitigation to reduce potential impacts from park and recreational facilities includes: • *Noise*: Barriers and setbacks placed on school sites. • *Traffic*: Traffic devices for circulation. • *Lighting*: Provision of hoods and deflectors on lighting fixtures for outdoor play area/field lights. **Verification comments:**	During the planning process for future park and recreation facilities	DARM	X				X	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Public Services *(continued)***:**

PS-5: As future detention, court, library, and hospital facilities are planned, the appropriate agencies shall evaluate if specific environmental effects would occur. Typical impacts from court, library, and hospital facilities include noise, traffic, and lighting. Typical mitigation to reduce potential impacts includes: • *Noise:* Barriers and setbacks placed on school sites. • *Traffic:* Traffic devices for circulation. • *Lighting:* Provision of hoods and deflectors on outdoor lighting fixtures. **Verification comments:**	During the planning process for future detention, court, library, and hospital facilities	DARM, to the extent that agencies constructing these facilities are subject to City of Fresno regulation	X				X	

Utilities and Service Systems

USS-1: The City shall develop and implement a wastewater master plan update. **Verification comments:**	Prior to wastewater conveyance and treatment demand exceeding capacity	DPU						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)***:**

USS-2: Prior to exceeding existing wastewater treatment capacity, the City shall evaluate the wastewater system and shall not approve additional development that contributes wastewater to the wastewater treatment facility that could exceed capacity until additional capacity is provided. By approximately the year 2025, the City shall construct the following improvements: • Construct an approximately 70 MGD expansion of the Regional Wastewater Treatment and Reclamation Facility and obtain revised waste discharge permits as the generation of wastewater is increased. • Construct an approximately 0.49 MGD expansion of the North Facility and obtain revised waste discharge permits as the generation of wastewater is increased. **Verification comments:**	Prior to exceeding existing wastewater treatment capacity	DPU						**X**
USS-3: Prior to exceeding existing wastewater treatment capacity, the City shall evaluate the wastewater system and shall not approve additional development that contributes wastewater to the wastewater treatment facility that could exceed capacity until additional capacity is provided. After *(continued on next page)*	Prior to exceeding existing wastewater treatment capacity	DPU						**X**

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-3 *(continued from previous page)* approximately the year 2025, the City shall construct the following improvements: • Construct an approximately 24 MGD wastewater treatment facility within the Southeast Development Area and obtain revised waste discharge requirements as the generation of wastewater is increased. • Construct an approximately 9.6 MGD expansion of the Regional Wastewater Treatment and Reclamation Facility and obtain revised waste discharge permits as the generation of wastewater is increased. **Verification comments:**	*[see previous page]*	*[see previous page]*						
USS-4: A Traffic Control/Traffic Management Plan to address traffic impacts during construction of water and sewer facilities shall be prepared and implemented, subject to approval by the City (and Fresno County, when work is being done in unincorporated area roadways). The plan shall identify access and parking restrictions, pavement markings and signage, and hours of construction and for deliveries. It shall include haul routes, the notification plan, and coordination with emergency service providers and schools. **Verification comments:**	Prior to construction of water and sewer facilities	PW for work in the City; PW and Fresno County Public Works and Planning when unincorporated area roadways are involved						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Utilities and Service Systems *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-5: Prior to exceeding capacity within the existing wastewater collection system facilities, the City shall evaluate the wastewater collection system and shall not approve additional development that would generate additional wastewater and exceed the capacity of a facility until additional capacity is provided. By approximately the year 2025, the following capacity improvements shall be provided. • Orange Avenue Trunk Sewer: This facility shall be improved between Dakota and Jensen Avenues. Approximately 37,240 feet of new sewer main shall be installed and approximately 5,760 feet of existing sewer main shall be rehabilitated. The size of the new sewer main shall range from 27 inches to 42 inches in diameter. The associated project designations in the 2006 Wastewater Master Plan are RS03A, RL02, C01-REP, C02-REP, C03-REP, C04-REP, C05-REP, C06-REL and C07-REP. • Marks Avenue Trunk Sewer: This facility shall be improved between Clinton Avenue and Kearney Boulevard. Approximately 12,150 feet of new sewer main shall be installed. The size of the new sewer main shall range from 33 inches to 60 inches in diameter. The associated project designations in the 2006 Wastewater Master Plan are CM1-REP and CM2-REP. *(continued on next page)*	Prior to exceeding capacity within the existing wastewater collection system facilities	DPU						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

USS-5 *(continued from previous page)* • North Avenue Trunk Sewer: This facility shall be improved between Polk and Fruit Avenues and also between Orange and Maple Avenues. Approximately 25,700 feet of new sewer main shall be installed. The size of the new sewer main shall range from 48 inches to 66 inches in diameter. The associated project designations in the 2006 Wastewater Master Plan are CN1-REL1 and CN3-REL1. • Ashlan Avenue Trunk Sewer: This facility shall be improved between Hughes and West Avenues and also between Fruit and Blackstone Avenues. Approximately 9,260 feet of new sewer main shall be installed. The size of the new sewer main shall range from 24 inches to 36 inches in diameter. The associated project designations in the 2006 Wastewater Master Plan are CA1-REL and CA2-REP. **Verification comments:**	*[see previous page]*	*[see previous page]*						

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

USS-6: Prior to exceeding capacity within the existing 28 pipeline segments shown in Figures 1 and 2 in Appendix J-1, the City shall evaluate the wastewater collection system and shall not approve additional development that would generate additional wastewater and exceed the capacity of one of the 28 pipeline segments until additional capacity is provided. **Verification comments:**	Prior to exceeding capacity within the existing 28 pipeline segments shown in Figures 1 and 2 in Appendix J-1 of the MEIR	DPU						X
USS-7: Prior to exceeding existing water supply capacity, the City shall evaluate the water supply system and shall not approve additional development that demand additional water until additional capacity is provided. By approximately the year 2025, the following capacity improvements shall be provided. • Construct an approximately 80 million gallon per day (MGD) surface water treatment facility near the intersection of Armstrong and Olive Avenues, in accordance with Chapter 9 and Figure 9-1 of the City of Fresno Metropolitan Water Resources Management Plan Update (2014 Metro Plan Update) Phase 2 Report, dated January 2012. *(continued on next page)*	Prior to exceeding existing water supply capacity	DPU						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

USS-7 *(continued from previous page)* • Construct an approximately 30 MGD expansion of the existing northeast surface water treatment facility for a total capacity of 60 MGD, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct an approximately 20 MGD surface water treatment facility in the southwest portion of the City, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. **Verification comments:**	*[see previous page]*	*[see previous page]*						
USS-8: Prior to exceeding capacity within the existing water conveyance facilities, the City shall evaluate the water conveyance system and shall not approve additional development that would demand additional water and exceed the capacity of a facility until additional capacity is provided. The following capacity improvements shall be provided by approximately 2025. • Construct 65 new groundwater wells, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. *(continued on next page)*	Prior to exceeding capacity within the existing water conveyance facilities	DPU						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Utilities and Service Systems *(continued)*:								
USS-8 *(continued from previous page)* • Construct a 2.0 million gallon potable water reservoir (Reservoir T2) near the intersection of Clovis and California Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct a 3.0 million gallon potable water reservoir (Reservoir T3) near the intersection of Temperance and Dakota Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct a 3.0 million gallon potable water reservoir (Reservoir T4) in the Downtown Planning Area, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct a 4.0 million gallon potable water reservoir (Reservoir T5) near the intersection of Ashlan and Chestnut Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct a 4.0 million gallon potable water reservoir (Reservoir T6) near the intersection of Ashlan Avenue and Highway 99, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. *(continued on next page)*	*[see previous page]*	*[see previous page]*						

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)***:**

USS-8 *(continued from previous two pages)* • Construct 50.3 miles of regional water transmission mains ranging in size from 24-inch to 48-inch diameter, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct 95.9 miles of 16-inch diameter transmission grid mains, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. **Verification comments:**	*[see Page 37]*	*[see Page 37]*						
USS-9: Prior to exceeding capacity within the existing water conveyance facilities, the City shall evaluate the water conveyance system and shall not approve additional development that would demand additional water and exceed the capacity of a facility until additional capacity is provided. The following capacity improvements shall be provided after approximately the year 2025 and additional water conveyance facilities shall be provided prior to exceedance of capacity within the water conveyance facilities to accommodate full buildout of the General Plan Update. *(continued on next page)*	Prior to exceeding capacity within the existing water conveyance facilities	DPU						**X**

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Utilities and Service Systems *(continued)*:								
USS-9 *(continued from previous page)* • Construct a 4.0 million gallon potable water reservoir (SEDA Reservoir 1) within the northern part of the Southeast Development Area. • Construct a 4.0 million gallon potable water reservoir (SEDA Reservoir 2) within the southern part of the Southeast Development Area. Additional water conveyance facilities shall be provided prior to exceedance of capacity within the water conveyance facilities to accommodate full buildout of the General Plan Update. **Verification comments:**	*[see previous page]*	*[see previous page]*						
Utilities and Service Systems - *Hydrology and Water Quality*								
USS-10: In order to maintain Fresno Irrigation District canal operability, FMFCD shall maintain operational intermittent flows during the dry season, within defined channel capacity and downstream capture capabilities, for recharge. **Verification comments:**	During the dry season	Fresno Irrigation District (FID)						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources:*

USS-11: When FMFCD proposes to provide drainage service outside of urbanized areas: (a) FMFCD shall conduct preliminary investigations on undeveloped lands outside of highly urbanized areas. These investigations shall examine wetland hydrology, vegetation and soil types. These preliminary investigations shall be the basis for making a determination on whether or not more in-depth wetland studies shall be necessary. If the proposed project site does not exhibit wetland hydrology, support a prevalence of wetland vegetation and wetland soil types then no further action is required. (b) Where proposed activities could have an impact on areas verified by the Corps as jurisdictional wetlands or waters of the U.S. (urban and rural streams, seasonal wetlands, and vernal pools), FMFCD shall obtain the necessary Clean Water Act, Section 404 permits for activities where fill material shall be placed in a wetland, obstruct the flow or circulation of waters of the United States, impair or reduce the reach of such waters. As part of FMFCD's Memorandum of Understanding with CDFG, Section 404 and 401 permits would be obtained from the U.S. Army Corps of Engineers and from the *(continued on next page)*	Prior to development approvals outside of highly urbanized areas	California Regional Water Quality Control Board (RWQCB), and USACE						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Utilities and Service Systems - *Biological Resources* *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-11 *(continued from previous page)* Regional Water Quality Control Board for any activity involving filling of jurisdictional waters). At a minimum, to meet "no net loss policy," the permits shall require replacement of wetland habitat at a 1:1 ratio. (c) Where proposed activities could have an impact on areas verified by the Corps as jurisdictional wetlands or waters of the U.S. (urban and rural streams, seasonal wetlands, and vernal pools), FMFCD shall submit and implement a wetland mitigation plan based on the wetland acreage verified by the U.S. Army Corps of Engineers. The wetland mitigation plan shall be prepared by a qualified biologist or wetland scientist experienced in wetland creation, and shall include the following or equally effective elements: i. Specific location, size, and existing hydrology and soils within the wetland creation area. ii. Wetland mitigation techniques, seed source, planting specifications, and required buffer setbacks. In addition, the mitigation plan shall ensure adequate water supply is provided to the created wetlands in order to maintain the proper *(continued on next page)*	*[see previous page]*	*[see previous page]*						

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)**:***

USS-11 *(continued from previous two pages)* hydrologic regimes required by the different types of wetlands created. Provisions to ensure the wetland water supply is maintained in perpetuity shall be included in the plan. iii. A monitoring program for restored, enhanced, created, and preserved wetlands on the project site. A monitoring program is required to meet three objectives; 1) establish a wetland creation success criteria to be met; 2) to specify monitoring methodology; 3) to identify as far as is possible, specific remedial actions that will be required in order to achieve the success criteria; and 4) to document the degree of success achieved in establishing wetland vegetation. (d) A monitoring plan shall be developed and implemented by a qualified biologist to monitor results of any on-site wetland restoration and creation for five years. The monitoring plan shall include specific success criteria, frequency and timing of monitoring, and assessment of whether or not maintenance activities are being carried out and how these shall be adjusted if necessary. *(continued on next page)*	*[see Page 41]*	*[see Page 41]*	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)**:***

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-11 *(continued from previous three pages)* If monitoring reveals that success criteria are not being met, remedial habitat creation or restoration should be designed and implemented by a qualified biologist and subject to five years of monitoring as described above. Or (e) In lieu of developing a mitigation plan that outlines the avoidance, purchase, or creation of wetlands, FMFCD could purchase mitigation credits through a Corps approved Mitigation Bank. **Verification comments:**	*[see Page 41]*	*[see Page 41]*						
USS-12: When FMFCD proposes to provide drainage service outside in areas that support seasonal wetlands or vernal pools: (a) During facility design and prior to initiation of ground disturbing activities in areas that support seasonal wetlands or vernal pools, FMFCD shall conduct a preliminary rare plant assessment. The assessment will determine the likelihood on whether or not the project site could support rare plants. If it is determined that the project site would not support rare plants, then no further *(continued on next page)*	During facility design and prior to initiation of ground disturbing activities in areas that support seasonal wetlands or vernal pools	California Department of Fish & Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS)						**X**

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Utilities and Service Systems - *Biological Resources* *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-12 *(continued from previous page)* action is required. However, if the project site has the potential to support rare plants; then a rare plant survey shall be conducted. Rare plant surveys shall be conducted by qualified biologists in accordance with the most current CDFG/USFWS guidelines or protocols and shall be conducted at the time of year when the plants in question are identifiable. (b) Based on the results of the survey, prior to design approval, FMFCD shall coordinate with CDFG and/or implement a Section 7 consultation with USFWS, shall determine whether the project facility would result in a significant impact to any special status plant species. Evaluation of project impacts shall consider the following: • The status of the species in question (*e.g.*, officially listed by the State or Federal Endangered Species Acts). • The relative density and distribution of the on-site occurrence versus typical occurrences of the species in question. *(continued on next page)*	*[see previous page]*	*[see previous page]*						

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-12 *(continued from previous two pages)* • The habitat quality of the on-site occurrence relative to historic, current or potential distribution of the population. (c) Prior to design approval, and in consultation with the CDFG and/or the USFWS, FMFCD shall prepare and implement a mitigation plan, in accordance with any applicable State and/or federal statutes or laws, that reduces impacts to a less than significant level. **Verification comments:**	*[see Page 44]*	*[see Page 44]*						
USS-13: When FMFCD proposes to provide drainage service outside in areas that support seasonal wetlands or vernal pools: (a) During facility design and prior to initiation of ground disturbing activities in areas that support seasonal wetlands or vernal pools, FMFCD shall conduct a preliminary survey to determine the presence of listed vernal pool crustaceans. *(continued on next page)*	During facility design and prior to initiation of ground disturbing activities in areas that support seasonal wetlands or vernal pools	CDFW and USFWS						X

A - Incorporated into Project
B - Mitigated

C - Mitigation in Process
D - Responsible Agency Contacted

E - Part of City-Wide Program
F - Not Applicable

Utilities and Service Systems - *Biological Resources* *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-13 *(continued from previous page)* (b) If potential habitat (vernal pools, seasonally inundated areas) or fairy shrimp exist within areas proposed to be disturbed, FMFCD shall complete the first and second phase of fairy shrimp presence or absence surveys. If an absence finding is determined and accepted by the USFWS, then no further mitigation shall be required for fairy shrimp. (c) If fairy shrimp are found to be present within vernal pools or other areas of inundation to be impacted by the implementation of storm drainage facilities, FMFCD shall mitigate impacts on fairy shrimp habitat in accordance with the USFWS requirements of the Programmatic Biological Opinion. This shall include on-site or off-site creation and/or preservation of fairy shrimp habitat at ratios ranging from 3:1 to 5:1 depending on the habitat impacted and the choice of on-site or off-site mitigation. Or mitigation shall be the purchase of mitigation credit through an accredited mitigation bank. **Verification comments:**	*[see previous page]*	*[see previous page]*						

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-14: When FMFCD proposes to construct drainage facilities in an area where elderberry bushes may occur: (a) During facility design and prior to initiation of construction activities, FMFCD shall conduct a project-specific survey for all potential Valley Elderberry Longhorn Beetle (VELB) habitats (elderberry shrubs), including a stem count and an assessment of historic or current VELB habitat. (b) FMFCD shall avoid and protect all potential identified VELB habitat where feasible. (c) Where avoidance is infeasible, develop and implement a VELB mitigation plan in accordance with the most current USFWS mitigation guidelines for unavoidable take of VELB habitat pursuant to either Section 7 or Section 10(a) of the Federal Endangered Species Act. The mitigation plan shall include, but might not be limited to, relocation of elderberry shrubs, planting of elderberry shrubs, and monitoring of relocated and planted elderberry shrubs. **Verification comments:**	During facility design and prior to initiation of construction activities	CDFW and USFWS						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)*:

USS-15: Prior to ground disturbing activities during nesting season (March through July) for a project that supports bird nesting habitat, FMFCD shall conduct a survey of trees. If nests are found during the survey, a qualified biologist shall assess the nesting activity on the project site. If active nests are located, no construction activities shall be allowed within 250 feet of the nest until the young have fledged. If construction activities are planned during the no n-breeding period (August through February), a nest survey is not necessary. **Verification comments:**	Prior to ground disturbing activities during nesting season (March through July) for a project that supports bird nesting habitat	CDFW and USFWS						X
USS-16: When FMFCD proposes to construct drainage facilities in an area that supports bird nesting habitat: (a) FMFCD shall conduct a pre-construction breeding-season survey (approximately February 1 through August 31) of proposed project sites in suitable habitat (levee and canal berms, open grasslands with suitable burrows) during the same calendar year that construction is planned to begin. If phased construction procedures are planned for the proposed project, the results of the above survey shall be valid only for the season when it is conducted. *(continued on next page)*	Prior to ground disturbing activities during nesting season (March through July) for a project that supports bird nesting habitat	CDFW and USFWS						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)*:

USS-16 *(continued from previous page)* (b) During the construction stage, FMFCD shall avoid all burrowing owl nest sites potentially disturbed by project construction during the breeding season while the nest is occupied with adults and/or young. The occupied nest site shall be monitored by a qualified biologist to determine when the nest is no longer used. Avoidance shall include the establishment of a 160-foot diameter non-disturbance buffer zone around the nest site. Disturbance of any nest sites shall only occur outside of the breeding season and when the nests are unoccupied based on monitoring by a qualified biologist. The buffer zone shall be delineated by highly visible temporary construction fencing. Based on approval by CDFG, pre-construction and pre-breeding season exclusion measures may be implemented to preclude burrowing owl occupation of the project site prior to project-related disturbance. Burrowing owls can be passively excluded from potential nest sites in the construction area, either by closing the burrows or placing one-way doors in the burrows according to current CDFG protocol. Burrows shall be examined not more than 30 days before construction to ensure that no owls have recolonized the area of construction. *(continued on next page)*	*[see previous page]*	*[see previous page]*						

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Utilities and Service Systems - *Biological Resources* *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-16 *(continued from previous two pages)* For each burrow destroyed, a new burrow shall be created (by installing artificial burrows at a ratio of 2:1 on protected lands nearby. **Verification comments:**	*[see Page 49]*	*[see Page 49]*						
USS-17: When FMFCD proposes to construct drainage facilities in the San Joaquin River corridor: (a) FMFCD shall not conduct instream activities in the San Joaquin River between October 15 and April 15. If this is not feasible, FMFCD shall consult with the National Marine Fisheries Service and CDFW on the appropriate measures to be implemented in order to protect listed salmonids in the San Joaquin River. (b) Riparian vegetation shading the main–channel that is removed or damaged shall be replaced at a ratio and quantity sufficient to maintain the existing shading of the channel. The location of replacement trees on or within *(continued on next page)*	During instream activities conducted between October 15 and April 15	National Marine Fisheries Service (NMFS), CDFW, and Central Valley Flood Protection Board (CVFPB)						X

A - Incorporated into Project
B - Mitigated

C - Mitigation in Process
D - Responsible Agency Contacted

E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems / *Biological Resources* *(continued)*:

USS-17 *(continued from previous page)* FMFCD berms, detention ponds or river channels shall be approved by FMFCD and the Central Valley Flood Protection Board. **Verification comments:**	*[see previous page]*	*[see previous page]*						

Utilities and Service Systems – *Recreation / Trails*:

USS-18: When FMFCD updates its District Service Plan: Prior to final design approval of all elements of the District Services Plan, FMFCD shall consult with Fresno County, City of Fresno, and City of Clovis to determine if any element would temporarily disrupt or permanently displace adopted existing or planned trails and associated recreational facilities as a result of the proposed District Services Plan. If the proposed project would not temporarily disrupt or permanently displace adopted existing or planned trails, no further mitigation is necessary. If the proposed project would have an effect on the trails and associated facilities, FMFCD shall implement the following: *(continued on next page)*	Prior to final design approval of all elements of the District Services Plan	DARM, PW, City of Clovis, and County of Fresno						X

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Utilities and Service Systems – *Recreation / Trails* *(continued)*:								
USS-18 *(continued from previous page)* (a) If short-term disruption of adopted existing or planned trails and associated recreational facilities occur, FMFCD shall consult and coordinate with Fresno County, City of Fresno, and City of Clovis to temporarily re-route the trails and associated facilities. (b) If permanent displacement of the adopted existing or planned trails and associated recreational facilities occur, the appropriate design modifications to prevent permanent displacement shall be implemented in the final project design or FMFCD shall replace these facilities. **Verification comments:**	*[see previous page]*	*[see previous page]*						
Utilities and Service Systems – *Air Quality*:								
USS-19: When District drainage facilities are constructed, FMFCD shall: (a) Minimize idling time of construction equipment vehicles to no more than ten minutes, or require that engines be shut off when not in use. *(continued on next page)*	During storm water drainage facility construction activities	Fresno Metropolitan Flood Control District and SJVAPCD						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems – *Air Quality* *(continued)***:**

USS-19 *(continued from previous page)* (b) Construction shall be curtailed as much as possible when the Air Quality Index (AQI) is above 150. AQI forecasts can be found on the SJVAPCD web site. (c) Off-road trucks should be equipped with on-road engines if possible. (d) Construction equipment should have engines that meet the current off-road engine emission standard (as certified by CARB), or be re-powered with an engine that meets this standard. **Verification comments:**	*[see previous page]*	*[see previous page]*						

Utilities and Service Systems – *Adequacy of Storm Water Drainage Facilities*:

USS-20: Prior to exceeding capacity within the existing storm water drainage facilities, the City shall coordinate with FMFCD to evaluate the storm water drainage system and shall not approve additional development that would convey additional storm water to a facility that would experience an exceedance of capacity until the necessary additional capacity is provided. **Verification comments:**	Prior to exceeding capacity within the existing storm water drainage facilities	FMFCD, PW, and DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Utilities and Service Systems – *Adequacy of Water Supply Capacity*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-21: Prior to exceeding existing water supply capacity, the City shall evaluate the water supply system and shall not approve additional development that demand additional water until additional capacity is provided. By approximately the year 2025, the City shall construct an approximately 25,000 AF/year tertiary recycled water expansion to the Fresno-Clovis Regional Wastewater Reclamation Facility in accordance with the 2013 Recycled Water Master Plan and the 2014 City of Fresno Metropolitan Water Resources Management Plan update. Implementation of Mitigation Measure USS-5 is also required prior to approximately the year 2025. **Verification comments:**	Prior to exceeding existing water supply capacity	DPU and DARM						X

Utilities and Service Systems – *Adequacy of Landfill Capacity*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-22: Prior to exceeding landfill capacity, the City shall evaluate additional landfill locations and shall not approve additional development that could contribute solid waste to a landfill that is at capacity until additional capacity is provided. **Verification comments:**	Prior to exceeding landfill capacity	DPU and DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Chapter 5

PREPARERS

LIST OF PREPARERS AND CONSULTATIONS

List of Preparers

Crawford & Bowen Planning, Inc.

- Travis Crawford, AICP, Principal Environmental Planner
- Emily Bowen, LEED AP, Principal Environmental Planner

Persons and Agencies Consulted

City of Fresno

- Bonique Emerson, Planning Manager

Appendices

Appendix A

CalEEMod Output Files

Tract 6249 - Single Family Residential

San Joaquin Valley Unified APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	239.00	Dwelling Unit	24.00	430,200.00	758

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2020
Utility Company					
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Proposed Project includes 239 single family residential units over 24 acres of land.

Energy Mitigation - Project Includes installation of energy-efficient appliances (e.g. dishwashers and fans). Includes 28% improvement in energy efficiency with compliance with current building standards. Also includes on-site renewable energy per 2019 CalGreen code.

Construction Off-road Equipment Mitigation -

Water Mitigation -

Waste Mitigation -

Vehicle Trips - Trip lengths have been updated.

Area Mitigation -

Mobile Land Use Mitigation -

Table Name	Column Name	Default Value	New Value
tblLandUse	LotAcreage	77.60	24.00
tblVehicleTrips	HO_TL	7.50	5.00
tblVehicleTrips	HS_TL	7.30	5.00
tblVehicleTrips	HW_TL	10.80	7.00
tblWoodstoves	NumberCatalytic	24.00	0.00
tblWoodstoves	NumberNoncatalytic	24.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.2060	2.0879			0.2658	0.1007	0.3665	0.1190	0.0934	0.2124	0.0000	234.8760	234.8760			236.3852
2020	0.3388	2.9603			0.1127	0.1493	0.2619	0.0305	0.1404	0.1708	0.0000	476.2599	476.2599			478.3499
2021	4.1280	0.8019			0.0301	0.0388	0.0689	8.1200e-003	0.0364	0.0445	0.0000	140.2457	140.2457			140.9156
Maximum	**4.1280**	**2.9603**			**0.2658**	**0.1493**	**0.3665**	**0.1190**	**0.1404**	**0.2124**	**0.0000**	**476.2599**	**476.2599**			**478.3499**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.2060	2.0879			0.2658	0.1007	0.3665	0.1190	0.0934	0.2124	0.0000	234.8758	234.8758			236.3850
2020	0.3388	2.9603			0.1127	0.1493	0.2619	0.0305	0.1404	0.1708	0.0000	476.2595	476.2595			478.3495
2021	4.1280	0.8019			0.0301	0.0388	0.0689	8.1200e-003	0.0364	0.0445	0.0000	140.2456	140.2456			140.9155
Maximum	**4.1280**	**2.9603**			**0.2658**	**0.1493**	**0.3665**	**0.1190**	**0.1404**	**0.2124**	**0.0000**	**476.2595**	**476.2595**			**478.3495**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**8-1-2019**	**10-31-2019**	1.6944	1.6944
2	**11-1-2019**	**1-31-2020**	0.8843	0.8843
3	**2-1-2020**	**4-30-2020**	0.8103	0.8103
4	**5-1-2020**	**7-31-2020**	0.8269	0.8269
5	**8-1-2020**	**10-31-2020**	0.8276	0.8276
6	**11-1-2020**	**1-31-2021**	0.8029	0.8029
7	**2-1-2021**	**4-30-2021**	0.9145	0.9145
8	**5-1-2021**	**7-31-2021**	3.7667	3.7667
		Highest	3.7667	3.7667

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.1486	0.1100				0.0170	0.0170		0.0170	0.0170	0.0000	106.4354	106.4354			107.1213
Energy	0.0337	0.2879				0.0233	0.0233		0.0233	0.0233	0.0000	333.4551	333.4551			335.4366
Mobile	0.8000	8.2328			1.6459	0.0332	1.6792	0.4428	0.0315	0.4743	0.0000	2,807.3573	2,807.3573			2,813.2797
Waste						0.0000	0.0000		0.0000	0.0000	57.8930	0.0000	57.8930			143.4275
Water						0.0000	0.0000		0.0000	0.0000	4.9402	0.0000	4.9402			21.1958
Total	**2.9823**	**8.6307**			**1.6459**	**0.0735**	**1.7195**	**0.4428**	**0.0718**	**0.5146**	**62.8332**	**3,247.2478**	**3,310.0810**			**3,420.4609**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.1486	0.1100				0.0170	0.0170		0.0170	0.0170	0.0000	106.4354	106.4354			107.1213
Energy	0.0256	0.2188				0.0177	0.0177		0.0177	0.0177	0.0000	253.3829	253.3829			254.8886
Mobile	0.7872	8.0740			1.5636	0.0318	1.5955	0.4207	0.0301	0.4508	0.0000	2,696.6129	2,696.6129			2,702.4620
Waste						0.0000	0.0000		0.0000	0.0000	22.5783	0.0000	22.5783			55.9367
Water						0.0000	0.0000		0.0000	0.0000	3.9522	0.0000	3.9522			16.9566
Total	**2.9614**	**8.4028**			**1.5636**	**0.0665**	**1.6302**	**0.4207**	**0.0648**	**0.4855**	**26.5305**	**3,056.4311**	**3,082.9616**			**3,137.3652**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.70**	**2.64**	**0.00**	**0.00**	**5.00**	**9.52**	**5.19**	**5.00**	**9.66**	**5.65**	**57.78**	**5.88**	**6.86**	**0.00**	**0.00**	**8.28**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/1/2019	8/28/2019	5	20	
2	Site Preparation	Site Preparation	8/29/2019	9/11/2019	5	10	
3	Grading	Grading	9/12/2019	10/30/2019	5	35	
4	Building Construction	Building Construction	10/31/2019	3/31/2021	5	370	
5	Paving	Paving	4/1/2021	4/28/2021	5	20	
6	Architectural Coating	Architectural Coating	4/29/2021	5/26/2021	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 87.5

Acres of Paving: 0

Residential Indoor: 871,155; Residential Outdoor: 290,385; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	2	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	86.00	26.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	17.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0351	0.3578				0.0180	0.0180		0.0167	0.0167	0.0000	34.6263	34.6263			34.8672
Total	**0.0351**	**0.3578**				**0.0180**	**0.0180**		**0.0167**	**0.0167**	**0.0000**	**34.6263**	**34.6263**			**34.8672**

3.2 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	7.0000e-004	4.9000e-004			1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.1113	1.1113			1.1122
Total	**7.0000e-004**	**4.9000e-004**			**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.1113**	**1.1113**			**1.1122**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0351	0.3578				0.0180	0.0180		0.0167	0.0167	0.0000	34.6263	34.6263			34.8671
Total	**0.0351**	**0.3578**				**0.0180**	**0.0180**		**0.0167**	**0.0167**	**0.0000**	**34.6263**	**34.6263**			**34.8671**

3.2 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	7.0000e-004	4.9000e-004			1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.1113	1.1113			1.1122
Total	**7.0000e-004**	**4.9000e-004**			**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.1113**	**1.1113**			**1.1122**

3.3 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000			0.0000
Off-Road	0.0217	0.2279				0.0120	0.0120		0.0110	0.0110	0.0000	17.0843	17.0843			17.2195
Total	**0.0217**	**0.2279**			**0.0903**	**0.0120**	**0.1023**	**0.0497**	**0.0110**	**0.0607**	**0.0000**	**17.0843**	**17.0843**			**17.2195**

3.3 Site Preparation - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	4.2000e-004	2.9000e-004			7.2000e-004	1.0000e-005	7.2000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6668	0.6668			0.6673
Total	**4.2000e-004**	**2.9000e-004**			**7.2000e-004**	**1.0000e-005**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6668**	**0.6668**			**0.6673**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000			0.0000
Off-Road	0.0217	0.2279				0.0120	0.0120		0.0110	0.0110	0.0000	17.0843	17.0843			17.2195
Total	**0.0217**	**0.2279**			**0.0903**	**0.0120**	**0.1023**	**0.0497**	**0.0110**	**0.0607**	**0.0000**	**17.0843**	**17.0843**			**17.2195**

3.3 Site Preparation - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	4.2000e-004	2.9000e-004			7.2000e-004	1.0000e-005	7.2000e-004	1.9000e-004	0.0000	2.0000e-004	0.0000	0.6668	0.6668			0.6673
Total	**4.2000e-004**	**2.9000e-004**			**7.2000e-004**	**1.0000e-005**	**7.2000e-004**	**1.9000e-004**	**0.0000**	**2.0000e-004**	**0.0000**	**0.6668**	**0.6668**			**0.6673**

3.4 Grading - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1518	0.0000	0.1518	0.0629	0.0000	0.0629	0.0000	0.0000	0.0000			0.0000
Off-Road	0.0829	0.9541				0.0417	0.0417		0.0384	0.0384	0.0000	97.4773	97.4773			98.2483
Total	**0.0829**	**0.9541**			**0.1518**	**0.0417**	**0.1935**	**0.0629**	**0.0384**	**0.1013**	**0.0000**	**97.4773**	**97.4773**			**98.2483**

3.4 Grading - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	1.6300e-003	1.1400e-003			2.8000e-003	2.0000e-005	2.8200e-003	7.4000e-004	2.0000e-005	7.6000e-004	0.0000	2.5930	2.5930			2.5951
Total	**1.6300e-003**	**1.1400e-003**			**2.8000e-003**	**2.0000e-005**	**2.8200e-003**	**7.4000e-004**	**2.0000e-005**	**7.6000e-004**	**0.0000**	**2.5930**	**2.5930**			**2.5951**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1518	0.0000	0.1518	0.0629	0.0000	0.0629	0.0000	0.0000	0.0000			0.0000
Off-Road	0.0829	0.9541				0.0417	0.0417		0.0384	0.0384	0.0000	97.4772	97.4772			98.2482
Total	**0.0829**	**0.9541**			**0.1518**	**0.0417**	**0.1935**	**0.0629**	**0.0384**	**0.1013**	**0.0000**	**97.4772**	**97.4772**			**98.2482**

3.4 Grading - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	1.6300e-003	1.1400e-003			2.8000e-003	2.0000e-005	2.8200e-003	7.4000e-004	2.0000e-005	7.6000e-004	0.0000	2.5930	2.5930			2.5951
Total	**1.6300e-003**	**1.1400e-003**			**2.8000e-003**	**2.0000e-005**	**2.8200e-003**	**7.4000e-004**	**2.0000e-005**	**7.6000e-004**	**0.0000**	**2.5930**	**2.5930**			**2.5951**

3.5 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0520	0.4637				0.0284	0.0284		0.0267	0.0267	0.0000	51.7229	51.7229			52.0379
Total	**0.0520**	**0.4637**				**0.0284**	**0.0284**		**0.0267**	**0.0267**	**0.0000**	**51.7229**	**51.7229**			**52.0379**

3.5 Building Construction - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	2.7900e-003	0.0763			3.7900e-003	5.8000e-004	4.3700e-003	1.1000e-003	5.5000e-004	1.6500e-003	0.0000	15.5770	15.5770			15.6095
Worker	8.8000e-003	6.1800e-003			0.0151	1.1000e-004	0.0152	4.0200e-003	1.0000e-004	4.1200e-003	0.0000	14.0171	14.0171			14.0283
Total	**0.0116**	**0.0825**			**0.0189**	**6.9000e-004**	**0.0196**	**5.1200e-003**	**6.5000e-004**	**5.7700e-003**	**0.0000**	**29.5941**	**29.5941**			**29.6378**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0520	0.4637				0.0284	0.0284		0.0267	0.0267	0.0000	51.7229	51.7229			52.0379
Total	**0.0520**	**0.4637**				**0.0284**	**0.0284**		**0.0267**	**0.0267**	**0.0000**	**51.7229**	**51.7229**			**52.0379**

3.5 Building Construction - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	2.7900e-003	0.0763			3.7900e-003	5.8000e-004	4.3700e-003	1.1000e-003	5.5000e-004	1.6500e-003	0.0000	15.5770	15.5770			15.6095
Worker	8.8000e-003	6.1800e-003			0.0151	1.1000e-004	0.0152	4.0200e-003	1.0000e-004	4.1200e-003	0.0000	14.0171	14.0171			14.0283
Total	**0.0116**	**0.0825**			**0.0189**	**6.9000e-004**	**0.0196**	**5.1200e-003**	**6.5000e-004**	**5.7700e-003**	**0.0000**	**29.5941**	**29.5941**			**29.6378**

3.5 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2777	2.5134				0.1463	0.1463		0.1376	0.1376	0.0000	303.4091	303.4091			305.2596
Total	**0.2777**	**2.5134**				**0.1463**	**0.1463**		**0.1376**	**0.1376**	**0.0000**	**303.4091**	**303.4091**			**305.2596**

3.5 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0135	0.4146			0.0226	2.2800e-003	0.0249	6.5200e-003	2.1900e-003	8.7100e-003	0.0000	91.9687	91.9687			92.1503
Worker	0.0476	0.0323			0.0901	6.4000e-004	0.0907	0.0239	5.9000e-004	0.0245	0.0000	80.8821	80.8821			80.9400
Total	**0.0611**	**0.4469**			**0.1127**	**2.9200e-003**	**0.1156**	**0.0305**	**2.7800e-003**	**0.0332**	**0.0000**	**172.8508**	**172.8508**			**173.0903**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2777	2.5134				0.1463	0.1463		0.1376	0.1376	0.0000	303.4087	303.4087			305.2592
Total	**0.2777**	**2.5134**				**0.1463**	**0.1463**		**0.1376**	**0.1376**	**0.0000**	**303.4087**	**303.4087**			**305.2592**

3.5 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0135	0.4146			0.0226	2.2800e-003	0.0249	6.5200e-003	2.1900e-003	8.7100e-003	0.0000	91.9687	91.9687			92.1503
Worker	0.0476	0.0323			0.0901	6.4000e-004	0.0907	0.0239	5.9000e-004	0.0245	0.0000	80.8821	80.8821			80.9400
Total	**0.0611**	**0.4469**			**0.1127**	**2.9200e-003**	**0.1156**	**0.0305**	**2.7800e-003**	**0.0332**	**0.0000**	**172.8508**	**172.8508**			**173.0903**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0608	0.5578				0.0307	0.0307		0.0288	0.0288	0.0000	74.1239	74.1239			74.5710
Total	**0.0608**	**0.5578**				**0.0307**	**0.0307**		**0.0288**	**0.0288**	**0.0000**	**74.1239**	**74.1239**			**74.5710**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	2.6800e-003	0.0917			5.5200e-003	2.6000e-004	5.7700e-003	1.5900e-003	2.5000e-004	1.8400e-003	0.0000	22.2569	22.2569			22.2994
Worker	0.0107	7.0200e-003			0.0220	1.5000e-004	0.0222	5.8500e-003	1.4000e-004	5.9900e-003	0.0000	19.0706	19.0706			19.0832
Total	**0.0134**	**0.0988**			**0.0275**	**4.1000e-004**	**0.0279**	**7.4400e-003**	**3.9000e-004**	**7.8300e-003**	**0.0000**	**41.3276**	**41.3276**			**41.3827**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0608	0.5578				0.0307	0.0307		0.0288	0.0288	0.0000	74.1238	74.1238			74.5709
Total	**0.0608**	**0.5578**				**0.0307**	**0.0307**		**0.0288**	**0.0288**	**0.0000**	**74.1238**	**74.1238**			**74.5709**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	2.6800e-003	0.0917			5.5200e-003	2.6000e-004	5.7700e-003	1.5900e-003	2.5000e-004	1.8400e-003	0.0000	22.2569	22.2569			22.2994
Worker	0.0107	7.0200e-003			0.0220	1.5000e-004	0.0222	5.8500e-003	1.4000e-004	5.9900e-003	0.0000	19.0706	19.0706			19.0832
Total	**0.0134**	**0.0988**			**0.0275**	**4.1000e-004**	**0.0279**	**7.4400e-003**	**3.9000e-004**	**7.8300e-003**	**0.0000**	**41.3276**	**41.3276**			**41.3827**

3.6 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0126	0.1292				6.7800e-003	6.7800e-003		6.2400e-003	6.2400e-003	0.0000	20.0235	20.0235			20.1854
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Total	**0.0126**	**0.1292**				**6.7800e-003**	**6.7800e-003**		**6.2400e-003**	**6.2400e-003**	**0.0000**	**20.0235**	**20.0235**			**20.1854**

3.6 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	5.8000e-004	3.8000e-004			1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0395	1.0395			1.0402
Total	**5.8000e-004**	**3.8000e-004**			**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0395**	**1.0395**			**1.0402**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0126	0.1292				6.7800e-003	6.7800e-003		6.2400e-003	6.2400e-003	0.0000	20.0235	20.0235			20.1854
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Total	**0.0126**	**0.1292**				**6.7800e-003**	**6.7800e-003**		**6.2400e-003**	**6.2400e-003**	**0.0000**	**20.0235**	**20.0235**			**20.1854**

3.6 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	5.8000e-004	3.8000e-004			1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.0395	1.0395			1.0402
Total	**5.8000e-004**	**3.8000e-004**			**1.2000e-003**	**1.0000e-005**	**1.2100e-003**	**3.2000e-004**	**1.0000e-005**	**3.3000e-004**	**0.0000**	**1.0395**	**1.0395**			**1.0402**

3.7 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	4.0378					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Off-Road	2.1900e-003	0.0153				9.4000e-004	9.4000e-004		9.4000e-004	9.4000e-004	0.0000	2.5533	2.5533			2.5576
Total	**4.0400**	**0.0153**				**9.4000e-004**	**9.4000e-004**		**9.4000e-004**	**9.4000e-004**	**0.0000**	**2.5533**	**2.5533**			**2.5576**

3.7 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	6.6000e-004	4.3000e-004			1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1781	1.1781			1.1788
Total	**6.6000e-004**	**4.3000e-004**			**1.3600e-003**	**1.0000e-005**	**1.3700e-003**	**3.6000e-004**	**1.0000e-005**	**3.7000e-004**	**0.0000**	**1.1781**	**1.1781**			**1.1788**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	4.0378					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Off-Road	2.1900e-003	0.0153				9.4000e-004	9.4000e-004		9.4000e-004	9.4000e-004	0.0000	2.5533	2.5533			2.5576
Total	**4.0400**	**0.0153**				**9.4000e-004**	**9.4000e-004**		**9.4000e-004**	**9.4000e-004**	**0.0000**	**2.5533**	**2.5533**			**2.5576**

3.7 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Vendor	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Worker	6.6000e-004	4.3000e-004			1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.1781	1.1781			1.1788
Total	**6.6000e-004**	**4.3000e-004**			**1.3600e-003**	**1.0000e-005**	**1.3700e-003**	**3.6000e-004**	**1.0000e-005**	**3.7000e-004**	**0.0000**	**1.1781**	**1.1781**			**1.1788**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Improve Pedestrian Network

Provide Traffic Calming Measures

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.7872	8.0740			1.5636	0.0318	1.5955	0.4207	0.0301	0.4508	0.0000	2,696.612 9	2,696.612 9			2,702.462 0
Unmitigated	0.8000	8.2328			1.6459	0.0332	1.6792	0.4428	0.0315	0.4743	0.0000	2,807.357 3	2,807.357 3			2,813.279 7

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	2,275.28	2,368.49	2060.18	4,314,702	4,098,967
Total	2,275.28	2,368.49	2,060.18	4,314,702	4,098,967

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	7.00	5.00	5.00	45.60	19.00	35.40	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.499524	0.033454	0.168279	0.130431	0.021581	0.005690	0.021752	0.108566	0.001799	0.001690	0.005397	0.000987	0.000848

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Exceed Title 24

Percent of Electricity Use Generated with Renewable Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
NaturalGas Mitigated	0.0256	0.2188				0.0177	0.0177		0.0177	0.0177	0.0000	253.3829	253.3829			254.8886
NaturalGas Unmitigated	0.0337	0.2879				0.0233	0.0233		0.0233	0.0233	0.0000	333.4551	333.4551			335.4366

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	6.24871e +006	0.0337	0.2879				0.0233	0.0233		0.0233	0.0233	0.0000	333.4551	333.4551			335.4366
Total		**0.0337**	**0.2879**				**0.0233**	**0.0233**		**0.0233**	**0.0233**	**0.0000**	**333.4551**	**333.4551**			**335.4366**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	4.74822e +006	0.0256	0.2188				0.0177	0.0177		0.0177	0.0177	0.0000	253.3829	253.3829			254.8886
Total		**0.0256**	**0.2188**				**0.0177**	**0.0177**		**0.0177**	**0.0177**	**0.0000**	**253.3829**	**253.3829**			**254.8886**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	2.09382e +006	0.0000			0.0000
Total		**0.0000**			**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	1.52038e +006	0.0000			0.0000
Total		**0.0000**			**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.1486	0.1100				0.0170	0.0170		0.0170	0.0170	0.0000	106.4354	106.4354			107.1213
Unmitigated	2.1486	0.1100				0.0170	0.0170		0.0170	0.0170	0.0000	106.4354	106.4354			107.1213

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4038					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Consumer Products	1.6802					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Hearth	0.0105	0.0894				7.2300e-003	7.2300e-003		7.2300e-003	7.2300e-003	0.0000	103.5366	103.5366			104.1518
Landscaping	0.0542	0.0206				9.7900e-003	9.7900e-003		9.7900e-003	9.7900e-003	0.0000	2.8988	2.8988			2.9695
Total	**2.1486**	**0.1100**				**0.0170**	**0.0170**		**0.0170**	**0.0170**	**0.0000**	**106.4354**	**106.4354**			**107.1213**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.4038					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Consumer Products	1.6802					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000			0.0000
Hearth	0.0105	0.0894				7.2300e-003	7.2300e-003		7.2300e-003	7.2300e-003	0.0000	103.5366	103.5366			104.1518
Landscaping	0.0542	0.0206				9.7900e-003	9.7900e-003		9.7900e-003	9.7900e-003	0.0000	2.8988	2.8988			2.9695
Total	**2.1486**	**0.1100**				**0.0170**	**0.0170**		**0.0170**	**0.0170**	**0.0000**	**106.4354**	**106.4354**			**107.1213**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	3.9522			16.9566
Unmitigated	4.9402			21.1958

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	15.5718 / 9.81701	4.9402			21.1958
Total		**4.9402**			**21.1958**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	12.4574 / 9.21817	3.9522			16.9566
Total		**3.9522**			**16.9566**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	22.5783			55.9367
Unmitigated	57.8930			143.4275

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	285.2	57.8930			143.4275
Total		**57.8930**			**143.4275**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	111.228	22.5783			55.9367
Total		**22.5783**			**55.9367**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix B

Traffic Impact Analysis

TRAFFIC IMPACT ANALYSIS

FOR

TRACT 6249
Fresno, California

Prepared For:

Morton & Pitalo, Inc.
75 Iron Point Circle, Suite 120
Folsom, CA 95630

Prepared By:

KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
(916) 660-1555

REGISTERED PROFESSIONAL ENGINEER
KENNETH D. ANDERSON
No. C32774
Exp. 6/2020
CIVIL
STATE OF CALIFORNIA

April 23, 2019
Revised June5, 2019

Job No. 4705-024

6249 Sub Fresno.rpt

TRAFFIC IMPACT ANALYSIS FOR
TRACT 6249
Fresno, CA

TABLE OF CONTENTS

April 23, 2019
Revised June 5, 2019

LIST OF TABLES

LIST OF FIGURES

Assigned Planner is Jose Valenzuela

FAASTER Reference Numbers are P19-01259, P19-01469 & P19-01470

Revised June 5, 2019

TRAFFIC IMPACT ANALYSIS FOR
TRACT 6249
Fresno, CA

INTRODUCTION / SUMMARY

This report documents **KD Anderson & Associates'** analysis of the traffic impacts associated with developing the **Tract 6249** in the City of Fresno, California. The assessment which follows adheres to City of Fresno requirements, as well as input received from Fresno County and Caltrans District 6.

Project Description

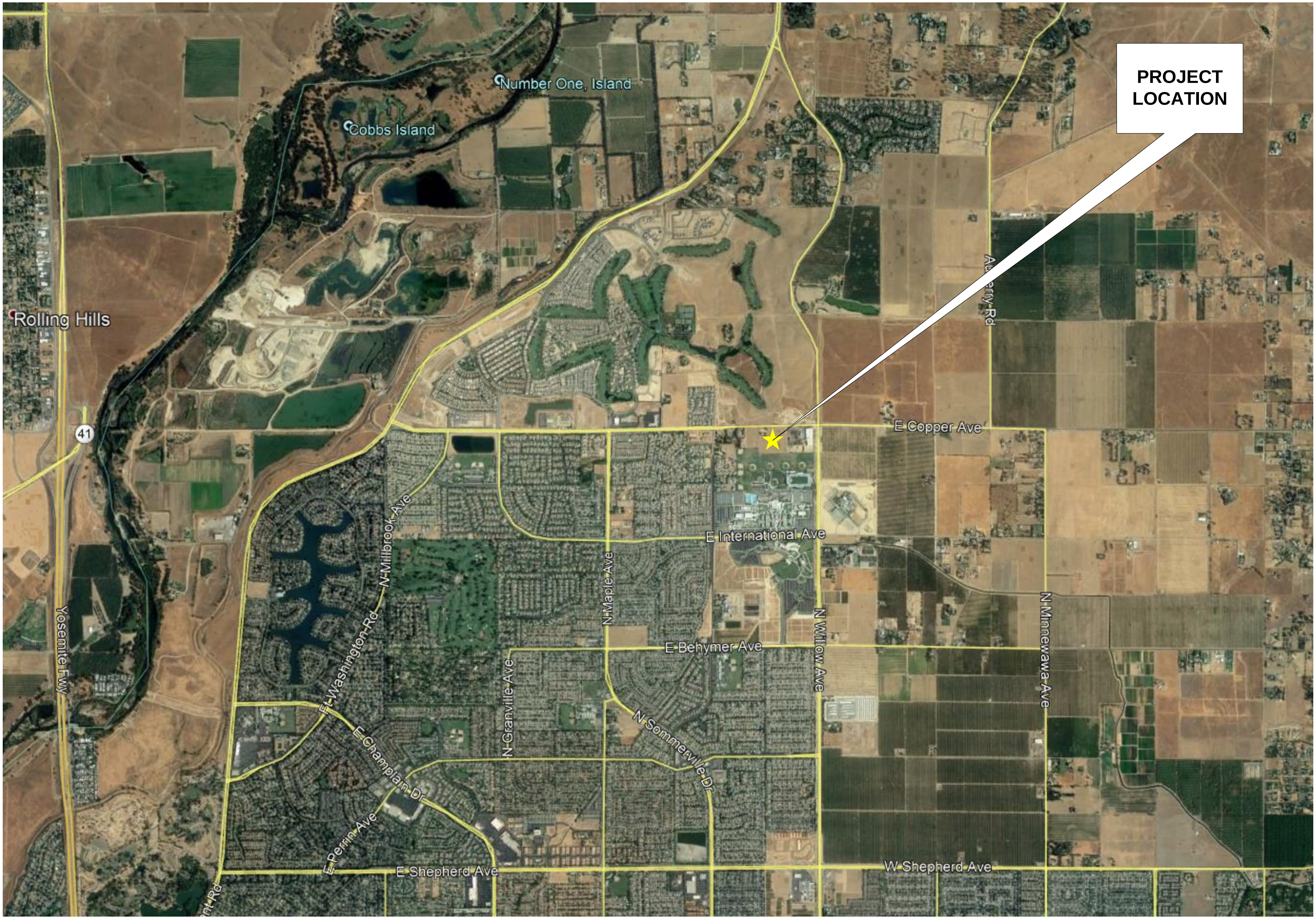
The site of the Tract 6249 Subdivision is generally on the southwest corner of the intersection of E. Copper Avenue and N. Willow Avenue north of Clovis North High School, as noted in Figure 1. The project proposes 239 single family units, as noted in Figure 2. The project also includes a General Plan Amendment for the adjoining 5 acres located to the east from BP to Mixed Use, although no plan for development of that site exists. Direct access to the project site occurs via two driveways on E. Copper Avenue west of its intersection with N. Willow Avenue, and full access is planned at both locations. This analysis addresses the ramifications of changes to existing zoning and to the City of Fresno General Plan that are needed to implement the project. The majority of the project subdivision site is currently zoned for this use and will not change. The eastern quarter of the subdivision site is designed BP and will be changed to reflect the project.

Study Scenarios

This analysis is conducted using existing background conditions, near-term future background conditions, and long-term future background conditions. The effects of the proposed project on each of the three background conditions have been analyzed, resulting in analysis of the following six scenarios:

- Existing conditions,
- Existing Plus Project,
- EPAP No Project,
- EPAP Plus Project,
- Cumulative No Project (i.e., current zoning), and
- Cumulative Plus Project.

Existing Plus Approved Projects (EPAP) conditions are a near-term future background condition which includes existing traffic levels, and traffic associated with approved and pending land use development projects in the vicinity of the project site.



VICINITY MAP

KD Anderson & Associates, Inc.
Transportation Engineers

4705-024 RA 6/5/2019

figure 1

TENTATIVE TRACT MAP NO. 6249
A SINGLE FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT
IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

PREPARED MARCH 11, 2019

GENERAL NOTES

1. 578-01-35 & 578-01-24 ARE VACANT / IDLE, 578-01-23S HAS RESIDENTIAL HOME
2. SITE ACREAGE TO BE SUBDIVIDED IS 18.85± GROSS ACRES AND 18.14± NET ACRES (GROSS ACREAGE, LESS PUBLIC ROADS).
3. THE TRACT IS NOT WITHIN 200' OF ANY RAILROAD, FREEWAY OR EXPRESSWAY.
4. ABANDON ALL WELL AND SEPTIC TANKS TO COUNTY STANDARDS.
5. NO IRRIGATION CANAL IS ON SITE.
6. ALL PUBLIC UTILITIES (GAS & ELECTRIC – PG&E, TELEPHONE – AT&T, CABLE TELEVISION - COMCAST, AND CITY OF FRESNO WATER & SEWER) SHALL BE INSTALLED TO CITY STANDARDS.
7. THERE ARE EXISTING ABOVE GROUND USES OR STRUCTURES SUCH AS BUILDINGS, WATER WELLS, POWER LINES, TOWERS, ETC., WITHIN THE PROPOSED SUBDIVISION ON APN 578-01-23S.
8. THIS AREA IS NOT SUBJECT TO FLOOD INUNDATION.
9. THERE ARE EXISTING UNDERGROUND FEATURES SUCH AS WELLS, CESSPOOLS, SEWERS, CULVERTS, STORM DRAIN, DUMP SITES AND OTHER UNDERGROUND STRUCTURES WITHIN THE PROPOSED SUBDIVISION ON APN 578-01-23S.
10. ALL IMPROVEMENTS SHALL BE AS REQUIRED BY THE CITY OF FRESNO AND BUILT TO CITY STANDARDS AND SHALL INCLUDE SANITARY SEWER, DOMESTIC WATER, UNDERGROUND POWER, TELEPHONE, GAS, CONCRETE CURBS, GUTTERS, SIDEWALKS, PERMANENT STREET PAVEMENT, STREET LIGHTS, ETC. ON-SITE STREETS WILL BE PRIVATE AND AS APPROVED BY THE CITY OF FRESNO.
11. THE DESIGN ON THE PROPOSED SUBDIVISION SHALL PROVIDE TO THE EXTENT FEASIBLE FOR FUTURE PASSIVE OR NATURAL HEATING OR COOLING OPPORTUNITIES AND OTHER MEASURES THAT CONSERVE NON-RENEWABLE ENERGY RESOURCES.
12. ALL STREETS ADJACENT TO THE BOUNDARIES OF THIS SUBDIVISION HAVE BEEN PREVIOUSLY DEDICATED FOR PUBLIC STREET PURPOSES AND ALL ARE TO REMAIN (UNLESS OTHERWISE NOTED).
13. THERE WILL BE GRADE DIFFERENTIALS GREATER THAN SIX INCHES BETWEEN THE SUBJECT AND ADJACENT PROPERTIES ON THE EAST, SOUTH AND WEST BOUNDARIES.
14. ALL INTERIOR ROAD AND OPEN SPACE SHALL BE CONTAINED WITHIN A PRIVATE EASEMENT PROVIDING FOR PUBLIC USE AND THE INSTALLATION AND MAINTENANCE OF PUBLIC AND PRIVATE UNDERGROUND UTILITIES
15. DIRECT VEHICULAR ACCESS RIGHTS FROM LOTS ABUTTING COPPER AVENUE SHALL BE RELINQUISHED.

ASSESSOR'S PARCEL NUMBER
578-01-35, 578-01-23S, 578-01-24S & 578-010-47S

SITE ADDRESS
2711, 2797, 2917 & 2929 E. COPPER AVE. FRESNO, CA 93619

SITE AREA TO BE SUBDIVIDED
(APNs 578-01-35, 578-01-23S, 578-01-24S)
18.85± ACRES (GROSS)
18.14± ACRES (NET)

NUMBER OF LOTS IN SUBDIVISION
239 NUMBERED LOTS, 12 LETTERED LOTS

DENSITY
RESIDENTIAL:
12.68 DWELLING UNITS/ACRE

EXISTING BUILDINGS
RESIDENTIAL HOME ON APN 578-01-23

EXISTING TREES
TREES ON APN 578-01-23

EXISTING USE
578-01-35 & 578-01-24S VACANT, 578-01-23S RESIDENTIAL HOME,
578-010-47S PACKING COMPANY

SOURCE OF WATER
CITY OF FRESNO / PRIVATE

SOURCE OF SEWAGE DISPOSAL
CITY OF FRESNO / PRIVATE

SOURCE OF WASTE DISPOSAL
CITY OF FRESNO

SOURCE OF ELECTRICITY
PG&E

SOURCE OF GAS
PG&E

SOURCE OF CABLE T.V.
COMCAST

SOURCE OF TELEPHONE
AT&T

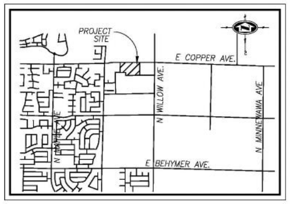
EXISTING GENERAL PLAN DESIGNATION
APN 578-01-35 - MEDIUM DENSITY RESIDENTIAL
APN 578-01-23 - MEDIUM DENSITY RESIDENTIAL
APN 578-01-24S - MEDIUM DENSITY RESIDENTIAL / BUSINESS PARK
APN 578-010-47S - BUSINESS PARK

PROPOSED GENERAL PLAN DESIGNATION
APN 578-01-35 - MEDIUM HIGH DENSITY RESIDENTIAL
APN 578-01-23S - MEDIUM HIGH DENSITY RESIDENTIAL
APN 578-01-24S - MEDIUM HIGH DENSITY RESIDENTIAL
APN 578-010-47S - CORRIDOR/CENTER MIXED USE

EXISTING ZONING
APN 578-01-35 - RS-5 (RESIDENTIAL SINGLE FAMILY)
APN 578-01-23S - RS-5 (RESIDENTIAL SINGLE FAMILY)
APN 578-01-24S - RS-5 (RESIDENTIAL SINGLE FAMILY)& BP (BUSINESS PARK)
APN 578-010-47S - BP (BUSINESS PARK)

PROPOSED ZONING
APN 578-01-35 - RM-1 (RESIDENTIAL MULTI-FAMILY)
APN 578-01-23S - RM-1 (RESIDENTIAL MULTI-FAMILY)
APN 578-01-24S - RM-1 (RESIDENTIAL MULTI-FAMILY)
APN 578-010-47S - CMX (CORRIDOR/CENTER MIXED-USE)

PROPOSED USE
APN 578-01-35 - SINGLE FAMILY RESIDENTIAL
APN 578-01-23S - SINGLE FAMILY RESIDENTIAL
APN 578-01-24S - SINGLE FAMILY RESIDENTIAL
APN 578-010-47S - PACKING SHED (REMAIN AS IS)



VICINITY MAP
N.T.S.

LEGEND

⊕	MANHOLE
DI	DRAIN INLET
DMH	DRAIN MANHOLE
(E)	EXISTING
INV	INVERT
L.E.	LANDSCAPE EASEMENT
P.E.	PEDESTRIAN EASEMENT
P.U.E.	PUBLIC UTILITY EASEMENT
Ⓡ	ACCESSIBLE RAMP CALLOUT
←	DRAINAGE SLOPE
▮▮	RECYCLING AND REFUSE ENCLOSURE CITY STD. DTLS. P-33, P-34 & P-35
⊗	TREES TO BE REMOVED
	ADA PARALLEL PARKING
8"S	UNDERGROUND SEWER PIPE
12"D	UNDERGROUND STORM DRAIN PIPE
12"W	UNDERGROUND WATER PIPE

GRAPHIC SCALE
60 30 0 60 120
1 in = 60 ft

OWNER/SUBDIVIDER

APN 578-010-23
TARLTON FRENO LLC
CHRIS WHITTEAKER
3562 S. ELM
FRESNO, CA 93706

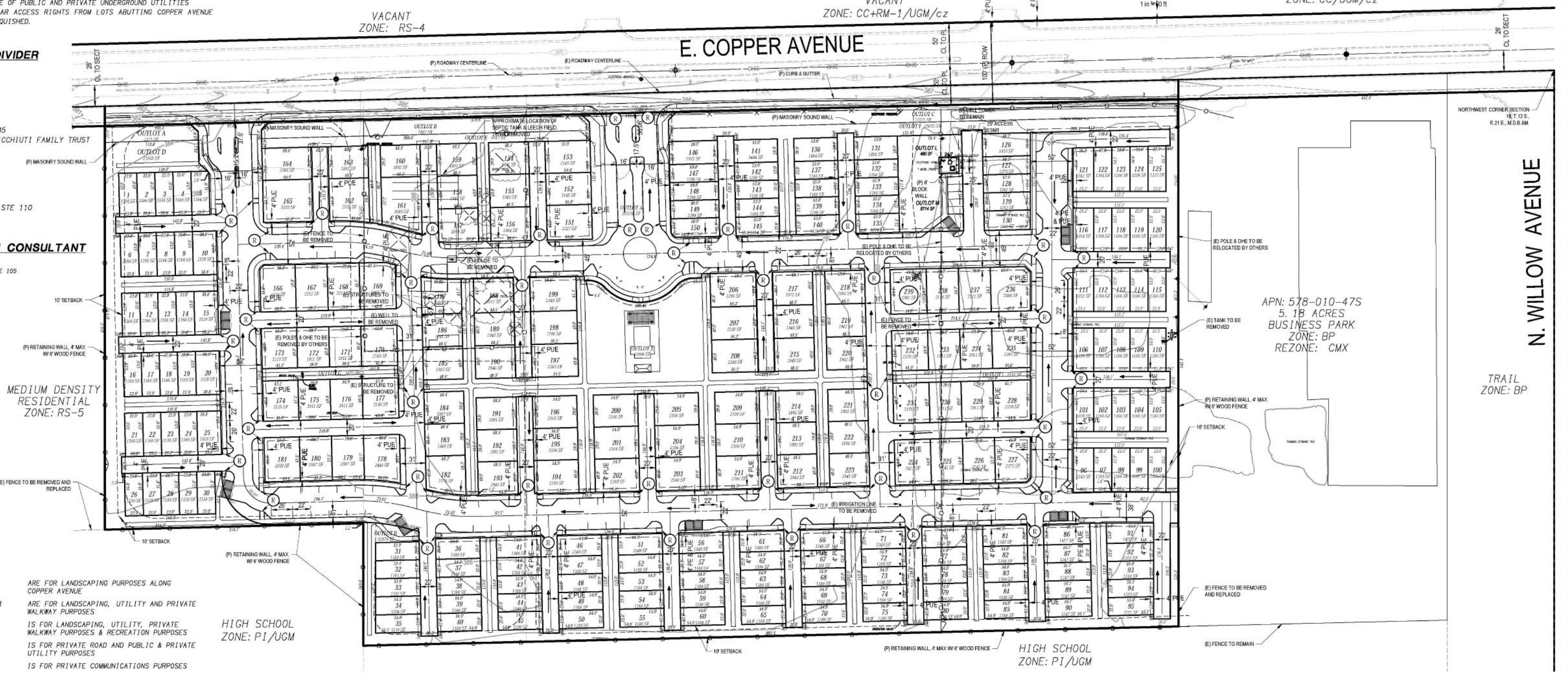
APN 578-010-24 & 35
PATRICK VINCENT RICCHIUTI FAMILY TRUST
1970 E. BIRKHEAD
FRESNO, CA 93720

APPLICANT

LENNAR
8080 N. PALM AVE, STE 110
FRESNO, CA 93711
(559) 437-4269

CIVIL DESIGN CONSULTANT

MORTON & PITALO, INC.
7643 N, INGRAM AVE, STE 105
FRESNO, CA 93711
(559) 853-4505



OUTLOTS

OUTLOTS A, B & C	ARE FOR LANDSCAPING PURPOSES ALONG COPPER AVENUE
OUTLOTS D, E, F, G, H & I	ARE FOR LANDSCAPING, UTILITY AND PRIVATE WALKWAY PURPOSES
OUTLOTS J	IS FOR LANDSCAPING, UTILITY, PRIVATE WALKWAY PURPOSES & RECREATION PURPOSES
OUTLOT K	IS FOR PRIVATE ROAD AND PUBLIC & PRIVATE UTILITY PURPOSES
OUTLOT L	IS FOR PRIVATE COMMUNICATIONS PURPOSES

SCALE:
HORIZ. 1" = 60'
VERT. 1" = N/A

BENCH MARK COUNTY BM IK49
ELEVATION = 391.809 USGS DATUM
BRASS CAP, 26' WEST OF WILLOW AVENUE, 78' SOUTH OF COPPER AVENUE, 2' SOUTH OF POWER POLE

COMPUTED	
DESIGNED	GJB
DRAWN	KLF
PROJ. ENGR.	GJB

MORTON & PITALO, INC.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Folsom * Sacramento * Fresno
2870 Gateway Oaks Drive, Suite #120
Sacramento, CA 95833
phone: (916) 927-2400
survey email: staking@mpengr.com ••web: www.mpengr.com

SINGLE AND MULTIPLE FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT
TENTATIVE TRACT MAP NO. 6249
IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

DATE MARCH 11, 2018
SHEET TM-1
OF 2

SITE PLAN

figure 2

Cumulative conditions are a long-term background condition with future year traffic forecasts based on development of surrounding land uses and the roadway network. This set of scenarios assumes 2035 conditions with future development consistent with the Fresno Council of Governments (FCOG) Travel Demand Model.

Summary

Existing Conditions. This analysis evaluated the operation of four intersections within the City of Fresno, one location on the Clovis-Fresno broader and one intersection in Fresno County outside the sphere of influence of the City of Fresno identified through consultation with applicable agencies:

- Friant Road / N. Willow Avenue
- E. Copper Avenue / N. Millbrook Avenue
- E. Copper Avenue / N. Chestnut Avenue
- E. Copper Avenue / N. Willow Avenue
- N. Chestnut Avenue / International Avenue
- N. Chestnut Avenue / Behymer Avenue

Evaluation of a.m. / p.m. peak hour traffic volume collected in February 2019 revealed that the E. Copper Avenue/ N. Chestnut Avenue and E. Copper Avenue / N. Willow Avenue intersections operate at LOS E in the a.m. peak hour, but that conditions in the p.m. peak hour and at all other intersections satisfy the applicable minimum standard. Peak hour traffic signal warrants are met at the E. Copper Avenue / N. Chestnut Ave intersection (a.m. peak hour only) and at the E. Copper Avenue / N. Willow Avenue intersection (a.m. and p.m. peak hour). The E. Copper Avenue / N/ Willow Avenue intersection is on the City of Fresno's traffic signal priority list.

Current collision history was reviewed and no correctable issues associated with this history were identified.

Project Characteristics. The subdivision included in the proposed project envisions development 239 residential units with access to E. Copper Avenue at two locations roughly 1,600 and 1,120 feet west of the N. Willow Avenue intersection. That portion of the project will generate 2,256 daily trips, with 177 trips in the a.m. peak hour and 237 trips occurring in the p.m. peak hour. The share of this traffic expected to make use of state highway facilities has been identified.

The Trip Generation associated with the portion of the project that has no development plan but will be re-designated from BP to Mixed Use could generate 43 a.m. and 106 p.m. peak hour trips if developed with a mix of residential and retail uses.

Existing Plus Project Level of Service Impacts. The immediate development of the project will exacerbate the deficient Level of Service already occurring today at two intersections, and the incremental change in delay is significant.

Installation of a **traffic signal** with separate left turn lanes and protected signal phasing is recommended at the **E. Copper Avenue / N. Chestnut Avenue** intersection. With this improvement the intersection will operate at LOS D or better. The project proponents should be responsible for installing these improvements with applicable fee credits.

Installation of a **traffic signal** with separate left turn lanes and protected signal phasing is recommended at the **E. Copper Avenue / N. Willow Avenue** intersection. With this improvement the intersection will operate at LOS D or better. The project proponents should be responsible for installing these improvements with applicable fee credits.

Project Access. In the near term the project access intersection on E. Copper Avenue would operate acceptably with full access. However, conditions in excess of the minimum standard are projected under cumulative conditions, and the long-term plan for E. Copper Avenue includes a raised median. A median should be installed along the project frontage within westbound left-turns allowed into the site at the eastern subdivision driveway. This treatment could result in the need to construct improvements to the E. Copper Avenue / N. Chestnut Avenue and E. Copper Avenue / N. Willow Avenue intersections to permit u-turns.

Pedestrian Impacts. The project will result in pedestrians walking from the site to existing sidewalks and the Class I trail along N. Willow Avenue. Gaps in pedestrian facilities will exist to the west between the site and sidewalk on N. Chestnut Avenue and to the east from the site to the N. Willow Avenue trail. The project proponents shall install an all-weather path within the existing right of way in one area to address this safety impact.

Existing Plus Approved Projects (EPAP) Impacts. The analysis of short-term impacts addressed the effects of fifteen approved / pending but unbuilt projects. The two intersections impacts under Existing plus Project conditions remain affected by the project, but the same mitigation identified for Existing Plus Project conditions is adequate. Development of approved projects will result in LOS F conditions at the E. Copper Avenue / Millbrook Avenue intersection, and the project's impact is incrementally significant. A traffic signal will be needed at the E. Copper Avenue / Millbrook Avenue intersection, and because the project does not cause the need for the signal, this impact will be mitigated by paying adopted fees.

Cumulative Plus Project Impacts. Long term traffic conditions were identified based on forecasts from the Fresno Council of Governments (FCOG) regional travel demand forecasting model. Without improvements resulting Levels of Service will exceed the minimum standard at all unsignalized study intersections, and the project's impact is incrementally significant at three intersections. At one location the level of improvements needed to deliver minimum LOS standards exceeds that identified for previous scenarios, and the necessary configuration of the E. Copper Avenue / N. Willow Avenue intersection is identified in this report.

Fair Share Calculation. The project's share of long-term traffic at each study location has been identified.

EXISTING SETTING

Regionally, the Tract 6249 subdivision site is served by rural Fresno County Roads and City of Fresno streets which link the site with Fresno Metropolitan Area to the south and west and with the City of Clovis to the east and with rural Fresno County to the north.

Study Area Circulation System - Roads

Study area limits were determined in consultation with City of Fresno staff with input from Caltrans District 6 and Fresno County. Project scoping information and comments received are included in the Appendix.

N. Willow Avenue is a north-south road that traverses boundary between the cities of Fresno and Clovis before extending north into Fresno County. Willow Avenue originates in the south at an intersection on Ashlan Avenue and extends northerly for about nine miles across SR 168 along the project site to Friant Old Friant Road. The Clovis Unified School District's (CUSD) Clovis North HS and Granite Ridge Intermediate School as well as Clovis Community College are located west of N. Willow Avenue south of the project site.

N. Willow Avenue in the area of the project is designated a 6-lane super arterial road in the City of Fresno General Plan Circulation diagram. The west side of N. Willow Avenue has been improved to that standard in the area south along the schools' frontage, but only southbound one travel lane exists from that are for roughly 700 feet to E. Copper Avenue. One travel lane exists in the northbound direction, and north of the E. Copper Avenue intersection N. Willow Avenue is a two-lane road. The speed limit on N. Willow Avenue is 50 mph, but a 25 mph school zone exists in the area of the CUSD's schools.

The City of Clovis is currently pursuing a project that will widen the east side of N. Willow Avenue to its ultimate with in the area from roughly 700 feet south of E. Copper Avenue to Shepherd Avenue.

E. Copper Avenue is an east-west road that is designated an 4-lane super arterial in the City of Fresno Circulation Element. Copper Avenue extends east for about six miles from an intersection on Old Friant Road through the N. Willow Avenue intersection into rural Fresno County. In the area west of the project the south side of E. Copper Avenue has been widened to the ultimate standard, but E. Copper Avenue is two-lane road in the area east of N. Chestnut Avenue. The posted speed limit is 50 mph in the area of the project.

N. Chestnut Avenue is a north-south street that lies ½ mile west of and parallel to N. Willow Avenue. Chestnut Avenue traverses Fresno County and the City of Fresno but its northern terminus is on N. Willow Avenue. The portion of N. Chestnut Avenue immediately south of N. Willow Avenue is designated a four-lane collector in the Circulation diagram. While the portion of N. Chestnut Avenue just south of E. Copper Avenue is a two-lane road the street has been incrementally widened as development has occurred, and its full width is available in the area of the CUSD schools.

University Avenue is an east-west local street that links N. Chestnut Avenue and N. Willow Avenue and provides direct access to the north side of Clovis North HS. University Avenue is a two-lane facility with on-street parking.

International Avenue is a four-lane east-west collector street that lies ½ mile south of N. Willow Avenue and provides direct access to Clovis North HS and Granite Ridge IS's parking facilities and to the community college. International Avenue extends south from an intersection on E. Copper Avenue and turns to the east at N. Chestnut Avenue before ending at N. Willow Avenue.

Behymer Avenue is an east-west street that lies a mile south of N. Willow Avenue. The roadway originates at an intersection on Granville Avenue, and the portion of Behymer Avenue from Granville Avenue to Maple Avenue is designated a collector street. The roadway is a four lane arterial east of Maple Avenue.

Study Area Circulation System - Intersections

The quality of traffic flow is often governed by the operation of key intersections. The following intersections have been identified for evaluation in this study in consultation with City of Fresno staff based on an initial estimate of the project's traffic contribution performed through the Fresno Council of Governments (FCOG) regional travel demand forecasting model and comments received from the City of Clovis, Fresno County and Caltrans District 6.

There are two signalized intersections in the study area.

The **N. Chestnut Avenue / International Avenue intersection** is controlled by an actuated traffic signal. International Avenue has two through lanes in each direction, as well as separate right and left turn lanes on each approach. The northbound N. Chestnut Avenue approach is striped as three lanes with separate left turn, through and right turn lanes. The southbound N. Chestnut Avenue approach has two through travel lanes plus separate left turn and right turn lanes. Crosswalks are striped across each leg of the intersection.

The **N. Chestnut Avenue / Behymer Avenue intersection** is controlled by an actuated traffic signal. Behymer Avenue has two through lanes in each direction, as well as separate right and left turn lanes on each approach. The northbound and southbound N. Chestnut Avenue approaches are striped as three lanes with separate left turn, through and right turn lanes. Crosswalks are striped across each leg of the intersection.

The other four study locations are controlled by stop signs.

The **Friant Road / N. Willow Avenue intersection** is a Fresno County intersection outside of the City of Fresno Sphere of Influence. The intersection is controlled by stop signs on the eastbound and westbound N. Willow Avenue approaches. Friant Road has three lane approaches striped with separate left turn, and a thru lane and a combined thru plus right turn lane. The westbound N. Willow Avenue approach includes a separated right turn lane that is not controlled by the stop sign and a single combined left and thru lane. The eastbound approach (named Birkhead Avenue) has a single lane. There are no crosswalks at the intersection.

The **E. Copper Avenue / N. Millbrook Avenue intersection** is controlled by stop signs on the northbound and southbound Millbrook Avenue approaches. The E. Copper Avenue approaches feature two through travel lanes and separate left turn and right turn lanes. The three-lane northbound N. Millbrook Avenue approach has separate left turn, through and right turn lanes. The southbound approach has a left turn lane and a combined thru plus right turn lane. Crosswalks are striped across the N. Millbrook Avenue approaches.

The **E. Copper Avenue / N. Chestnut Avenue intersection** is controlled by all-way stop signs. Each approach has two lanes striped as a left turn and combined thru plus right turn lanes, except for southbound N. Chestnut which has a separate right turn lane. There are no crosswalks at this intersection.

The **E. Copper Avenue / N. Willow Avenue intersection** is controlled by an all-way stop and each approach is a single lane. There are no crosswalks at this intersection.

Standards of Significance: Levels of Service - Methodologies

To assess the quality of existing traffic conditions and provide a basis for analyzing project impacts, Levels of Service were calculated at study area intersections. "Level of Service" is a qualitative measure of traffic operating conditions whereby a letter grade "A" through "F", corresponding to progressively worsening operating conditions, is assigned to an intersection or roadway segment.

Analysis Methodology for Intersections. The following methodologies were selected in coordination with City of Clovis were utilized for this traffic analysis.

The techniques presented in the *Highway Capacity Manual, 6th Edition* (HCM) were used to signalized intersections and un-signalized intersections with Two-Way traffic controls. HCM techniques base Level of Service on the length of delays experienced by motorists waiting at the intersection. The delay values reported for Two-Way Stop-Controlled intersections include the overall average delay experienced by all motorists, as well as the delays experienced by motorists on each approach where motorists must yield the right of way.

As noted in the *City of Fresno Traffic Impact Study Report Guidelines,*

> “While the City of Fresno does not officially advocate the use of any software, Synchro is the software used and preferred by City staff.”

The lengths of vehicle queues were also analyzed for this traffic impact study. Methods presented in the *HCM, 6th Ed* were used to analyze queuing. The 95th percentile queue length values are presented in this traffic impact study.

Worksheets and output reports for the calculation of LOS and vehicles queues are presented in the technical appendix.

Table 1 presents general characteristics associated with each Level of Service grade.

TABLE 1
LEVEL OF SERVICE DEFINITIONS

Level of Service	Signalized Intersection	Unsignalized Intersection	Roadway (Daily)
"A"	Uncongested operations, all queues clear in a single-signal cycle. Ave Delay ≤10 seconds per vehicle	Little or no delay. Ave Delay ≤ 10 sec/veh	Completely free flow.
"B"	Uncongested operations, all queues clear in a single cycle. Delay > 10 sec/veh and ≤ 20 sec/veh	Short traffic delays. Delay > 10 sec/veh and ≤ 15 sec/veh	Free flow, presence of other vehicles noticeable.
"C"	Light congestion, occasional backups on critical approaches. Delay >20 sec/veh and <35 sec/veh	Average traffic delays. Delay > 15 sec/veh and ≤ 25 sec/veh	Ability to maneuver and select operating speed affected.
"D"	Significant congestions of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed. Delay > 35 sec/veh and < 55 sec/veh	Long traffic delays. Delay > 25 sec/veh and ≤ 35 sec/veh	Unstable flow, speeds and ability to maneuver restricted.
"E"	Severe congestion with some long standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es). Delay >55 sec and ≤ 80 sec/veh	Very long traffic delays, failure, extreme congestion. Delay > 35 sec/veh and ≤ 50 sec/veh	At or near capacity, flow quite unstable.
"F"	Total breakdown, stop-and-go operation. Delay > 80 sec/veh	Intersection often blocked by external causes. Delay > 50 sec/veh	Forced flow, breakdown.

Sources: *Highway Capacity Manual, 6th Edition,* and Transportation Research Board (TRB) Special Report 209.

Traffic Signal Warrants. The extent to which a traffic signal may be justified is determined based on many factors. From the standpoint of traffic impact analysis, signal warrant criteria contained in the *California Manual of Uniform Traffic Control Devices (CMUTCD)* are employed in order to assess the relative impact of the additional traffic accompanying a development proposal. For this analysis, Warrant 3 (Peak Hour Traffic) has been employed.

Two sets of traffic signal warrant thresholds have been adopted for *urban* and *rural* conditions. The two sets are differentiated based on travel speed (i.e., 40 mph or less is urban) and population (i.e., 10,000 or more is urban) of this analysis rural criteria have been employed.

Standards of Significance. Local jurisdictions adopt standards of significance for determining environmental impacts relating to traffic, and in the locations near the proposed project the standards of the City of Fresno and Fresno County apply.

Level of Service. In this traffic impact study, the significance of the proposed project's impact on traffic operating conditions is based on a determination of whether resulting LOS is considered acceptable by the City of Fresno. A project's impact on traffic conditions is considered significant if implementation of the project would result in LOS changing from levels considered acceptable to levels considered unacceptable, or if the project would substantially worsen already unacceptable LOS.

Policy MT-1-n of the *Fresno General Plan* (City of Fresno 2014a) is used in this traffic impact study to define acceptable LOS.

> ”**MT-1-n Peak Hour Vehicle LOS.** Maintain a peak-hour vehicle LOS standard of D or better for all roadway areas outside of identified Activity Center and Bus Rapid Transit Corridor districts, unless the City Traffic Engineer determines that mitigation to maintain this LOS would be infeasible and/or conflict with the achievement of other General Plan policies.”

LOS A through D are considered acceptable, while LOS E and F are considered unacceptable. In consultation with City of Fresno staff (Gormley pers. comm.), in this traffic impact study a project will be considered to have a significant impact on LOS if the project:

- would cause LOS to degrade from LOS D to LOS E or F,
- would cause LOS to degrade from LOS E to LOS F, or
- would cause average delay to increase by five seconds or more where the LOS is LOS E or F without the project.

Fresno County's minimum standard is LOS D within the Sphere of Influence (SOI) of the City of Fresno and LOS C beyond the SOI. The LOS C standard applies to the Friant Road / N. Willow Avenue intersection.

Vehicle Queuing. The *City of Fresno Traffic Impact Study Report Guidelines* requires a queuing analysis of the study intersections and recommendations for queues that are projected to exceed the available storage capacity. However, queuing is not included in the significance criteria specified in the guidelines.

A queuing deficiency is identified in No Project scenarios if the calculated 95th percentile queue length exceeds the storage length by more than 25 feet (the average storage length for one additional vehicle) since the turn lane bay taper can typically store at least one vehicle.

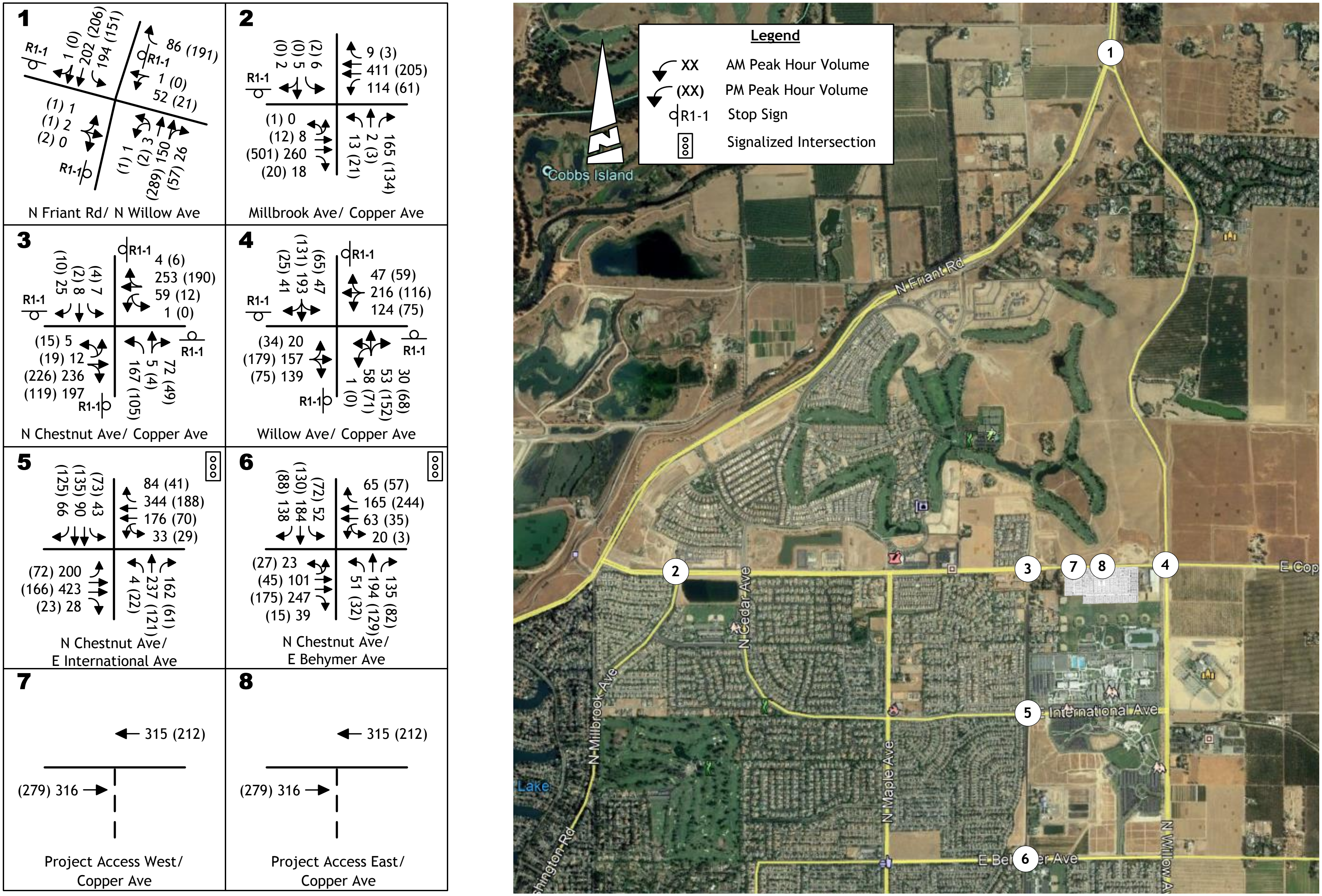
For Plus Project scenarios, a significant queuing impact is identified if the proposed project would cause the calculated 95th percentile queue length to exceed the existing storage capacity at a signalized intersection by more than 25 feet. In storage lanes that are already deficient under No Project scenarios, a significant queuing impact is identified if the proposed project would increase the calculated 95th percentile queue length by more than 25 feet.

Where a left-turn lane connects to a center-two-way left-turn lane (CTWLTL), although the calculated queue may exceed the length of the painted left-turn pocket, the presence of the CTWLTL provides additional storage and allows the queue to avoid spilling into through lanes. Therefore, queues exceeding the painted storage length in these situations may not contribute to operational problems.

Existing Traffic Volumes / Levels of Service / Signal Warrants

Traffic Counts. New traffic counts were made for this study at the six study intersections and were conducted on February 26, 2019 which was a day when area schools were operating in regular session.

Figure 3 illustrates the intersection turning movement counts assessed for this study, as well as current intersection geometry. This data has been used to determine the operating Level of Service at each intersection.



EXISTING TRAFFIC VOLUMES AND LANE CONFIGURATIONS

KD Anderson & Associates, Inc.
Transportation Engineers
4705-024 RA 6/5/2019

figure 3

Intersection Level of Service. Table 2 identifies current intersection Levels of Service. As noted, because of the high volume of peak period traffic associated with travel to and from area schools, the all-way stop controlled intersections at E. Copper Avenue / N. Chestnut Avenue and E. Copper Avenue / N. Willow Avenue operate at LOS E in the a.m. peak hour. LOS E exceeds the minimum LOS D standard. All other locations operate with Level of Service that satisfies the LOS D minimum (City) or LOS C minimum (County) at that time, and all study locations meet the minimum standard in the p.m. peak hour.

TABLE 2
EXISTING INTERSECTION LEVEL OF SERVICE

Intersection	Control	AM Peak Hour		PM Peak Hour	
		LOS	Average Delay (sec)	LOS	Average Delay (sec/veh)
Friant Road / N. Willow Ave					
Westbound left+thru	EB/SB Stop	C	23.9	C	20.8
Eastbound approach		C	20.6	B	14.1
E. Copper Ave / N. Millbrook Ave					
Northbound approach	NB/SB Stop	B	11.2	B	12,6
Southbound approach		C	23.2	A	8.9
E. Copper Ave / N. Chestnut Ave	All-Way Stop	**E**	**40.2**	B	12.3
E. Copper Ave / N. Willow Ave	All-Way Stop	**E**	**45.1**	C	14.5
International Ave / N. Chestnut Ave	Signal	D	37.3	B	19.6
Behymer Ave / N. Chestnut Ave	Signal	B	17.5	B	14.6

Bold indicates conditions in excess of adopted standard

Traffic Signal Warrants. The volume of traffic occurring at each intersection was compared to the MUTCD requirements for Warrant 3 (Peak Hour Traffic). The observed volumes do not satisfy warrant requirements at the Friant Road / N. Willow Avenue and E. Copper Avenue / Millbrook Avenue intersections. The volume of traffic observed at the E. Copper Avenue / N. Chestnut Avenue intersection in the morning satisfies peak hour warrants. Peak hour warrants are met at the E. Copper Avenue / N. Willow Avenue intersection during both time periods.

Intersection Queues. The 95th percentile queues occurring at signalized intersections were estimated as a byproduct of HCM Synchro peak hour Level of Service calculation, and the results are presented in Table 3. As shown current 95th percentile queues are contained within the existing storage in each lane, except at the N. Chestnut Avenue / International Avenue intersection where the 95th percentile queue in the eastbound left turn lane exceeds the available storage in the a.m. peak hour.

TABLE 3
EXISTING PEAK PERIOD QUEUES

Intersection		**Storage (feet)**	**Existing**			
			2016			
			AM		**PM**	
Approach / Lanes			**Volume**	**95th % Queue**	**Volume**	**95th % Queue**
E. Copper Ave / Millbrook Ave						
Northbound		*	180	<25	158	<25
Southbound		*	13	<25	2	<25
E. Copper Ave / N. Chestnut Ave						
Eastbound		*	450	400	379	85
Westbound		*	317	120	208	40
Northbound		*	244	70	158	<25
Southbound		*	40	<25	16	<25
E. Copper Ave / N. Willow Ave						
Eastbound		*	316	200	288	80
Westbound		*	387	340	250	65
Northbound		*	142	55	291	80
Southbound		*	281	170	221	55
International Avenue / N. Chestnut Avenue						
Eastbound	Left	200	200	235	72	105
	Thru (2)	*	423	220	166	85
	Right	150	28	<25	23	<25
Westbound	Left	240	209	245	99	135
	Thru (2)	*	344	175	188	90
	Right	150	84	<25	41	<25
Northbound	Left	200	4	<25	22	50
	Thru	*	237	260	121	130
	Right	130	162	90	61	<25
Southbound	Left	200	43	75	73	115
	Thru (2)	*	90	50	135	70
	Right	200	66	<25	125	<25
Behymer Ave /N. Chestnut Ave						
Eastbound	Left	200	**124**	150	**72**	100
	Thru (2)	*	247	115	175	85
	Right	shared	39	-	15	-
Westbound	Left	220	83	115	38	65
	Thru (2)	*	165	90	244	115
	Right	75	65	<25	57	<25
Northbound	Left**	130	51	80	32	55
	Thru	*	194	195	129	125
	Right	130	135	25	82	<25
Southbound	Left	115	52	80	72	100
	Thru	*	184	175	130	115
	Right	110	**138**	25	**88**	<25

(*) Storage greater than 1,000 feet
(**) connect to a two-way left-turn lane that provide additional storage
Highlighted values exceed the available storage by at least 25 feet

Collision History

The Statewide Integrated Traffic Records System (SWITRS) was employed to review collision reports for the most recent five-year period (January 1, 2013 to December 31, 2017). The SWITRS "is a database that serves as a means to collect and process data gathered from a collision scene. The internet SWITRS application is a tool by which CHP staff and members of its Allied Agencies throughout California can request various types of statistical reports in an electronic format." The TIMS "has been developed over the past five-plus years by SafeTREC to provide quick, easy and free access to California crash data that has been geocoded by SafeTREC to make it easy to map out crashes." All collision reports found in SWITRS and TIMS between January 1, 2013 and December 21, 2017 were included in the analysis. Collision data for each study intersection are contained in the Appendix.

Over the five-year period, a total of four (4) collisions were reported within the influence zone of the existing study intersections. Table 4 summarizes the total number of collisions reported at each existing study intersection, the type of collision, the severity of the collision, the type of violation, and whether the collision involved another motor vehicle, a pedestrian/bicyclist or a fixed object. Based on the collision data recorded during the five-year period, all existing study intersections have experienced a relatively low average number of collisions per year with one exception. The exception is that the intersection of N. Willow Avenue and E. Copper Avenue experienced 3 collisions during the five-year period.

The type of collisions at the intersection of N. Willow Avenue and E. Copper Avenue included 2 (two) broadsides and one (1) rear end. The type of violations included one (1) failure to yield the right of way, one (1) unsafe speed, and one (1) driving under the influence. All occurred in the late evening when issues related to intersection capacity and the effects of peak local school traffic would not be an issue. The various factors inherent to these collisions were considered and not evidence was found to suggest that modification of lane geometrics or traffic controls. As a result, the number of correctable collisions experienced at the existing study intersections is considered less than significant.

TABLE 4
5 YEAR COLLISION HISTORY

ID	Intersection	Number of Collisions	Type of Collision					Severity					Type of Violation						Motor Vehicle Involved with…		
			Broadside	Rear End	Head-on	Object	Sideswipe	Fatal	Severe Injury	Other Visible Injury	Complaint of Pain Injury	Property Damage Only	Wrong Side of Road	Right of Way	Unsafe Speed	Improper Turning	Driving Under Influence	Pedestrian Violation	Pedestrian/Bicyclist	Other Motor Vehicle	Fixed Object
2	Millbrook Ave/ E Copper Ave	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	N. Chestnut Ave / E/ Copper Ave	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	N Willow Ave / E Copper Ave	3	2	1	-	-	-	-	1	-	1	1	-	1	1	-	1	-	-	3	-
5	N Chestnut Ave / International Ave	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	N Chestnut Ave / Behymer Ave	1	1	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	1	-	-

Public Transportation

The Fresno Area Express (FAX) system provides fixed route public transportation to the Fresno Metropolitan Area. The FAX system is operated by the City of Fresno and provides 16 fixed route bus lines (Fresno Area Express 2017). However, the closest FAX route stops about two miles south of the project site.

Bicycle, Pedestrian and Trails Master Plan

The City of Fresno *Active Transportation Plan* (City of Fresno 2016) guides and influences bikeway policies, programs, and development standards to make bicycling and walking in the City of Fresno more safe, comfortable, convenient, and enjoyable for all bicyclists and pedestrians. The plan identifies a recommended network of bicycle facilities that consists of 166 miles of additional Class I Bike Paths, 691 miles of additional Class II Bike Lanes, and 69 miles of additional Class III Bike Routes and 21 miles of Class IV Separated Bikeways. The plan also sets forth objectives, goals, and policies to guide the implementation of the recommended network. The current *Fresno General Plan* (City of Fresno 2014a) supports the *Bicycle, Pedestrian and Trails Master Plan* objective of a comprehensive bicycle and pedestrian facilities network.

In the study area a Class I bike path exists along the west side of N. Willow Avenue from E. Copper Avenue southward. Class II bike lanes exist on N. Willow Avenue on International Avenue, Behymer Avenue and N. Chestnut Avenue in the area where that roadway has been widened to its ultimate width. Class II Bike Lanes exist on E. Copper Avenue from Friant Road easterly to a point between Maple Avenue and N. Chestnut Avenue, and a Class I bike path exists in various locations.

Pedestrian facilities in the area of the project have been created as development has proceeded. The separated Class I bicycle path along the west side of N. Willow Avenue is available for pedestrians. Sidewalk exists on N. Chestnut Avenue beginning about 330 feet and 680 feet south of E. Copper Avenue on the west and east side respectively. However, there are no sidewalks along E. Copper Avenue in the area from about 600 feet west of N. Chestnut Avenue easterly.

City of Fresno Traffic Signal Mitigation Impact (TSMI) Fee Program

TSMI fees are charged to new development throughout the City to mitigate traffic impacts through the funding of traffic signal improvements that serve new development. TSMI fees for new development are calculated by multiplying the established fee rate by the new development's average daily traffic (ADT).

For each type of intersection improvement, the City maintains a list of priority improvement projects. The priority ranking is determined by assigning points based on several factors including: an intersection's daily and peak hour traffic volumes, reported collisions, proximity to schools and other pedestrian generators, the need for signal coordination, and engineering judgment. The priority lists are relied upon to prepare the construction schedules for intersection Capital Improvement Projects for which current funding is available.

The TSMI fee program is intended to implement necessary intersection signalization improvements. As such, when a traffic impact study for a proposed development project identifies impacts to intersections that would result from that project's traffic, the mitigating improvements to address those impacts will typically have already been included in the capital improvements anticipated for those intersections in the TSMI program.

The TSMI program assumes that each intersection on the list will eventually be fully improved to its ultimate configuration pursuant to the City's P-69 roadway design standards. The update of the TSMI program consists of identification of improvements needed to mitigate deficiencies resulting from new development.

The proposed annual adjustment to the TSMI fee program consists of several components:

- Review of new traffic signals that will be required
- Review of locations where protected left turn phasing will be needed

- Review of locations where additional vehicle lanes will be needed to maintain LOS standards
- Review of the estimated cost of the remaining improvements needed at each location
- Updating the fund balance in the TSMI fund
- Updating the current amount for which developers are eligible for reimbursement from future fee payments
- Updating the estimated number of average daily trips (ADT's) from new development projections
- Updating the program based on new grants or public funds that have been designated for the traffic signal capital improvement program, thus lessening the need for new development to fund those improvements by that same amount

As discussed above, the intersection improvements funded by TSMI fees are implemented on a citywide priority basis, as approved by City Council each year. As such, specific intersection improvements needed under existing conditions and/or to mitigate the opening day impacts of a particular new development project may not be scheduled to be completed before the development project is completed. In such instances, the developer would install the intersection improvements needed to provide mitigation for the project impacts on the Project's opening day, and the costs of installing these improvements would be deducted from the developer's total calculated fees payable to the TSMI fee program. In the event that the developer's aggregate cost for installing the intersection improvements exceeds the Project's calculated total fees payable to the TSMI fee program, the amount of improvement cost in excess of the calculated fees payable is to be reimbursed to the applicant from the TSMI program.

The intersection improvements identified under the TSMI program are implemented through the Traffic Signal Capital Improvement Program. Although the major portion of funding for the Capital Improvement Program is from the TSMI fund, there are also other sources of funding such as state and federal grants that can reduce the amount of the TSMI funds used. The TSMI program does not include a schedule for construction of the improvements and does not identify when the improvements will be required. However, the prioritization of the need for the improvements is monitored by the City based on observed conditions (such as traffic volumes, accidents, pedestrian generators, proximity to schools, and engineering judgment) new development, and relevant traffic impact studies. The E. Copper Avenue / N. Willow Avenue intersection is No. 26 in the *2017 Priority List for New Traffic Signal Installations* (City of Fresno).

It should be noted that this traffic impact study does not assume any of the improvements included in the TSMI program will be in place for any LOS analysis scenarios.

The City of Fresno Major Street Impact (FMSI) Fee Program

The City's FMSI fee program is made up of the New Growth Area Major Street Impact Fee and the Citywide Regional Street Impact Fee. The fees under these programs are calculated based on land use and net acreage of the property as determined by the City. As a basis for establishing the FMSI fees, the City staff developed the Major Street Capital Improvement Program and estimated the cost of the improvements necessary to implement the major street network identified in the *Fresno General Plan* and Master EIR and to meet the LOS and other policies of the *Fresno General Plan*. The Citywide Regional Street Impact Fee applies to all new developments and the New Growth Area Major Street Impact Fee is a condition on all new development projects in the New Growth Areas.

The FMSI program is updated as necessary on an ongoing basis, in compliance with the current *Fresno General Plan* and the new LOS standards identified therein. The City Council also may specify during a periodic update which improvements should receive funding from the FMSI fee program before other improvements. Based on roadway LOS evaluations, the location of approved new development that will add significant housing or jobs, or other considerations, the City has the ability to spend the fee revenues on any of the projects identified in the FMSI fee program.

PROJECT CHARACTERISTICS

The project deals with two distinct pieces. The western portion (18 acres) is a proposed single family subdivision which will require a GPA to change a portion from BP to MDR. The proposed project will create 239 new residences on that portion with access to E. Copper Avenue. The second portion is a GPA from BP to MU (Mixed use) on 5 acres to the east. No development plan for this area is available.

The project is described herein in terms of the amount of traffic it may generate and the routes that traffic will use.

Project Characteristics

Trip Generation. The amount of new traffic associated with development projects is typically forecast using information developed from recognized national sources. The Institute of Transportation Engineers (ITE) publication *Trip Generation, 10th Edition* is a source recognized by the City of Fresno and other local agencies, and applicable average trip generation rates for single family residences are presented in Table 5.

As shown the subdivision could generate 177 trips in the a.m. peak hour and 237 trips in the p.m. peak hour. With the adjoining 5-acre GPA included the project generates 220 a.m. and 343 net new p.m. trips.

Table 5 also compares trip generation forecasts for site under current zoning. The subdivision site is roughly 23% BP and 77% Medium Density Residential, while the adjoining 5 acres is BP. As shown, based on ITE rates development under current designation would result in 325 a.m. and 322 p.m. peak hour trips.

TABLE 5
TRIP GENERATION RATES AND FORECASTS

Land Use / Source	**Unit**	**AM Peak Hour**			**PM Peak Hour**		
		In	**Out**	**Total**	**In**	**Out**	**Total**
Proposed Project – Western Subdivision							
Single Family Detached (201)	Du	25%	75%	0.74	63%	37%	0.99
Tract 6249	239 du	44	133	177	149	88	237
Proposed Project – Eastern GPA							
Single Family Detached (201)	Du	25%	75%	0.74	63%	37%	0.99
Mixed Use - Residential	35 du[1]	7	19	26	22	13	35
Retail (820)	ksf	62%	38%	0.94	48%	52%	3.81
Mixed Use - Retail	28 ksf[2]	17	9	26	51	56	107
Pass-by trips	34%	6	3	9	17	19	36
Net new trips		11	6	17	34	37	71
Total Net New Trips		18	25	43	56	50	106
Proposed Project - Total							
Net New Trips		**62**	**158**	**220**	**205**	**138**	**343**
Site Development under Existing Zoning							
Business Park (770)[3]	Ksf	85%	25%	1.40	26%	74%	1.26
9.6 acres @ 0.40 FAR	167 ksf	199	35	234	55	155	210
Medium Density Residential	Du	25%	75%	0.74	63%	37%	0.99
14.5 acres @ 8.5 du per acre	123 du’s	23	68	91	77	45	122
Total under current designation		**222**	**103**	**325**	**132**	**200**	**332**

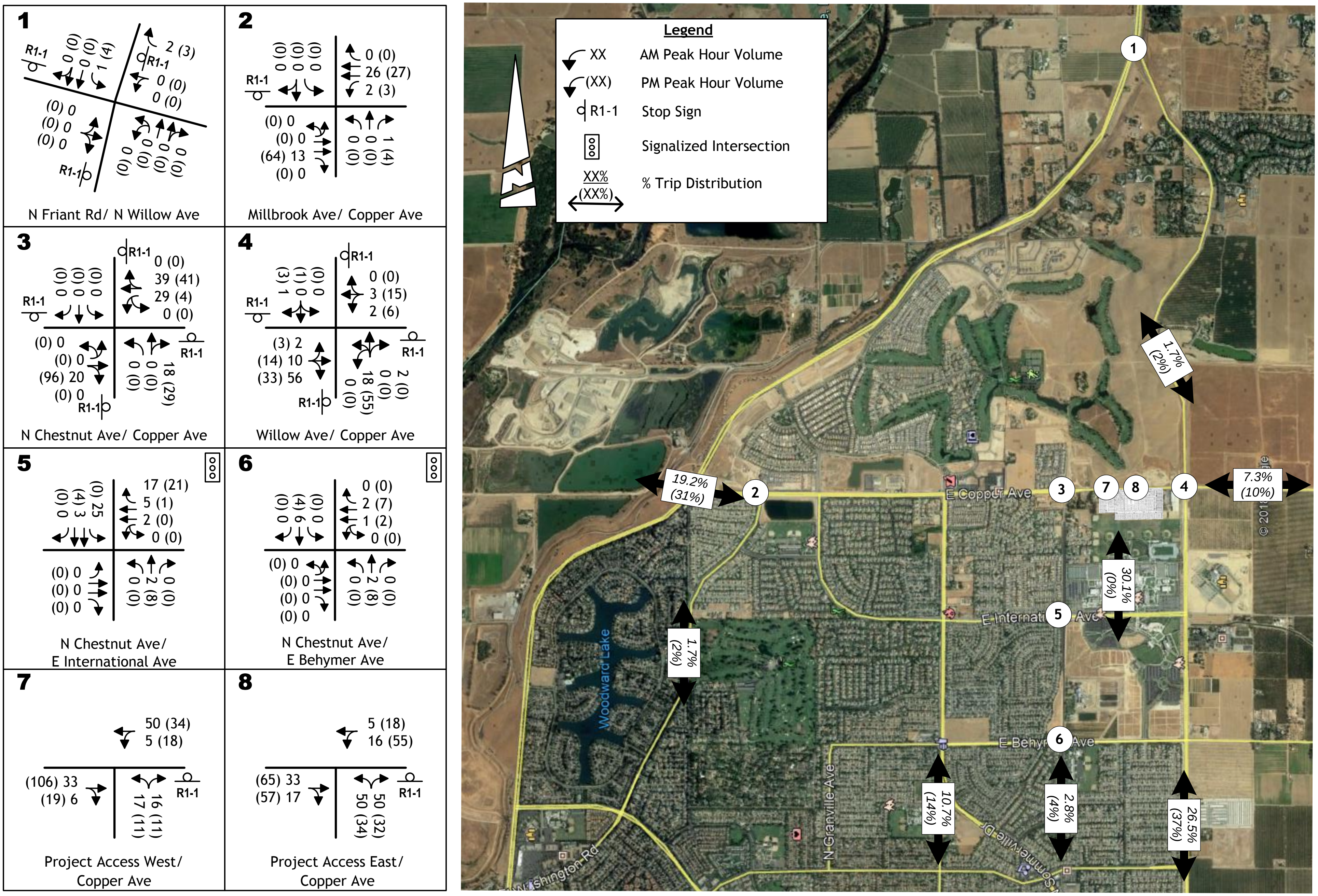
Source: ITE Trip Generation, 10th Edition except as noted. [1] 2.6 acres @ 13.5 du/acre [2] 2.6 acre @ 0.25 FAR
[3] Source: Trip Generation Manual 9th Edition

Trip Distribution. Having determined the number of trips that are expected to be generated by the project, it is necessary to identify the directional distribution of project-generated traffic. The distribution of project trips was identified from FCOG travel demand forecasts using “select zone” analysis to track site trips. However, these assumptions were adjusted to account for a regional traffic model’s tendency to understate travel between residences and schools in the a.m. peak hour. In this case some parents of students attending Granite Ridge IS or Clovis North HS will likely elect to drop off their children as part of a trip that continues onto employment, shopping, etc. Table 6 presents the resulting trip distribution assumptions.

TABLE 6
TRIP DISTRIBUTION ASSUMPTIONS

Direction	Route	Percent of Project Trips	
		AM Peak Hour (residential only)	PM Peak Hour
North	N. Willow Ave beyond E. Copper Ave	1.7%	2.0%
East	E. Copper Ave beyond N. Willow Ave	7.3%	10.0%
South	N Willow Ave beyond International Ave	26.5%	37.0%
	N. Chestnut Ave beyond Behymer Ave	2.8%	4.0%
	N. Maple Ave beyond Behymer Ave	10.7%	14.0%
	Millbrook Ave south of E. Copper Ave	1.7%	2.0%
	Clovis North HS and Granite Ridge IS	30.1%	0.0%
West	E. Copper Ave beyond Millbrook Ave	19.2%	31.0%
	Total	100.0%	100.0%

Trip Assignment. Project trips were assigned to the local street system based on the regional distribution assumptions identified in Figure 4. Figure 4 also identifies the assignment of project peak hour trips under existing conditions.



PROJECT ONLY TRAFFIC VOLUMES AND LANE CONFIGURATIONS

KD Anderson & Associates, Inc.
Transportation Engineers
4705-024 RA 6/5/2019

figure 4

EXISTING PLUS PROJECT IMPACTS

Existing Plus Project Traffic Conditions and Levels of Service

Figure 5 superimposes project trips onto the current background traffic volumes to create the "Existing Plus Project" condition. Subsequent tables compare the "Existing" and "Existing Plus Project" Levels of Service.

Project Traffic Impacts to Level of Service at Intersections. As shown in Table 7, the addition of project traffic may increase the length of delays occurring at intersections, but the project does not result in any new intersections operating with an overall Level of Service in excess of adopted standard. Because conditions are already in excess of the LOS D standard at the E. Copper Avenue / N. Chestnut Avenue intersection and at the E. Copper Avenue / N. Willow Avenue intersections, the significance of the project's impacts are based on consideration of the incremental change in delay. Because the project lengthens the average delay at each intersection by more than 5.0 seconds, its impact is significant.

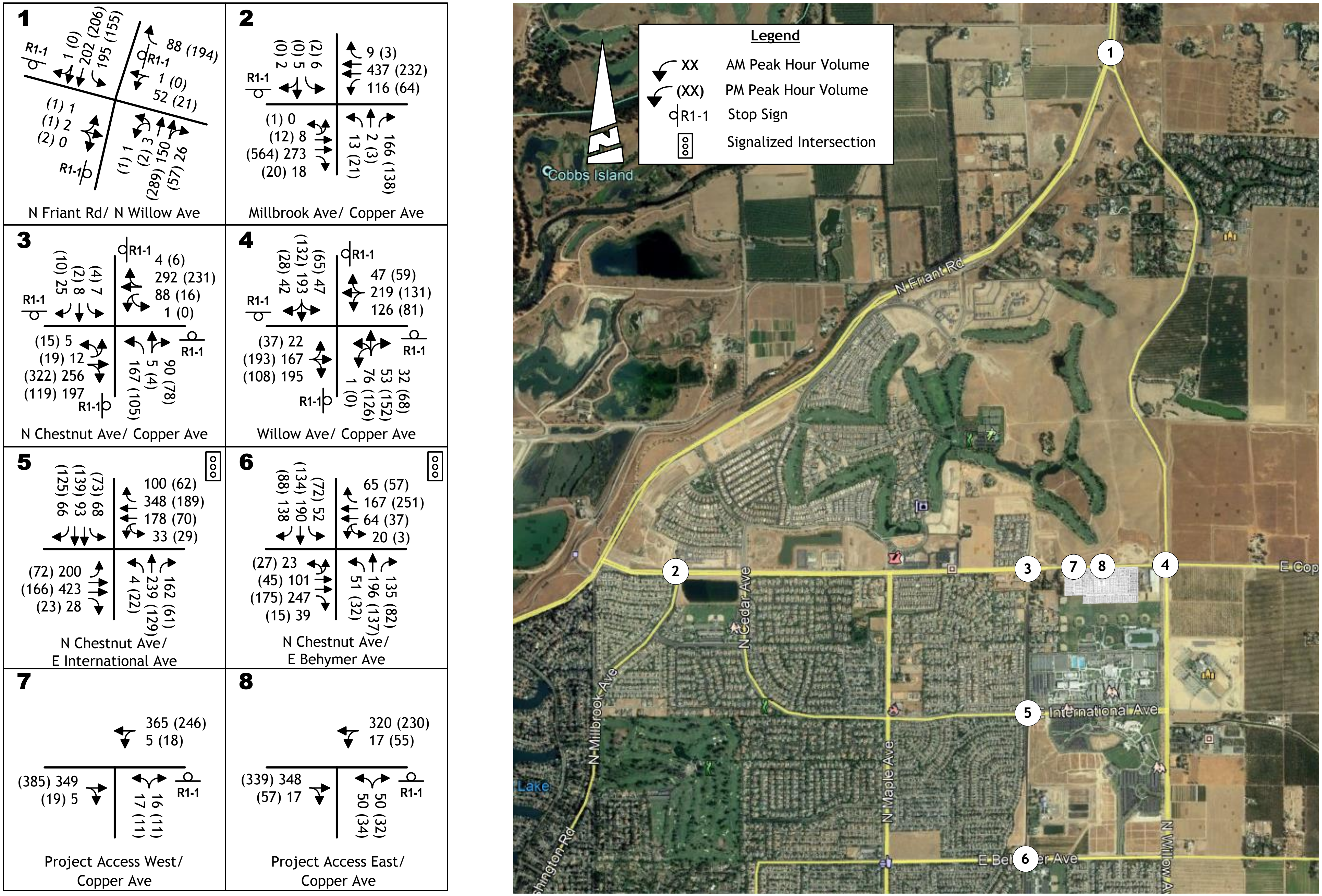
Mitigations: These measures are applicable.

E. Copper Avenue / N. Chestnut Avenue. Appropriate mitigation includes installing traffic signals with separate left turn lanes with protected phasing on each approach. This improvement would yield LOS D or better conditions. The project proponents should be responsible for installing these improvements with applicable fee credits.

E. Copper Avenue / N. Willow Avenue. Appropriate mitigation could include installing traffic signals with separate left turn lanes with protected phasing on each approach. This improvement would yield LOS D or better conditions. The project proponents should be responsible for installing these improvements with applicable fee credits.

Traffic Signal Warrants. The volume of traffic occurring at each unsignalized intersection with development of the project was again compared to the CMUTCD peak hour signal warrant requirements. The status of traffic signal warrants at study intersection is unchanged as a result of project trips.

Peak Hour Queues. Table 8 summarized projected 95th percentile queue lengths at study intersections. As shown, at signalized intersections the 95th percentile queues with the addition of project traffic are similar to those without the project under Existing conditions. At unsignalized locations on E. Copper Avenue the peak periods resulting at all-way stops are up to 150 feet longer. Because these queues occur in through travels "spillover" due to inadequate storage is not a significant impact. However, the traffic signals noted above will reduce the length of queues at these intersections. The project does not substantial increase the length of queues at any other location.



EXISTING PLUS PROJECT TRAFFIC VOLUMES AND LANE CONFIGURATIONS

TABLE 7
EXISTING PLUS PROJECT INTERSECTION LEVEL OF SERVICE

		AM Peak Hour				PM Peak Hour			
		Existing		Existing Plus Project		Existing		Existing Plus Project	
Intersection	**Control**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**
Friant Road / N. Willow Ave									
Westbound left+thru	EB/SB Stop	C	23.9	C	24.1	C	20.8	C	21.0
Eastbound approach		C	20.6	C	20.6	B	14.1	B	14.2
E. Copper Ave / N. Millbrook Ave									
Northbound approach	NB/SB Stop	B	11.2	B	11.3	B	12.6	B	13.3
Southbound approach		C	23.2	C	24.8	C	18.9	C	20.9
E. Copper Ave / N. Chestnut Ave	All-Way Stop	**E**	**40.2**	**F**	**76.0**	B	12.3	C	21.6
	Mitigated[1]	B	17.7	B	18.7	-	-	B	14.3
E. Copper Ave / West Access	NB Stop	-	-			-	-		
Northbound approach				C	15.3			B	13.1
E. Copper Ave / East Access	NB Stop	-	-			-	-		
Northbound approach				C	15.0			B	14.6
E. Copper Ave / N. Willow Ave	All-Way Stop	**E**	**45.1**	**F**	**68.1**	B	14.5	C	21.8
	Mitigated[1]	C	23.3	C	26.5	-	-	C	20.3
International Ave / N. Chestnut Ave	Signal	D	37.3	D	40.9	B	19.6	B	19.6
Behymer Ave / N. Chestnut Ave	Signal	B	17.5	B	17.6	B	14.6	B	14.7

Bold indicates conditions in excess of adopted standard **Highlighted** values are a significant impact

[1] Mitigation includes a traffic signal with separate left turn lanes on each approach with protected left turn phasing

TABLE 8 EXISTING PLUS PROJECT PEAK PERIOD QUEUES										
Intersection		**Storage (feet)**	**Existing**				**Existing Plus Project**			
			AM		**PM**		**AM**		**PM**	
Approach / Lanes			**Volume**	**95th % Queue**	**Volume**	**95th % Queue**	**Volume**	**95th % Queue**	**Volume**	**95th % Queue**
E. Copper Ave / Millbrook Ave										
Northbound		*	180	<25	158	<25	181	<25	162	<25
Southbound		*	13	<25	2	<25	13	<25	2	<25
E. Copper Ave / N. Chestnut Ave										
Eastbound		*	450	400	379	85	470	600	475	210
Westbound		*	317	120	208	40	385	210	253	70
Northbound		*	244	70	158	<25	262	80	187	<25
Southbound		*	40	<25	16	<25	40	<25	16	<25
E. Copper Ave / N. Willow Ave										
Eastbound		*	316	200	288	80	384	350	338	130
Westbound		*	387	340	250	65	392	400	271	90
Northbound		*	142	55	291	80	162	75	346	145
Southbound		*	281	170	221	55	282	190	225	70
International Avenue / N. Chestnut Avenue										
Eastbound	Left	200	200	235	72	105	200	235	72	105
	Thru (2)	*	423	220	166	85	423	220	166	85
	Right	150	28	<25	23	<25	28	<25	23	<25
Westbound	Left	240	209	245	99	135	211	250	99	135
	Thru (2)	*	344	175	188	90	348	180	189	90
	Right	150	84	<25	41	<25	100	<25	62	<25
Northbound	Left	200	4	<25	22	50	4	<25	22	50
	Thru	*	237	260	121	130	239	260	129	140
	Right	130	162	90	61	<25	162	90	61	<25
Southbound	Left	200	43	75	73	115	68	105	73	115
	Thru (2)	*	90	50	135	70	93	50	139	70
	Right	200	66	<25	125	<25	66	<25	125	45
Behymer Ave /N. Chestnut Ave										
Eastbound	Left	200	124	150	72	100	124	150	72	100
	Thru (2)	*	247	115	175	85	247	115	175	85
	Right	shared	39	-	15	-	39	-	15	-
Westbound	Left	220	83	115	38	65	84	120	40	65
	Thru (2)	*	165	90	244	115	167	90	251	120
	Right	75	65	<25	57	<25	65	<25	57	<25
Northbound	Left**	130	51	80	32	55	51	80	32	55
	Thru	*	194	195	129	125	196	195	137	130
	Right	130	135	25	82	<25	135	30	82	<25
Southbound	Left	115	52	80	72	100	52	80	72	100
	Thru	*	184	175	130	115	190	185	134	120
	Right	110	138	25	88	<25	138	25	88	<25

(*) Storage greater than 1,000 feet
(**) connect to a two-way left-turn lane that provide additional storage
Highlighted values exceed the available storage by at least 25 feet

Project Access. This scenario assumes full access at the two subdivision project driveways in order to assess the resulting traffic conditions and relative traffic impacts. Because no site plan is available for the eastern GPA parcel, this analysis assumes right-turn in and out only access to both N. Willow Avenue and to E. Copper Avenue, but those locations are not addressed quantitatively. As indicated, forecast Level of Service satisfies the minimum LOS D standard, and identified volumes do not satisfy traffic signal warrants. This, while review of other existing access on E. Copper Avenue reveals that no outbound left turns are allowed at any private access between Friant Road and N. Willow Avenue, satisfactory operation would be achieved with full access under this initial scenario. However, based on subsequent analysis of long-term cumulative conditions the project's western access should be limited to right turns only while westbound left turns into the site can also be allowed at the eastern access. This can be accomplished with a continuous raised median that is consistent with the plan for E. Copper Avenue. However, a median will create the need to accommodate u-turns at the intersections on either end.

Internal Circulation. The layout of the subdivision project's internal street system has been reviewed to consider the need for traffic calming measures. The project includes two east-west streets that provide primary access through the site. The length of these streets is roughly 1,500 feet, and un-interrupted travel of this distance can result in speeding issues. Review of the site plan reveals that the circulation design has included measures to address this issue, as bulb-outs are planned at all internal intersections to reduce the effective width of the street and to define the limits of on-street parking. While this treatment appears to be adequate overall, there are two narrow north-south connections between the main east-west streets that could benefit from undulation to reduce the potential for "cut-through" traffic (i.e., are of lots 170-177 and lots 231-232).

Pedestrian Impacts. The subdivision project will result in pedestrians walking between the site and other north Fresno area destinations, which primarily consist of area schools. However, while the project will construct sidewalks along its E. Copper Avenue frontage, some pedestrian activity will result in the areas between the project and existing sidewalks or multi-purpose trials. The total distances involved are 1,400 feet from the project to sidewalk on N. Chestnut Avenue and about 420 feet from the project to the Class I bike path on N. Willow Avenue. This is a significant impact.

Mitigation. The project proponent should be responsible for installing an interim all-weather path within existing rights of way between the project and at least one existing sidewalk / paths. With this improvement the project's impact is not significant.

EXISTING PLUS APPROVED PROJECTS (EPAP) – SHORT TERM FUTURE IMPACTS

The traffic impacts of the proposed project have also been considered within the context of traffic conditions in this area of Fresno assuming occupancy of other approved but as yet unconstructed projects under an "Existing Plus Approved Projects" (EPAP) condition.

Existing Plus Approved Projects (EPAP) Conditions

Land Use Assumptions. The City of Fresno was contacted and asked to identify a list of development projects that have been approved or pending but are not yet occupied. Table 9 presents the list of approved but not constructed projects identified by the City, as well as their estimated a.m. and p.m. peak hour trip generation. These projects would generate 951 trips in the a.m. peak hour and 1,421 p.m. peak hour trips.

TABLE 9
APPROVED / PENDING BUT UNBUILT PROJECTS / TRIP GENERATION

Tract	location	Description	Quantity	AM Peak Hour	PM Peak Hour
	SWC N. Chestnut / Copper -D-17-048	Multi Family	64 du	29	36
6106	NEC N. Chestnut / Copper	Single Family	65 du	48	64
	11075 N Knotting Hill	Office	28 ksf	32	32
6132	11110 N Knotting Hill	Single Family	21 du	16	21
6135	11261 N Chestnut	Single Family	13 du	10	13
6126	NEC Alicante / Crestview	Single Family	94 du	70	93
6153	11871 N Alicante	Single Family	41 du	30	41
6185	11860 N Alicante	Single Family	26 du	19	26
6231	11341 N Alicante	Single Family	89 du	66	88
62017	11291 N Alicante	Single Family	44 du	33	44
	NMC Copper / Maple P18-03235	Commercial	77 ksf	95	324
		Senior Care	87 ksf		
	2711/2792/2917 E Copper	Single Family	89 du	66	88
		Multiple Family	150 du	68	84
6238	11479 N Willow	Single Family	47 du	35	47
	Alicante Btw Crestview and N. Willow	Single Family	146 du	108	145
	NEC Friant / Copper	Multi Family	491	226	275
	Total			951	1,421

Technical Approach. The approach taken to estimate EPAP baseline volumes makes use of available data as these projects were included in a recent traffic study prepared for a neighboring project.[1] At intersections where that study did not provide information the trips using adjoining intersections were extended or a local trip generation / distribution analysis was conducted for adjoining development. The trips associated with approved / pending projects were then aggregated and superimposed onto the existing a.m./p.m. background condition to create the EPAP baseline volumes presented in Figure 6. For this analysis the current PHF's occurring at study intersections have been retained for the EPAP condition.

Circulation System Improvements. No improvements are assumed to have been made at study area intersections as a result of other approved / pending projects.

Intersection Levels of Service. Table 10 summarizes weekday peak hour Levels of Service under EPAP background condition. As noted in the discussion of Existing Plus Project impacts, these calculations conservatively assume that current PHF's will remain as background traffic growth occurs. As shown, the length of delays at intersections on E. Copper Avenue will increase, and LOS F conditions are forecast at the N. Millbrook Avenue, N. Chestnut Avenue and N. Willow Avenue intersections.

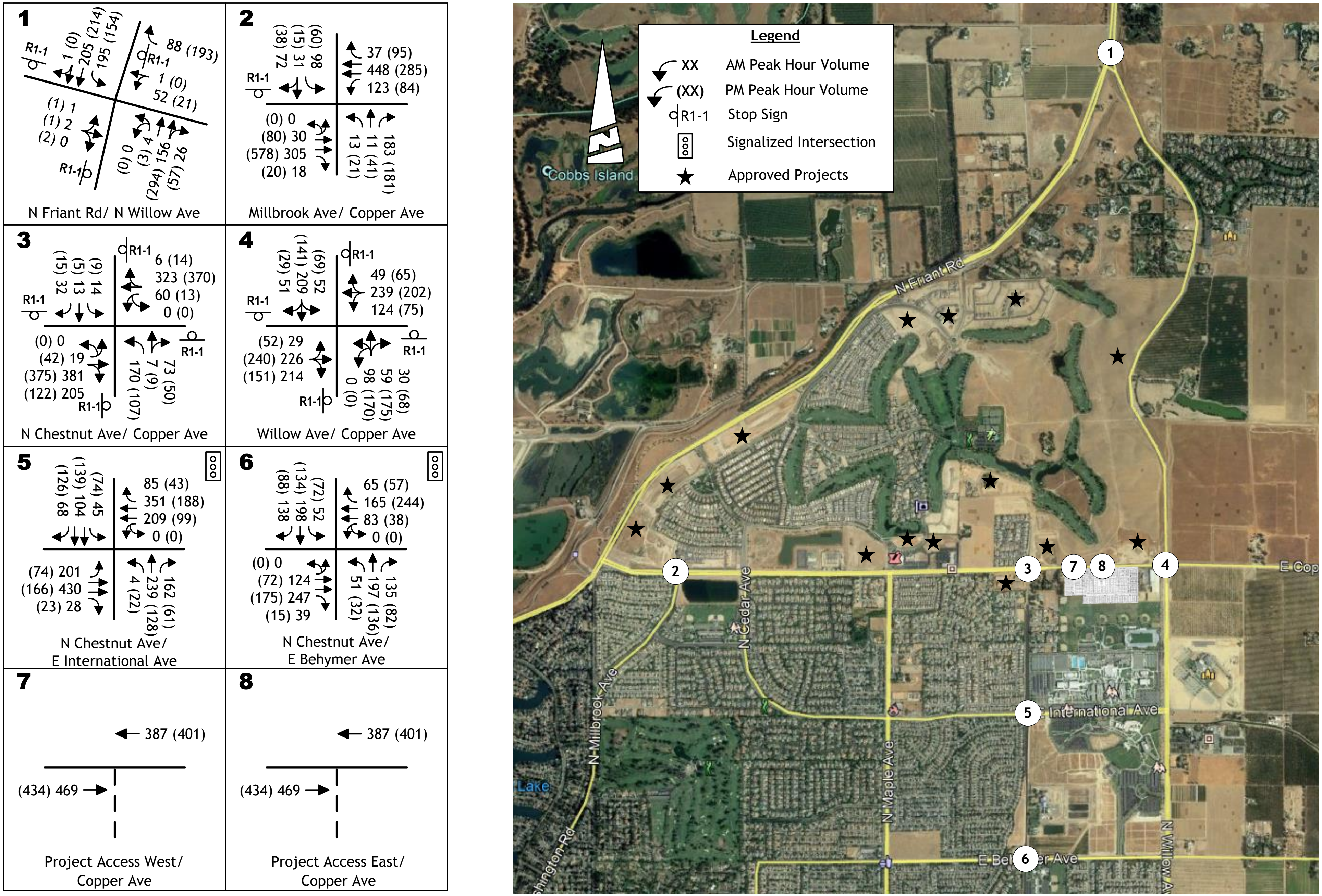
The conditions at the E. Copper Avenue / Millbrook Avenue intersection are consistent with the conclusions of the traffic study competed for a project at the intersection that was cited above. That document suggested a traffic signal with protected left turn phasing as its mitigation. That level of improvement would yield LOS C conditions.

Traffic Signal Warrants. Assuming development of approved / pending projects, the volume of traffic occurring at the three study intersections on E. Copper Avenue will satisfy rural peak hour warrants during both the a.m. and p.m. peak hours.

Peak Period Queues. Table 11 identifies 95th percentile queues at signalized intersections assuming development of approved / pending projects. As indicated, queues at all-way stop controlled intersections are much longer with the additions of traffic associated with other projects, but no additional left turn lanes at signalized intersections will experience queues that exceed available storage.

---

[1] Traffic Impact Analysis for Copper River Apartments, JLB Engineering, January 10, 2019



EXISTING PLUS APPROVED PROJECTS
TRAFFIC VOLUMES AND LANE CONFIGURATIONS

KD Anderson & Associates, Inc.
Transportation Engineers

4705-024 RA 6/5/2019

figure 6

TABLE 10
EPAP SHORT TERM PLUS PROJECT INTERSECTION LEVEL OF SERVICE

Intersection	**Control**	**AM Peak Hour**				**PM Peak Hour**			
		Existing Plus Approved / Pending Projects		**EPAP Plus Project**		**Existing Plus Approved / Pending Projects**		**EPAP Plus Project**	
		LOS	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**
Friant Road / N. Willow Ave									
Westbound left+thru	EB/SB Stop	C	24.5	C	24.6	C	21.3	C	21.6
Eastbound approach		C	20.8	C	20.9	B	14.3	B	14.5
E. Copper Ave / N. Millbrook Ave									
Northbound approach	NB/SB Stop	B	13.3	B	13.7	C	21.5	D	25.0
Southbound approach		**F**	**79.1**	**F**	**94.5**	**F**	**67.1**	**F**	**104.6**
	Signal	C	17.5	B	17.6	B	17.7	B	18.0
E. Copper Ave / N. Chestnut Ave	All-Way Stop	**F**	**127.7**	**F**	**193.5**	D	27.7	**F**	**95.5**
	Mitigated	B	19.1	C	20.4	-	-	B	15.3
E. Copper Ave / West Access	NB Stop	-	-			-	-		
Northbound approach				C	20.5			C	16.9
E. Copper Ave / East Access	NB Stop	-	-			-	-		
Northbound approach				C	20.0			C	20.5
E. Copper Ave / N. Willow Ave	All-Way Stop	**F**	**129.7**	**F**	**178.2**	**F**	**73.5**	**F**	**114.9**
	Mitigated	D	36.0	D	50.1	C	22.9	C	26.7
International Ave / N. Chestnut Ave	Signal	D	37.9	D	41.5	B	19.7	B	19.7
Behymer Ave / N. Chestnut Ave	Signal	2	17.6	B	17.7	B	14.7	B	14.8

Bold indicates conditions in excess of adopted standard **Highlighted** values are a significant impact.

[1] Mitigation is a traffic signal with separate left turn lanes one each approach and protected left turn phasing.

TABLE 11
EPAP PLUS PROJECT PEAK PERIOD QUEUES

Intersection		**Storage (feet)**	**Existing Plus Approved Projects**				**EPAP Plus Project**			
Approach / Lanes			**AM**		**PM**		**AM**		**PM**	
			Volume	**95th % Queue**	**Volume**	**95th % Queue**	**Volume**	**95th % Queue**	**Volume**	**95th % Queue**
E. Copper Ave / Millbrook Ave										
Northbound		*	207	<25	243	40	208	<25	247	45
Southbound		*	200	155	113	90	201	25	113	115
E. Copper Ave / N. Chestnut Ave										
Eastbound		*	605	975	539	275	625	1,210	635	680
Westbound		*	389	225	397	155	457	370	442	285
Northbound		*	250	75	166	25	268	90	195	30
Southbound		*	59	<25	29	<25	59	<25	29	<25
E. Copper Ave / N. Willow Ave										
Eastbound		*	469	640	443	395	537	880	493	525
Westbound		*	412	490	342	225	417	510	363	250
Northbound		*	187	100	413	345	207	120	468	485
Southbound		*	312	250	239	115	313	255	243	120
International Ave / N. Chestnut Ave										
Eastbound	Left	200	201	**235**	74	110	201	**235**	74	110
	Thru (2)	*	430	225	166	85	430	225	166	85
	Right	150	28	<25	23	<25	28	<25	23	<25
Westbound	Left	240	209	245	99	135	211	250	99	135
	Thru (2)	*	351	180	188	90	355	185	189	90
	Right	150	85	<25	43	<25	101	<25	64	<25
Northbound	Left	200	4	<25	22	50	4	<25	22	50
	Thru	*	239	260	128	250	241	265	132	140
	Right	130	162	90	61	<25	162	90	61	<25
Southbound	Left	200	45	75	74	115	70	110	74	115
	Thru (2)	*	104	55	139	70	107	60	143	70
	Right	200	68	<25	126	45	68	<25	126	45
Behymer Ave / N. Chestnut Ave										
Eastbound	Left	200	124	150	72	100	124	150	72	100
	Thru (2)	*	247	115	175	85	247	115	175	85
	Right	shared	39	-	15	-	39	-	15	-
Westbound	Left	220	83	115	38	65	84	120	40	65
	Thru (2)	*	165	90	244	115	167	90	251	120
	Right	75	65	<25	57	<25	65	<25	57	<25
Northbound	Left**	130	51	80	32	55	51	80	32	55
	Thru	*	194	195	129	130	199	200	144	135
	Right	130	135	25	82	<25	135	30	82	<25
Southbound	Left	115	52	80	72	100	52	80	72	100
	Thru	*	184	195	130	120	204	200	138	125
	Right	110	138	25	88	<25	138	25	88	<25

(*) Storage greater than 1,000 feet
(**) connect to a two-way left-turn lane that provide additional storage
Highlighted values exceed the available storage by at least 25 feet

EPAP Plus Project Impacts

Project Impacts to Intersection Levels of Service. Figure 7 presents the sum of background EPAP traffic and project trips. Table 10 also summarizes weekday peak hour Levels of Service under EPAP conditions with the proposed project.

As indicated the signalized study intersections on N. Chestnut Avenue will continue to operate with Levels of Service that satisfy the minimum LOS D standard. However, without improvements the Levels of Service at the N. Millbrook Avenue, N. Chestnut Avenue and N. Willow Avenue will be LOS F with very long delays. The project's impact at those locations is significant based on the incremental change in delay.

Mitigation:

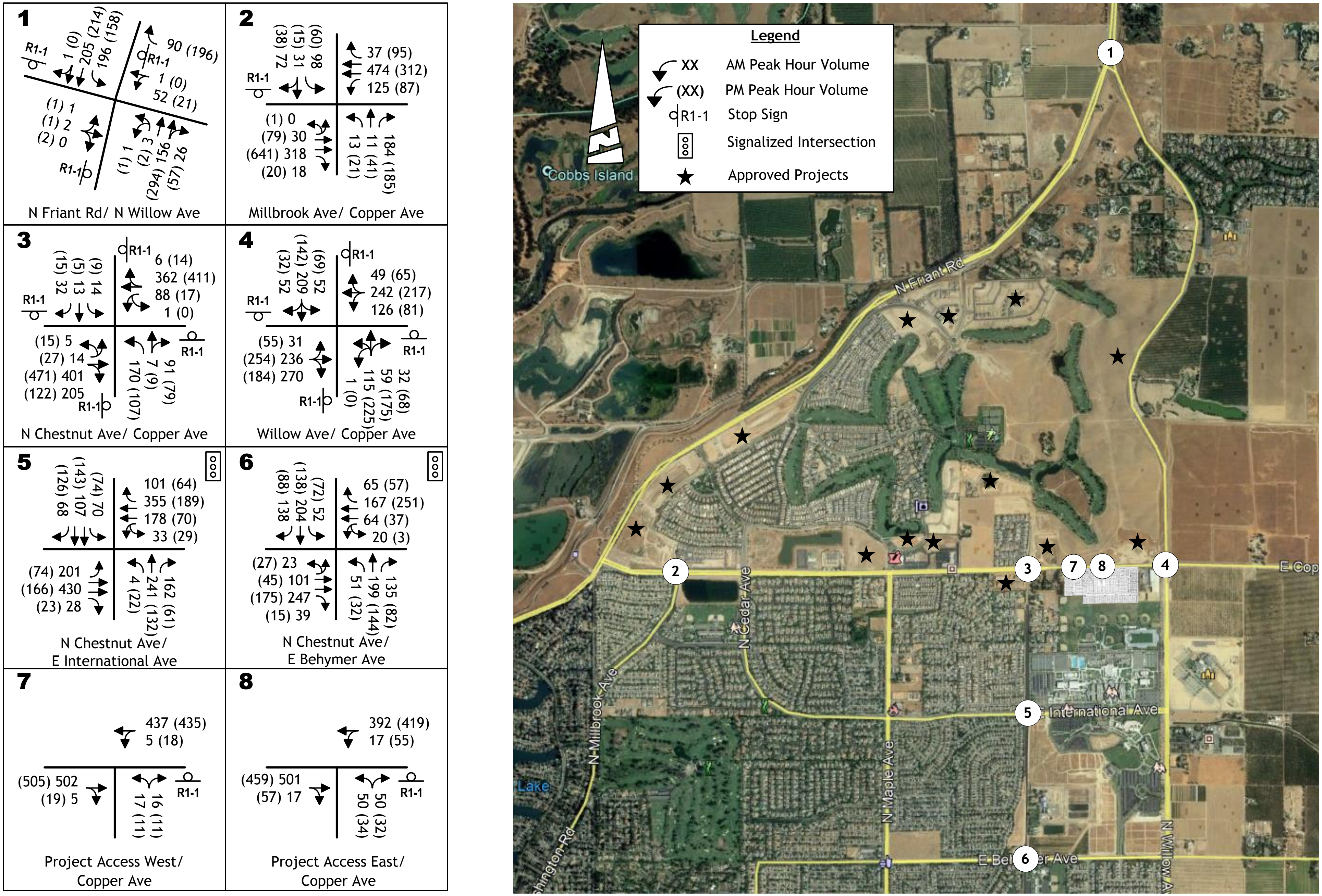
E. Copper Avenue / Millbrook Avenue intersection. Because the project alone does not impact the E. Copper Avenue / Millbrook Avenue intersection, the project will mitigate its impact by paying adopted impact fees.

E. Copper Avenue / N. Chestnut Avenue. The improvements noted under Existing Plus Project conditions would yield LOS D or better conditions. No additional mitigation is required.

E. Copper Avenue / N. Willow Avenue. The improvements noted under Existing Plus Project conditions would yield LOS D or better conditions. No additional mitigation is required.

Traffic Signal Warrants. Assuming development of approved projects and the proposed project, the volume of traffic occurring at the N. Millwood Avenue, N. Chestnut Avenue and N. Willow Avenue intersections on E. Copper Avenue will satisfy peak hour traffic signal warrants.

Peak Period Queues. Table 11 also identifies 95th percentile queues assuming development of approved projects and the proposed project. Assuming no improvements are installed, the long queues associated with all-way stop controlled intersections will become even longer if the project is developed. However, storage in lanes at the two existing signaled intersections will not be deficient.



EPAP PLUS PROJECT TRAFFIC VOLUMES AND LANE CONFIGURATIONS

CUMULATIVE YEAR 2036 IMPACTS

The impacts of the project have also been considered within the context of future traffic conditions under the City of Fresno General Plan.

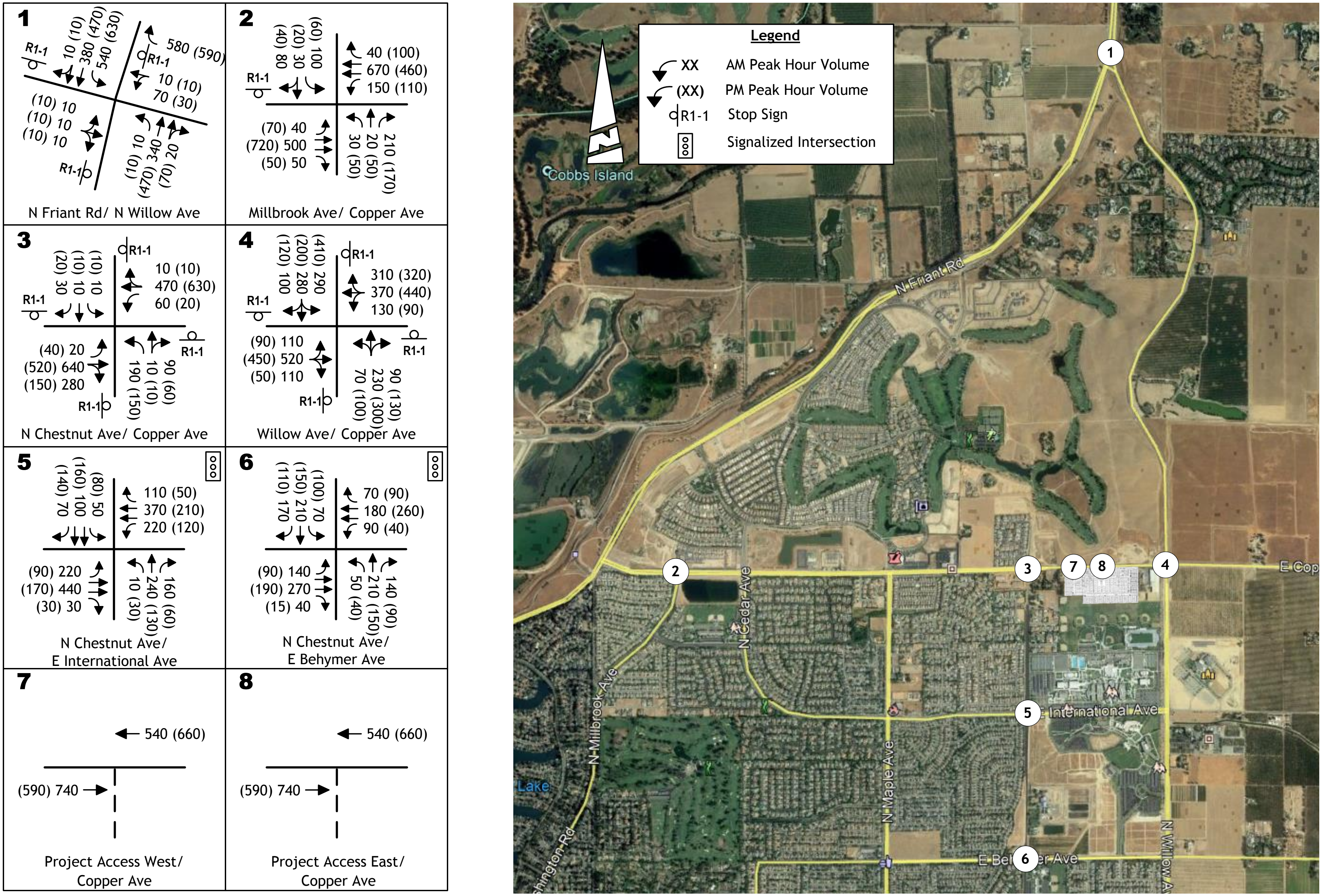
Approach to Developing Long Term Traffic Volume Forecasts

Long term traffic conditions have been evaluated based on consideration of Year 2036 traffic volume forecasts projected by the Fresno Council of Governments (FCOG) Year 2036 regional travel demand forecasting model. The technical approach employed to use model results to create intersection turning movements for study area intersections follows the approach suggested in FCOG user group guidelines. Because a GPA is required, two cumulative scenarios were created with 1) the current GP designations, and 2) the proposed project.

FCOG traffic model runs are the basis for estimating peak hour traffic. The Year 2036 a.m. and p.m. model forecasts were compared to the model's baseline Year 2019 forecasts, and the net difference in segment volumes was determined. These net changes were added or subtracted from the current peak hour approach volumes to create the adjusted cumulative volumes. Existing and adjusted cumulative traffic volumes were then compared to identify equivalent growth rates for intersection approaches for use in creating intersection turning movement volumes.

To create peak hour intersection turning movements, the segment / approach growth factors were applied to current peak hour volumes and the results were balanced to best approximate conditions on each leg using the methodologies contained in the Transportation Research Board's (TRB's) NCHRP Report 255, *Highway Traffic Data for Urbanized Area Project Planning and Design.* This approach reflects the fact that the development of various land uses may affect current travel patterns while adding new traffic, while new roadways may provide alternative routes for existing traffic.

Traffic Volume Forecasts. Figure 8 identifies Cumulative No Project conditions at study intersections, while Figure 9 presents Cumulative volumes with the proposed project.

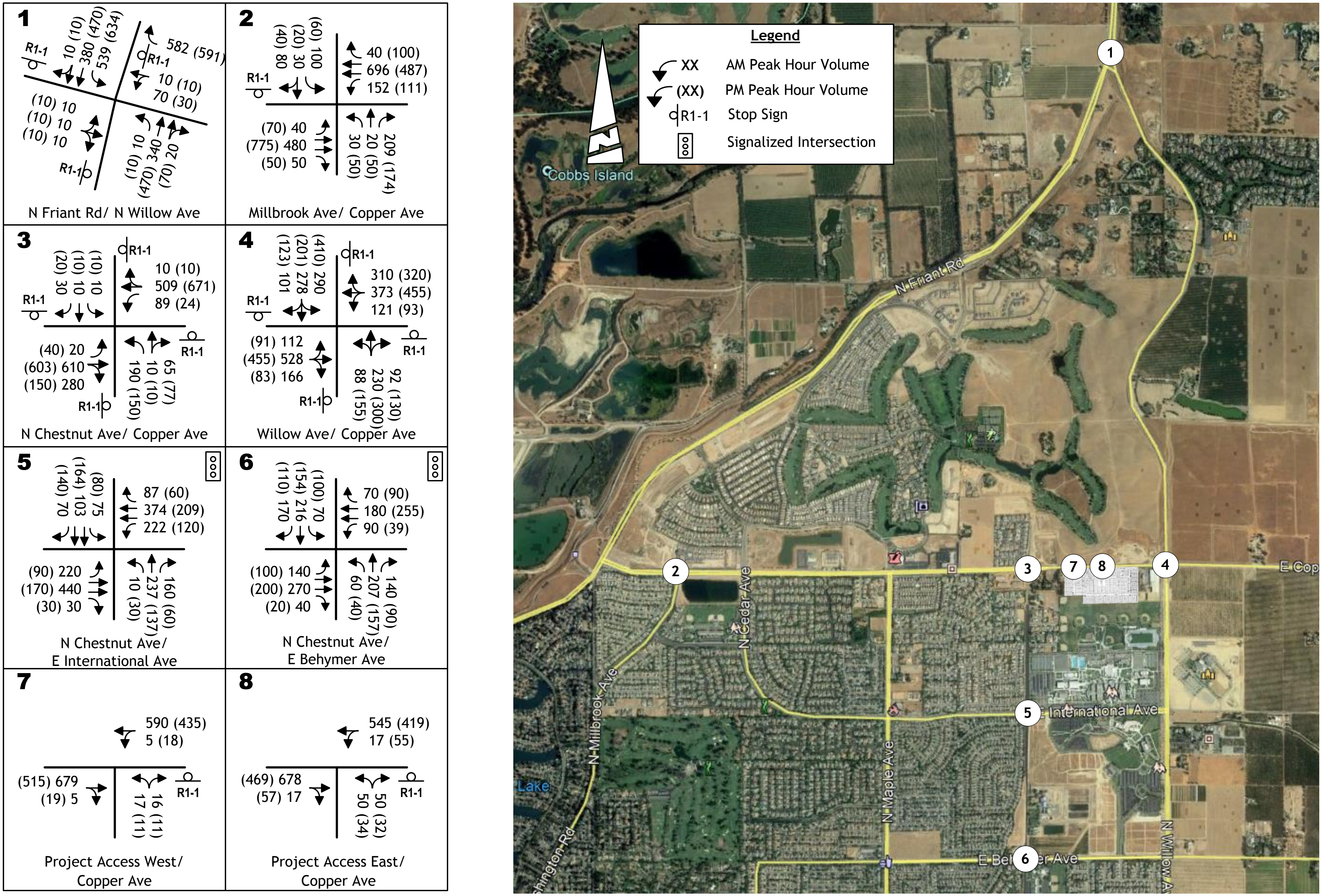


CUMULATIVE BASE TRAFFIC VOLUMES AND LANE CONFIGURATIONS

KD Anderson & Associates, Inc.
Transportation Engineers

4705-024 RA 6/5/2019

figure 8



CUMULATIVE PLUS PROJECT TRAFFIC VOLUMES AND LANE CONFIGURATIONS

KD Anderson & Associates, Inc.
Transportation Engineers
4705-024 RA 6/5/2019

figure 9

Cumulative Year 2036 Conditions

No Project Conditions at Intersections: Levels of Service. Table 12 summarizes weekday peak hour Levels of Service under conditions with the current land use designations on the project site and the Levels of Service with the proposed project. These calculations assume no improvements have been made to study area intersections.

As shown, without improvements all intersections that are currently unsignalized will operate with a Level of Service that exceeds the adopted minimum standards of the City of Fresno or Fresno County. The level of improvements needed to meet minimum Level of Service standards is noted below.

A traffic signal will be needed at the **Friant Road / N. Willow Avenue** intersection.

At the **E. Copper Avenue / Millbrook Avenue intersection** the improvements needed for the EPAP plus project conditions (i.e., traffic signal) will deliver LOS D or better.

At the **E. Copper Avenue / N. Chestnut Avenue intersection** the improvements required for EPAP plus Project conditions (i.e., traffic signal) will yield LOS D or better conditions.

At the **E. Copper Avenue / N. Willow Avenue intersection** the following improvements are needed to deliver LOS D:

- Traffic signal with protected left turn phasing
- Eastbound Approach: three lanes: left turn lane, through lane, through plus right turn lane
- Westbound Approach: three lanes: left turn lane, through lane, through plus right turn lane
- Northbound Approach: three lanes: left turn lane, through lane, right turn lane
- Southbound Approach: three lanes: left turn lane, through land, right turn lane

Table 13 presents resulting Level of Service with these improvements.

Traffic Signal Warrants. Year 2036 traffic volumes at un-signalized intersections were compared to traffic signal warrants. All un-signalized study intersections carry volumes that satisfy urban peak hour warrants without the GPA.

Peak Period Queues. Table 14 presents 95th percentile queues with and without the proposed project assuming no improvements are made to study area intersections. As shown, additional locations at all three signalized intersection will experience queues that extend for considerable distances, but the queues at the two signals on N. Chestnut Avenue will not exceed available storage. Table 15 presents resulting queue lengths with identified improvements. Resulting queues do not exceed the capacity of any existing left turn lanes. It will be necessary to consider the effects of queueing in the design of future intersection improvements at the E. Copper Avenue / N. Willow Avenue intersection, particularly with regards the southbound left turn lane. The identified peak period queues could justify dual left turn lanes.

TABLE 12
LONG TERM YEAR 2036 PLUS PROJECT INTERSECTION LEVEL OF SERVICE WITHOUT IMPROVEMENTS

		Year 2036 AM Peak Hour				**PM Peak Hour**			
		Current Land Use Designations		**With Project**		**Current Land Use Designation**		**With Project**	
Intersection	**Control**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**
Friant Road / N. Willow Ave									
Westbound left+thru	EB/SB Stop	**F**	**>300**	**F**	**>300**	**F**	**>300**	**F**	**>300**
Eastbound approach		**F**	**>300**	**F**	**>300**	**F**	**>300**	**F**	**>300**
E. Copper Ave / N. Millbrook Ave									
Northbound approach	NB/SB Stop	**F**	**49.4**	**E**	**47.9**	**F**	**78.0**	**F**	**102.3**
Southbound approach		**F**	**>300**	**F**	**>300**	**F**	**>300**	**F**	**>300**
E. Copper Ave / N. Chestnut Ave	All-Way Stop	**F**	**>300**	**F**	**>300**	**F**	**150.3**	**F**	**201.1**
E. Copper Ave / West Access Northbound approach	NB Stop	**-**	**-**	**D**	**34.6**	-	-	C	17.6
E. Copper Ave / East Access Northbound approach	NB Stop	**-**	**-**	**E**	**35.1**	-	-	C	21.7
E. Copper Ave / N. Willow Ave	All-Way Stop	**F**	**>300**	**F**	**>300**	**F**	**>300**	**F**	**>300**
International Ave / N. Chestnut Ave	Signal	D	44.4	D	44.5	B	16.6	B	17.0
Behymer Ave / N. Chestnut Ave	Signal	B	18.7	B	18.8	B	16.0	B	16.2

Bold indicates conditions in excess of adopted standard **Highlighted** values are a significant impact

TABLE 13
LONG TERM YEAR 2036 PLUS PROJECT INTERSECTION LEVEL OF SERVICE WITH IMPROVEMENTS

		Year 2036 AM Peak Hour				PM Peak Hour			
		Current Land Use Designations		With Project		Current Land Use Designation		With Project	
Intersection	**Control**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**	**LOS**	**Average Delay (sec/veh)**
Friant Road / N. Willow Ave	Signal	B	13.7	B	13.7	B	15.4	B	15.6
E. Copper Ave / N. Millbrook Ave	signal	C	20.5	C	20.6	B	17.7	B	18.0
E. Copper Ave / N. Chestnut Ave	Signal	C	25.8	C	27.0	B	18.0	B	18.5
E. Copper Ave / N. Willow Ave	Signal	D	42.8	D	44.7	D	44.6	D	46.3
International Ave / N. Chestnut Ave	Signal	D	44.4	D	44.5	B	16.6	B	17.0
Behymer Ave / N. Chestnut Ave	Signal	B	18.7	B	18.8	B	16.0	B	16.2

Bold indicates conditions in excess of adopted standard **Highlighted** values are a significant impact

TABLE 14
LONG TERM PLUS PROJECT PEAK PERIOD QUEUES WITHOUT IMPROVEMENTS

Intersection		**Storage (feet)**	**No Project**				**With Project**			
			AM		**PM**		**AM**		**PM**	
Approach / Lanes			**Volume**	**95th % Queue**	**Volume**	**95th % Queue**	**Volume**	**95th % Queue**	**Volume**	**95th % Queue**
E. Copper Ave / Millbrook Ave										
Northbound		*	260	80	270	105	259	85	274	120
Southbound		*	210	330	120	205	210	335	120	235
E. Copper Ave / N. Chestnut Ave										
Eastbound		*	940	>1,000	710	825	910	>1,000	793	>1,000
Westbound		*	540	580	660	770	608	690	705	840
Northbound		*	290	90	220	50	265	90	237	45
Southbound		*	50	<25	80	<25	50	<25	40	<25
E. Copper Ave / N. Willow Ave										
Eastbound		*	740	845	590	495	806	930	629	515
Westbound		*	810	980	850	995	804	910	868	960
Northbound		*	390	255	530	395	410	270	585	450
Southbound		*	670	720	730	775	669	725	734	725
International Ave / N. Chestnut Ave										
Eastbound	Left	200	220	**260**	90	130	220	260	90	130
	Thru (2)	*	440	230	170	90	440	230	170	90
	Right	150	30	<25	30	<25	30	<25	30	<25
Westbound	Left	240	220	260	120	160	222	260	120	**160**
	Thru (2)	*	370	190	210	105	374	195	209	105
	Right	150	110	<25	50	<25	87	<25	60	<25
Northbound	Left	200	10	25	30	60	10	25	30	**60**
	Thru	*	240	265	130	145	237	260	137	150
	Right	130	160	90	60	<25	160	85	60	<25
Southbound	Left	200	75	115	80	125	75	115	80	125
	Thru (2)	*	100	55	160	80	103	55	164	80
	Right	200	70	<25	140	45	70	<25	140	45
Behymer Ave / N. Chestnut Ave										
Eastbound	Left	200	140	170	90	120	140	170	100	130
	Thru (2)	*	270	125	190	90	270	125	200	95
	Right	shared	40	-	15	-	40	-	20	-
Westbound	Left	220	90	125	40	65	90	125	39	65
	Thru (2)	*	180	95	260	130	180	95	255	130
	Right	75	70	<25	90	<25	70	<25	90	<25
Northbound	Left**	130	60	95	40	65	60	95	40	70
	Thru	*	210	210	150	150	207	205	157	155
	Right	130	140	25	90	<25	140	30	90	<25
Southbound	Left	115	70	105	100	135	70	105	100	**140**
	Thru	*	210	205	150	145	216	210	154	150
	Right	110	170	25	110	<25	170	30	110	<25

(*) Storage greater than 1,000 feet
(**) connect to a two-way left-turn lane that provide additional storage
Highlighted values exceed the available storage by at least 25 feet

TABLE 15
LONG TERM PLUS PROJECT PEAK PERIOD QUEUES WITH IMPROVEMENTS

Intersection		**Storage (feet)**	**No Project**				**With Project**			
			AM		**PM**		**AM**		**PM**	
Approach / Lanes			**Volume**	**95th % Queue**	**Volume**	**95th % Queue**	**Volume**	**95th % Queue**	**Volume**	**95th % Queue**
E. Copper Ave / Millbrook Ave										
Eastbound	Left	240	40	65	70	105	40	65	70	105
Westbound	Left	270	150	260	110	180	152	270	111	185
Northbound	Left	230**	20	50	50	75	30	50	50	75
Southbound	left	*	100	170	60	85	100	170	60	85
E. Copper Ave / N. Chestnut Ave										
Eastbound	Left	280	20	50	40	85	20	50	40	85
Westbound	Left	160	60	105	20	55	89	180	24	55
Northbound	Left	150**	190	300	150	225	190	300	150	225
Southbound	Left	*	10	30	10	30	10	30	10	30
E. Copper Ave / N. Willow Ave										
Eastbound	Left	*	110	165	90	130	112	170	91	130
Westbound	Left	*	130	185	90	130	121	165	93	130
Northbound	Left	*	70	105	100	140	88	125	155	240
Southbound	left	*	290	330	410	565	290	330	410	565
International Ave / N. Chestnut Ave										
Eastbound	Left	200	220	**260**	90	130	220	**260**	90	130
Westbound	Left	240	220	260	120	160	222	260	120	**160**
Northbound	Left	200	10	25	30	60	10	25	30	**60**
Southbound	Left	200	75	115	80	125	75	115	80	125
Behymer Ave / N. Chestnut Ave										
Eastbound	Left	200	140	170	90	120	140	170	100	130
Westbound	Left	220	90	125	40	65	90	125	39	65
Northbound	Left**	130	60	95	40	65	60	95	40	70
Southbound	Left	115	70	105	100	**135**	70	105	100	**140**

(*) Storage greater than 1,000 feet
(**) connect to a two-way left-turn lane that provide additional storage
Highlighted values exceed the available storage by at least 25 feet

Cumulative Year 2036 Plus Project Conditions

Plus Project Conditions at Intersections: Levels of Service. Table 12 compares weekday peak hour Levels of Service under conditions with the current land use designations on the project site and the Levels of Service with the proposed project. These calculations assume no improvements have been made to study area intersections.

As shown, without improvements all intersections that are currently unsignalized will operate with a Level of Service that exceeds the adopted minimum standards of the City of Fresno or Fresno County. In this case the project's impact is based on the incremental change in delay. As indicated, with the exception of the Friant Road / N. Willow Avenue intersection, the incremental change in delay at all unsignalized locations would exceed the increment allowed by City of Fresno guidelines, and as result, the project's impact is significant.

The level of improvements needed to meet minimum Level of Service standard at each location is the same as was noted for the Cumulative No Project condition.

Mitigation:

E. Copper Avenue / Millbrook Avenue intersection. Because the project alone does not impact the E. Copper Avenue / Millbrook Avenue intersection, the project will mitigate its impact by paying adopted City of Fresno impact fees.

E. Copper Avenue / N. Chestnut Avenue. The improvements noted as mitigation under Existing Plus Project conditions would yield LOS D or better conditions. No additional mitigation is required.

E. Copper Avenue / N. Willow Avenue. The improvements for the Cumulative No Project condition would yield LOS D or better conditions. The project will contribute its fair share to the cost of these improvements by paying adopted fees.

Traffic Signal Warrants. All unsignalized intersections carry volumes that satisfy peak hour signal warrants.

Peak Period Queues. Table 14 presents 95th percentile queues with the proposed project assuming no improvements are made to study area intersections. As shown, additional locations at all three signalized intersection will experience queues that extend for considerable distances, but the queues at the two signals on N. Chestnut Avenue will not exceed available storage. Table 15 presents resulting queue lengths with identified improvements. Resulting queues do not exceed the capacity of any existing left turn lanes.

Project Access. As noted in Table 12, the Level of Service at the two project driveways is forecast to exceed the City's minimum LOS D standard under cumulative condition. As a result it is reasonable to expect that outbound left turns from the project onto westbound E. Copper

Avenue will be prohibited. However, based on the precedent established elsewhere along E. Copper Avenue, westbound left turns into the project site can be acceptable. The feasibility of left turn in only access is predicated on available distance between the project access and adjoining intersections. The eastern driveway is 1,120 feet from N. Willow Avenue, and this distance is adequate to accommodate the back-to-back storage of requirements of the eastbound left turn lane approaching N. Willow Avenue and the westbound left turn lane into the site. The two project driveways are about 485 feet apart, and this distance could be adequate for a left turn lane based on the length of other lanes that have been installed elsewhere on E. Copper Avenue. However, the City of Fresno would need to consider the eventual access requirements for the property on the north side of E. Copper Avenue, and a commitment to westbound left turn lanes at both driveways could severely limit the possibility of access to that property. For that reason it is recommended that the western driveway be limited to right turns in and out only.

Fair Share Calculation. The share of future traffic at each location that is caused by the proposed subdivision project has been determined and is noted in Table 16. Fair share contribution is applicable to those long-term improvements that are not addressed by adopted fee programs.

TABLE 16
SUBDIVISION PROJECT FAIR SHARE CALCULATION

Location	Time Period	Existing Traffic	Subdivision Project Traffic	Total Year 2036 Traffic	Future New Traffic	Fair Share Percentage
Friant Road / N. Willow Ave	a.m.	719	3	1,991	1,272	0.2%
	p.m.	922	5	2,325	1,403	0.4%
E. Copper Ave / Millbrook Ave	a.m.	1,013	37	1,927	914	4.0%
	p.m.	963	78	1,987	1,024	7.6%
E. Copper Ave / N. Chestnut Ave	a.m.	1,051	90	1,833	782	11.5%
	p.m.	761	121	1,775	990	12.2%
E. Copper Ave / N. Willow Ave	a.m.	1,126	90	2,689	1,563	5.8%
	p.m.	1,050	117	2,816	1,766	6.6%
International Ave / N. Chestnut Ave	a.m.	1,890	43	2,028	138	31.2%
	p.m.	1,126	10	1,290	164	6.1%
Behymer Ave / N. Chestnut Ave	a.m.	1.477	7	1,653	176	4.0%
	p.m.	1,134	10	1,355	221	4.5%

APPENDIX

(under separate cover)

Scope of Work and Correspondence with Agencies
FCOG Model Request
Traffic Model Results
Traffic Count Data
Level of Service Analysis Worksheets
Collison Data
Traffic Signal Warrants Worksheets

TECHNICAL APPENDIX

FOR

TRACT 6249
Fresno, California

Prepared For:

Morton & Pitalo, Inc.
75 Iron Point Circle, Suite 120
Folsom, CA 95630

Prepared By:

KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
(916) 660-1555

REGISTERED PROFESSIONAL ENGINEER
KENNETH D. ANDERSON
No. C32774
CIVIL
STATE OF CALIFORNIA

June 5, 2019

Job No. 4705-024

KD Anderson & Associates, Inc.
Transportation Engineers

April 23, 2019

Ms Jill Gormley, TE
City Traffic Engineer / Traffic Operations & Planning Manager
City of Fresno, Public Works Department
2600 Fresno Street, 4th Floor
Fresno, CA 93721-3623

RE: FINAL SCOPE OF WORK FOR TRACT 6249, FRESNO, CALIFORNIA

Dear Ms. Gormley:

This letter transmits the final scope of work for the traffic study required for Tentative Map No. 6249 in the City of Fresno, California. As we understand, the proposed project involves construction of 239 single family lots on an 85-acre parcel located on E. Copper Avenue near the N. Willow Avenue intersection. The existing General Plan designation is MDR/BP and because RS-5 Single Family designation is proposed a GPA is proposed. The City of Fresno will require a traffic impact study to identify the impacts of the project under Existing, Existing plus Other Approved Projects and Long Term Cumulative conditions. City staff will also request input from adjoining jurisdictions and Caltrans with regards to the study scope.

Analysis Approach. We originally suggested study area limits in our draft scope of work but that work program changed in response to a trip generation, distribution and assignment analysis submitted to the City of Fresno as well as City of Clovis, County of Fresno and Caltrans staff.

As result of the scoping process we will address these six (6) intersections:

1. Friant Road / N. Willow Avenue
2. E. Copper Avenue / N. Chestnut Avenue
3. E. Copper Avenue / N. Willow Avenue
4. E. International Avenue / N. Chestnut Avenue
5. E. Behymer Avenue / N. Chestnut Avenue
6. E. Behymer Avenue / N. Willow Avenue

The study will also address the project access on E. Copper Avenue.

The study will address weekday AM/PM peak hour conditions under the following study scenarios:

1. Existing Conditions when area schools are in session
2. Existing Plus Project Alone
3. Existing Plus Other Approved Projects (EPAP)
4. EPAP Plus Project
5. Long Term Cumulative without the Project under the FCOG regional travel demand forecasting model (Current GP designations)
6. Long Term with the Project

Scope of Work. To complete this assignment we anticipate the following tasks:

Task 1 – Identify Project Characteristics. We will identify the project's daily and peak hour trip generation based on rates published by the Institute of Transportation Engineers (ITE). That forecast will be compared to an estimate based on current General Plan land use designations. We will identify the directional distribution of project trips based on current travel patterns at study intersections, through review of the assumptions made for other development in this area of the community and/or via select link analysis using the FCOG traffic model.

Task 2 – Select Zone Analysis. We will ask FCOG to conduct a select zone "Trip Trace" analysis for the project to identify the routes that its trips will take and to confirm study area limits with other agencies. An exhibit illustrating these results will be included in our report to defend the choice of study area as applicable. FCOG's cost for this service is a separate cost in our budget.

Task 3 – Identify Current Background Traffic Conditions at Study Locations. We will identify daily, weekday a.m. (7:00 to 9:00 a.m.) and p.m. (4:00 to 6:00 p.m.) peak hour traffic volumes and determine the current operating Level of Service at the study intersections using HCM, 6th Edition methodology. We have assumed that new traffic counts will be required at all intersections, but current information approved by the City of Fresno will be re-used if available. We will make a visit to the site in order to collect the information needed to determine operating Levels of Service and to describe the pedestrian, bicycle and transit facilities that are available to serve this project. Peak hour traffic signal warrants will be reviewed at un-signalized intersections and 95th percentile queue lengths would be identified at signalized intersections.

Task 4 – Identify Project Specific Impacts. We will develop "Existing plus Project Alone" traffic volumes and determine whether resulting Levels of Service will satisfy minimum City of Fresno or other agency requirements prescribed under their General Plan. Pedestrian, transit and bicycle impacts will be identified. If needed, mitigation measures will be identified and resulting Levels of Service will be calculated.

Task 5 – Evaluate Existing Plus Approved Projects – Short Term Impacts. We will ask the City of Clovis and City of Fresno for information regarding other approved projects that can be expected to be occupied in the short term horizon. We will obtain the traffic studies completed for those projects to identify their contribution to study locations. Where data is not available we will conduct an applicable trip generation, distribution and assignment analysis. Project trips will be superimposed onto the background condition to create EPAP plus Project volumes. Improvements associated with approved projects will be determined in consultation with City staff. Resulting Levels of Service will be calculated and compared to adopted measures of significance. If needed, mitigation measures will be identified and resulting Levels of Service will be calculated.

Task 6 – Evaluate Long Term Cumulative Impacts. We will use FCOG regional travel demand forecasting model forecasts to create long term traffic volume projections with and without the proposed project. We will use that data to create intersection turning movement forecasts using the technical approach accepted by the City of Clovis and the City of Fresno. Planned long term improvements will be identified in consultation with City staff. This information will be used to calculate operating Levels of

KDA

Service with and without the proposed project. Improvements that are needed to meet minimum City of Clovis / Fresno Level of Service standards will be determined.

Thank you again for your assistance.

Sincerely,

KD Anderson & Associates, Inc.

Kenneth D. Anderson, P.E., President

Fresno Tract 6249.pro

Ken Anderson

From: Ken Anderson
Sent: Sunday, January 27, 2019 8:33 AM
To: Sean Smith
Cc: Jill.Gormley@fresno.gov
Subject: FW: Tract 6249 Fresno
Attachments: Tract 6249 Scoping Letter 1 25 2019.pdf

Sean:

I have prepared this draft scope of work for a Subdivision in Fresno north of Clovis North HS. The City of Fresno is looking it over. While the area around the site is in the County today it occurs to me that the Clovis SOI goes north along Willow to Copper. Therefore I probably need to ask that the City of Clovis also take a look at what we are doing and let me know if we are okay or if you have any comments.

Thanks for you help!

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Laura Terry <LTerry@kdanderson.com>
Sent: Friday, January 25, 2019 5:13 PM
To: Jill Gormley (jill.gormley@fresno.gov) <jill.gormley@fresno.gov>
Cc: Harpreet Kooner (hkooner@fresnocountyca.gov) <hkooner@fresnocountyca.gov>; David Padilla (dave.padilla@dot.ca.gov) <dave.padilla@dot.ca.gov>; Ken Anderson <KAnderson@kdanderson.com>
Subject: Tract 6249 Fresno

Good Afternoon,
Attached is a letter from Ken Anderson. Please contact him if you have questions.

Sincerely,

Laura Terry, Office Manager
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
(916) 660-1555

KD Anderson & Associates, Inc.
Transportation Engineers

January 25, 2019

Ms. Jill Gormley, TE, City Traffic Engineer / Traffic Operations & Planning Manager
City of Fresno, Public Works Department
2600 Fresno Street, 4th Floor
Fresno, CA 93721-3623

RE: TRAFFIC ANALYSIS SCOPING ASSESSMENT FOR TRACT 6249 IN THE CITY OF FRESNO, CA

Dear Ms. Gormley:

This letter documents **KD Anderson & Associates'** assessment of potential traffic impact analysis requirements for Subdivision Tract 6249 in the City of Fresno. The project will be located on the south side of Copper Avenue in the area between Willow Avenue and Chestnut Avenue immediately north of Clovis North HS.

Approach

As is typically the case, we identified the amount of vehicle traffic that the project may add to the local area circulation system and compared those initial projections with City of Fresno and Fresno County criteria contained in its traffic study guidelines. Project trip generation was determined based on ITE rates, and the distribution was suggested from a "trip trace" created from the FCOG regional traffic model.

Project Description

The proposed project consists of MDR uses on a site that has existing General Plan designations of BP on an eastern portion and MDR on the west. The site will yield 239 MDR units.

Trip Generation

The Institute of Transportation Engineers (ITE) publication *Trip Generation, 10th Edition* provides information on the characteristics of residential uses. Table 1 identifies the trip generation rates reported by ITE. The project would create 177 a.m. and 237 p.m. peak hour trips at its driveway.

TABLE 1
TRIP GENERATION RATES AND FORECASTS

		AM Peak Hour			PM Peak Hour		
Land Use / Source	**Unit**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Single Family Detached (201)	Du	25%	75%	0.74	63%	37%	0.99
Tract 6249	239 du	44	133	177	149	88	237

Source: ITE Trip Generation, 10th Edition

FCOG Trip Trace Results

We requested a new traffic model run from the Fresno Council of Governments that would illustrate the probable path of "new" trips generated by this land use. A copy of the plots for a.m. and p.m. peak hour trips is attached. We "highlighted" the results within the context of the volume thresholds employed under your guidelines. Yellow streets see an increase of more than 20 vehicles per hour (vph), while those highlighted in orange see an increase that is more than 10 vehicles but fewer than 20 vph.

In this case, this 10 vph volume level is reached in the p.m. peak hour at these locations:

- Copper Avenue from Friant Road to Minnewawa (see attachment PM 6/6)
- Friant Road from Willow Avenue to SR 41
- Maple Avenue from Willow Avenue to south of Shepherd Avenue
- Willow Avenue from Copper Avenue to south of SR 168
- Minnewawa Avenue from Copper Avenue to south of Shepherd, and
- Shepherd Avenue from Willow Avenue N Fowler Avenue

Distribution

The trip trace suggests the distribution noted in Table 2.

TABLE 2
LOCAL AREA TRIP DISTRIBUTION ASSUMPTIONS

Direction	Route	Percentage of Peak hour trips	AM Trips	PM Trips
South	Friant Road south of Copper Ave	28% to 29%	49	69
South	Maple Ave south of Copper Ave	7% to 14%	13	32
South	Chestnut Ave south of Copper Ave	5% to 4%	8	10
South	Willow Ave south of Copper Ave	41% to 35%	72	84
East	Copper Ave east of Willow Ave	6% to 10%	11	23
Others		14% to 8%	24	19
Total		100%	177	237

Study Area

Based on review of this information, as well as consideration of the a.m. peak hour issues typically associated with area schools, our proposed study area includes these nine locations:

1. E. Copper Avenue / N. Friant Road
2. E. Copper Avenue / N. Millbrook Avenue
3. E. Copper Avenue / N. Maple Avenue
4. E. Copper Avenue / N. Chestnut Avenue
5. E. Copper Avenue / N. Willow Avenue
6. E. International Avenue / N. Chestnut Avenue

7. E. International Avenue / N. Willow Avenue
8. E. Behymer Avenue / N. Chestnut Avenue
9. E. Behymer Avenue / N. Willow Avenue

The study will also address the project access on E. Copper Avenue.

Work Program

The study will address weekday AM/PM peak hour conditions under the following study scenarios:

1. Existing Conditions when area schools are in session
2. Existing Plus Project Alone
3. Existing Plus Other Approved Projects (EPAP)
4. EPAP Plus Project
5. Long Term Cumulative without the Project under the FCOG regional travel demand forecasting model (Current GP designations)
6. Long Term with the Project

Our Work Program is attached.

Next Steps

We would appreciate your review and comment on the adequacy of our scope of work, with particular interest in the study locations.

This same information is being transmitted to Caltrans District 6 and to Fresno County with a similar request for comment.

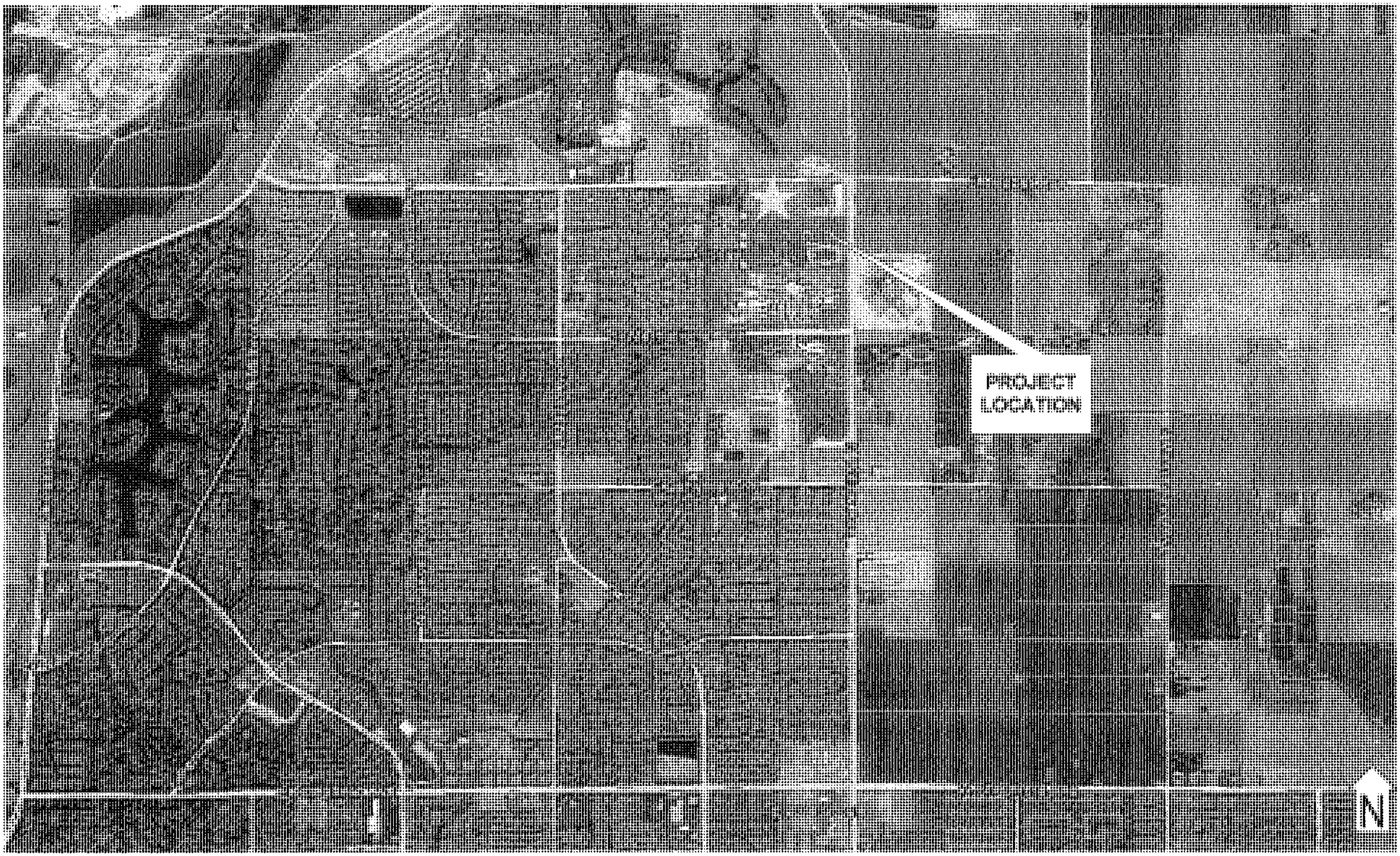
Thank you for your assistance. Please feel free to contact me if you have any questions or to confirm the breadth of the traffic study.

Sincerely Yours,
KD Anderson & Associates, Inc.

Kenneth D. Anderson, P.E.
President

Attachments: Vicinity Map, Site Plan, FCOG Plots a.m./p.m., Scope of Work

cc: Ms. Harpreet Kooner, Fresno County; Mr. David Padilla, District 6



VICINITY MAP

KD Anderson & Associates, Inc.
Transportation Engineers

4705-024 LT 1/25/2019

TENTATIVE TRACT MAP NO. 6249
A SINGLE FAMILY & MULTI-FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT
IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

PREPARED OCTOBER 31, 2018

GENERAL NOTES

1. 578-01-35 & 578-01-24 ARE VACANT / IDLE. 578-01-23 HAS RESIDENTIAL HOME ON THE
2. SITE ACREAGE IS 18.85± GROSS ACRES AND 18.14± NET ACRES (GROSS ACREAGE, LESS PUBLIC ROADS).
3. THE TRACT IS NOT WITHIN 200' OF ANY RAILROAD, FREEWAY OR EXPRESSWAY.
4. ABANDON ALL WELL AND SEPTIC TANKS TO COUNTY STANDARDS.
5. NO IRRIGATION CANAL IS ON SITE.
6. ALL PUBLIC UTILITIES (GAS & ELECTRIC - PG&E, TELEPHONE - AT&T, CABLE TELEVISION - COMCAST, AND CITY OF FRESNO WATER & SEWER) SHALL BE INSTALLED TO CITY STANDARDS.
7. THERE ARE EXISTING ABOVE GROUND USES OR STRUCTURES SUCH AS BUILDINGS, WATER WELLS, POWER LINES, TOWERS, ETC., WITHIN THE PROPOSED SUBDIVISION ON APN 578-01-23
8. THIS AREA IS NOT SUBJECT TO FLOOD INUNDATION.
9. THERE ARE EXISTING UNDERGROUND FEATURES SUCH AS WELLS, CESSPOOLS, SEWERS, CULVERTS, STORM DRAIN, DUMP SITES AND OTHER UNDERGROUND STRUCTURES WITHIN THE PROPOSED SUBDIVISION ON APN 578-01-23.
10. ALL IMPROVEMENTS SHALL BE AS REQUIRED BY THE CITY OF FRESNO AND BUILT TO CITY STANDARDS AND SHALL INCLUDE SANITARY SEWER, DOMESTIC WATER, UNDERGROUND POWER, TELEPHONE, GAS, CONCRETE CURBS, GUTTERS, SIDEWALKS, PERMANENT STREET PAVEMENT, STREET LIGHTS, ETC. ON-SITE STREETS WILL BE PRIVATE AND AS APPROVED BY THE CITY OF FRESNO.
11. THE DESIGN ON THE PROPOSED SUBDIVISION SHALL PROVIDE TO THE EXTENT FEASIBLE FOR FUTURE PASSIVE OR NATURAL HEATING OR COOLING OPPORTUNITIES AND OTHER MEASURES THAT CONSERVE NON-RENEWABLE ENERGY RESOURCES.
12. ALL STREETS ADJACENT TO THE BOUNDARIES OF THIS SUBDIVISION HAVE BEEN PREVIOUSLY DEDICATED FOR PUBLIC STREET PURPOSES AND ALL ARE TO REMAIN (UNLESS OTHERWISE NOTED).
13. THERE WILL BE GRADE DIFFERENTIALS GREATER THAN SIX INCHES BETWEEN THE SUBJECT AND ADJACENT PROPERTIES ON THE EAST, SOUTH AND WEST BOUNDARIES.
14. ALL INTERIOR ROAD AND OPEN SPACE SHALL BE CONTAINED WITHIN A PRIVATE EASEMENT PROVIDING FOR PUBLIC USE AND THE INSTALLATION AND MAINTENANCE OF PUBLIC AND PRIVATE UNDERGROUND UTILITIES
15. DIRECT VEHICULAR ACCESS RIGHTS FROM LOTS ABUTTING COPPER AVENUE SHALL BE RELINQUISHED.

ASSESSOR'S PARCEL NUMBER
578-01-35, 578-01-23, 578-01-24

SITE ADDRESS
2711, 2797 & 2917 E. COPPER AVE. FRESNO, CA 93619

SITE AREA
18.85± ACRES (GROSS)
18.14± ACRES (NET)

NUMBER OF LOTS
239 NUMBERED LOTS, 11 LETTERED LOTS

NUMBER OF UNITS
239 UNITS

DENSITY
RESIDENTIAL:
12.88 DWELLING UNITS/ACRE

EXISTING BUILDINGS
RESIDENTIAL HOME ON APN 578-01-23

EXISTING TREES
12± TREES EXISTING. ALL TO BE REMOVED.

EXISTING USE
578-01-35 & 578-01-24 VACANT, 578-01-23 RESIDENTIAL HOME

EXISTING GENERAL PLAN DESIGNATION
MEDIUM DENSITY RESIDENTIAL / BUSINESS PARK

PROPOSED GENERAL PLAN DESIGNATION
MEDIUM HIGH DENSITY RESIDENTIAL

EXISTING ZONING
RESIDENTIAL SINGLE FAMILY, RS-5

PROPOSED USE
SINGLE FAMILY RESIDENTIAL & MULTI-FAMILY RESIDENTIAL

PROPOSED ZONING
RM-1 (RESIDENTIAL MULTI-FAMILY)

SOURCE OF WATER
CITY OF FRESNO

SOURCE OF SEWAGE DISPOSAL
CITY OF FRESNO

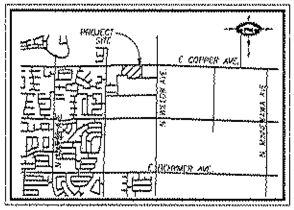
SOURCE OF WASTE DISPOSAL
CITY OF FRESNO

SOURCE OF ELECTRICITY
PG&E

SOURCE OF GAS
PG&E

SOURCE OF CABLE T.V.
COMCAST

SOURCE OF TELEPHONE
AT&T

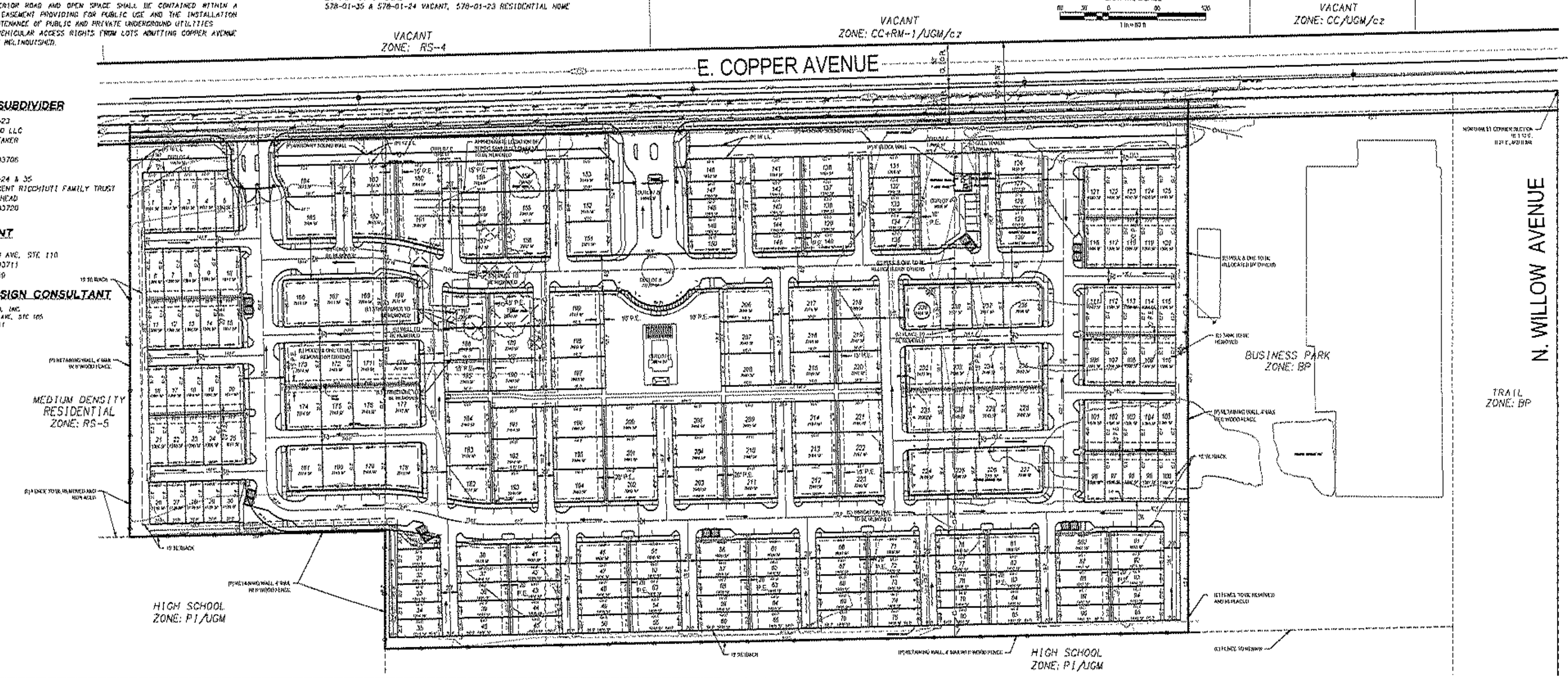


VICINITY MAP
N.T.S.

LEGEND

⊕	MANHOLE
DI	DRAIN INLET
DMH	DRAIN MANHOLE
(E)	EXISTING
INV	INVERT
L.E.	LANDSCAPE EASEMENT
P.E.	PEDESTRIAN EASEMENT
P.U.E.	PUBLIC UTILITY EASEMENT
→	DRAINAGE SLOPE
▨	RECYCLING AND REFUSE ENCLOSURE
⊗	TREES TO BE REMOVED
	ADA PARALLEL PARKING
12"S	UNDERGROUND SEWER PIPE
12"D	UNDERGROUND STORM DRAIN PIPE
12"W	UNDERGROUND WATER PIPE

GRAPHIC SCALE
60 30 0 60 120
1 in = 60 ft



OWNER/SUBDIVIDER
APN 578-010-23
TARLTON FRESNO LLC
CHRIS WHITTEAKER
3562 S. ELM
FRESNO, CA 93706

APN 578-010-24 & 35
PATRICK VINCENT RICCHIUTI FAMILY TRUST
1970 E. BIRKHEAD
FRESNO, CA 93720

APPLICANT
LENNAR
8080 N. PALM AVE, STE 110
FRESNO, CA 93711
(559) 437-4200

CIVIL DESIGN CONSULTANT
MORTON & PITALO, INC.
7643 N. INGRAM AVE, STE 105
FRESNO, CA 93711
(559) 853-4505

SCALE:
HORIZ. 1" = 60'
VERT. 1" = N/A

BENCH MARK COUNTY BM 1649
ELEVATION = 391.809 USGS DATUM
BRASS CAP, 39' WEST OF WILLOW AVENUE, 78' SOUTH OF COPPER AVENUE, 2' SOUTH OF POWER POLE

COMPUTED	
DESIGNED	GJB
DRAWN	KLF
PROJ. ENGR.	GJB

MORTON & PITALO, INC.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Folsom • Sacramento • Fresno
2870 Gateway Oaks Drive, Suite #120
Sacramento, CA 95833
phone: (916) 927-2400
survey email: staking@mpengr.com • web: www.mpengr.com

SINGLE AND MULTIPLE FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT
TENTATIVE TRACT MAP NO. 6249
IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

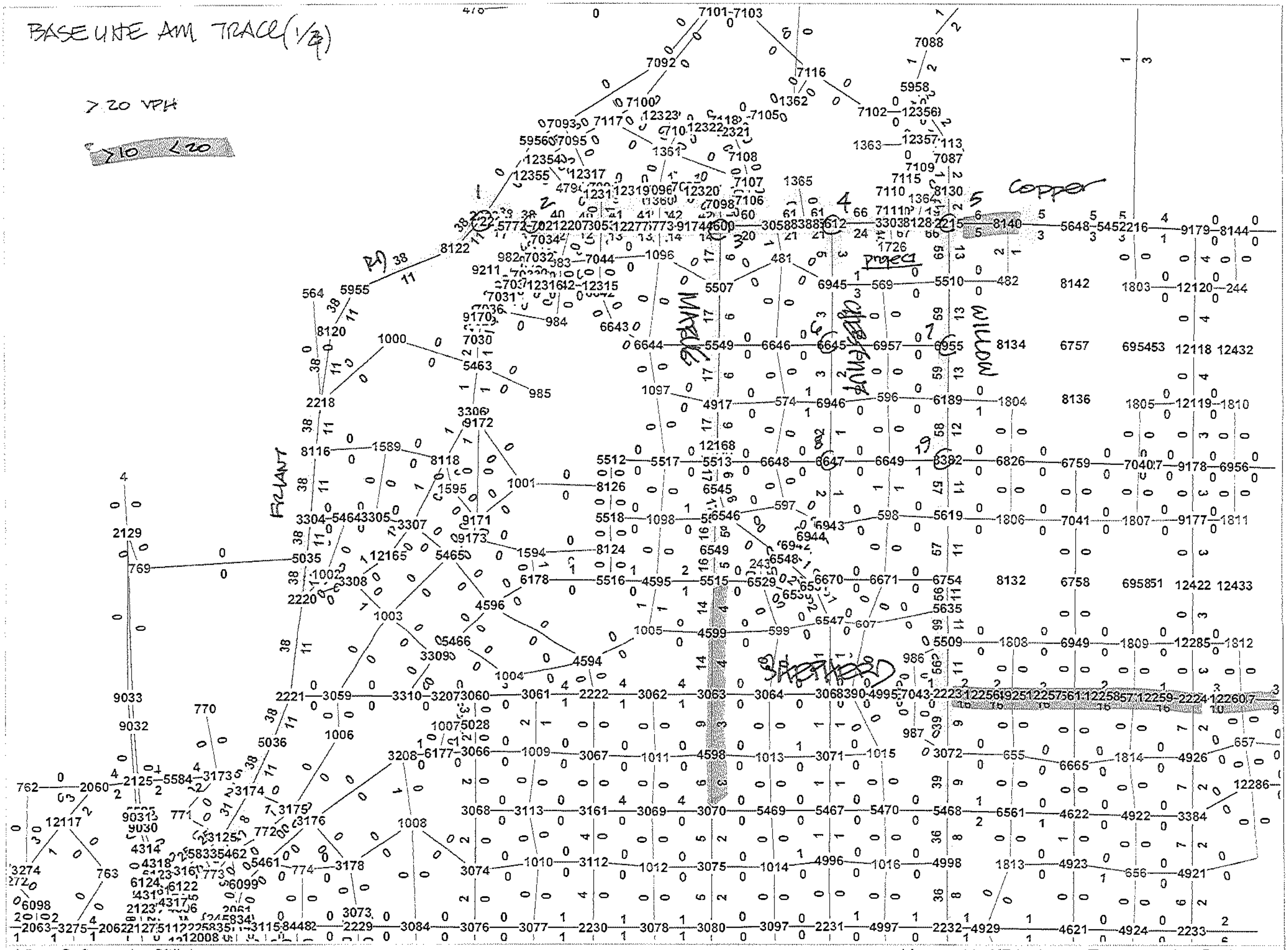
DATE OCTOBER 31, 2018
SHEET TM-1
OF 2

JOB NO. 18-0064-00

BASELINE AM TRACE (1/4)

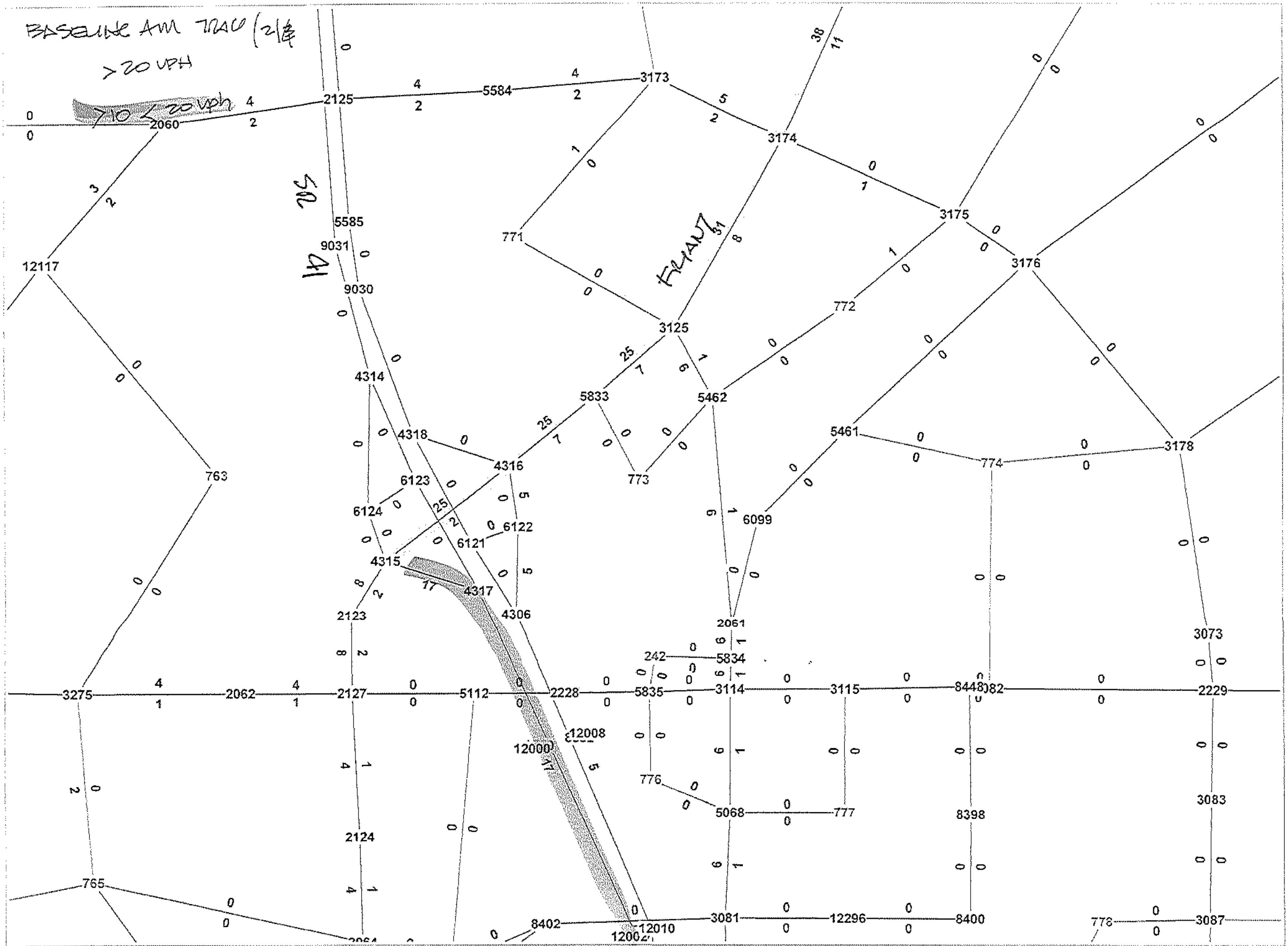
> 20 VPH

>10 <20



Viper Software by Citilabs

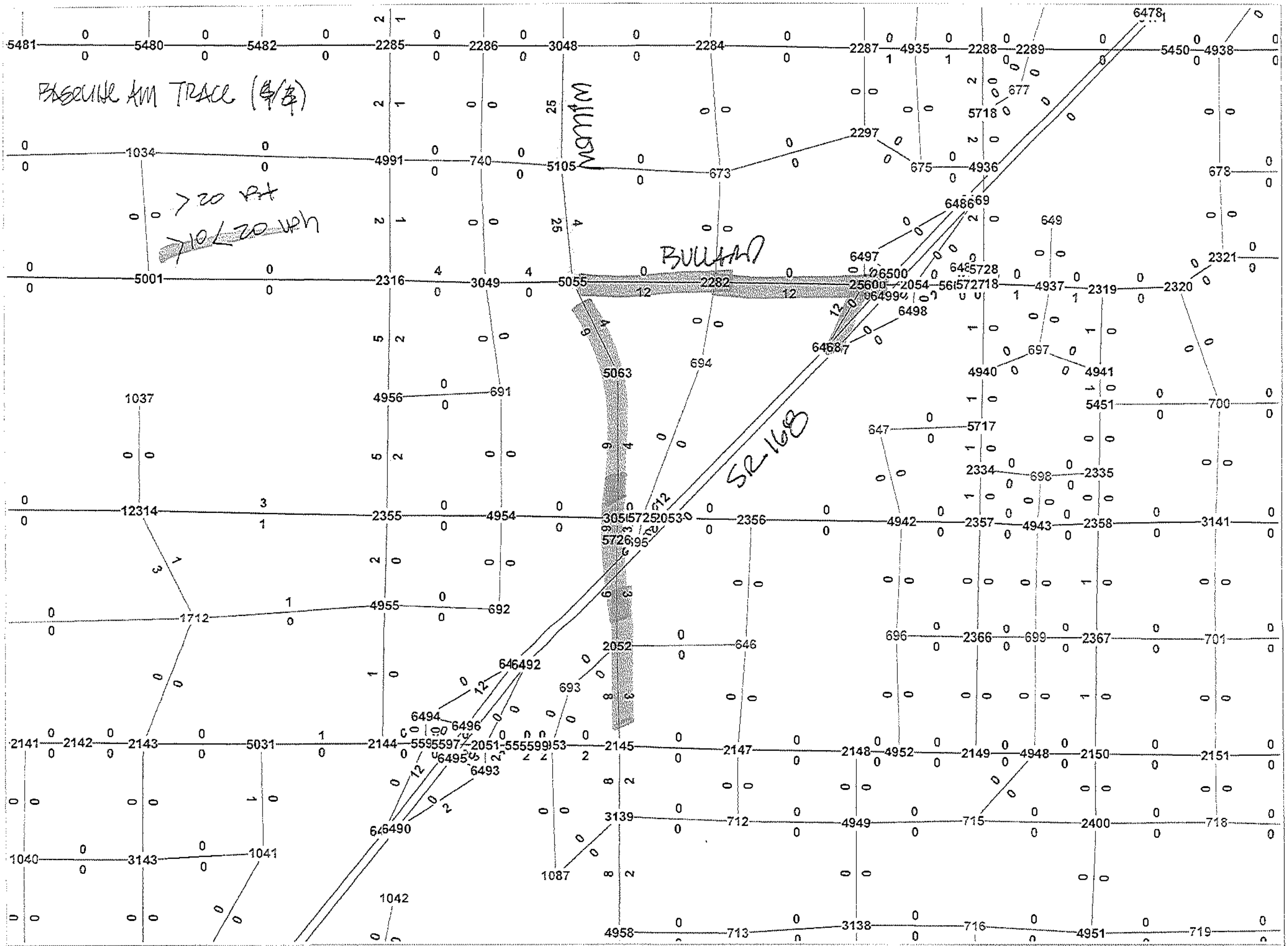
Licensed to KDAnderson Transportation Engineers



Viper Software by Citilabs

Licensed to KDAnderson Transportation Engineers

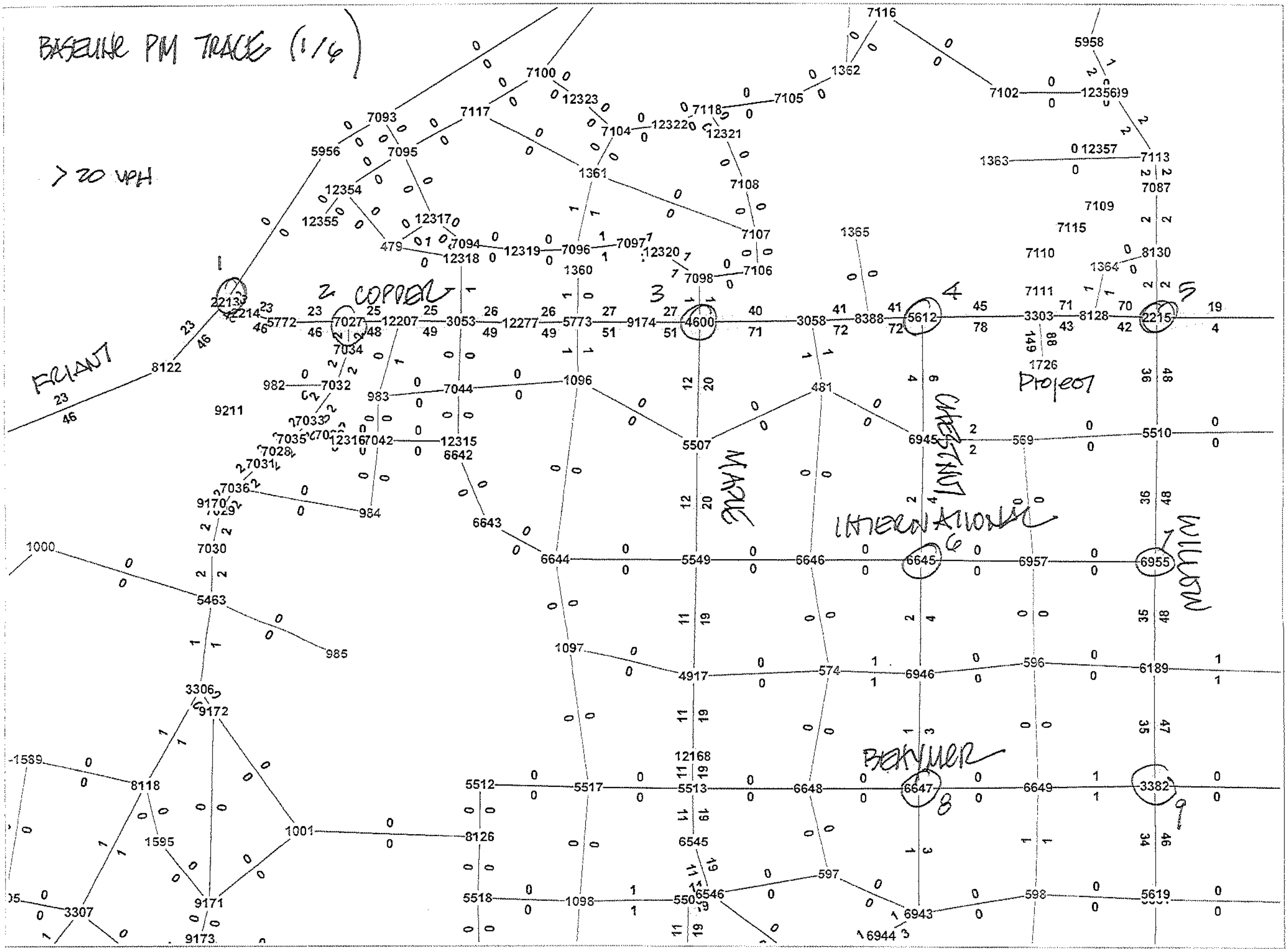
Baseline AM Truck (3/4)
>20 vph
>10/<20
SHEPHERD
WILLOW
SR 168
BULLARD
Viper Software by Citilabs
Licensed to KDAnderson Transportation Engineers



Viper Software by Citilabs

Licensed to KDAnderson Transportation Engineers

BASELINE PM TRACE (1/6)



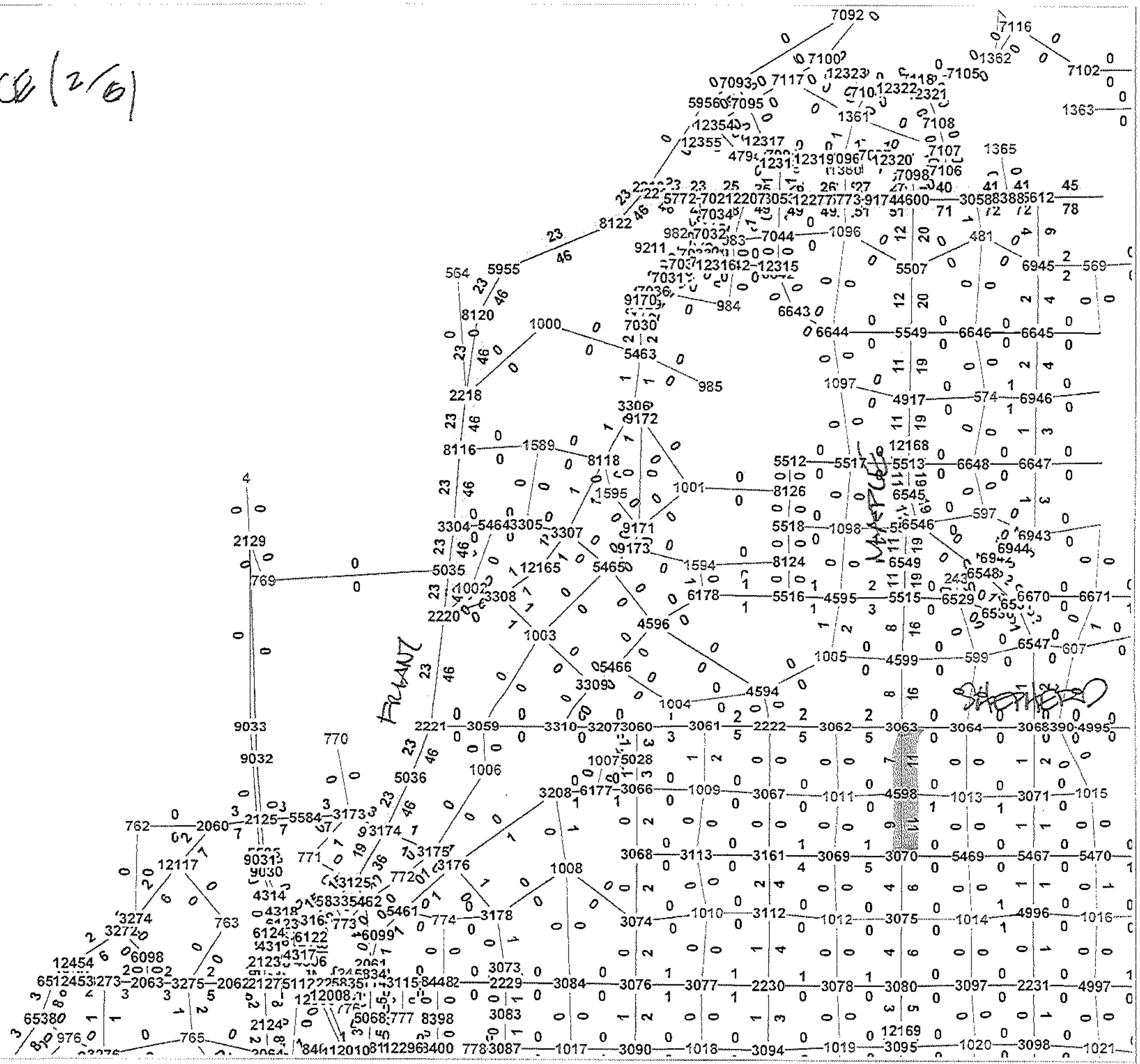
Viper Software by Citilabs

Licensed to KDAnderson Transportation Engineers

BASELINE PM TRACE (2/6)

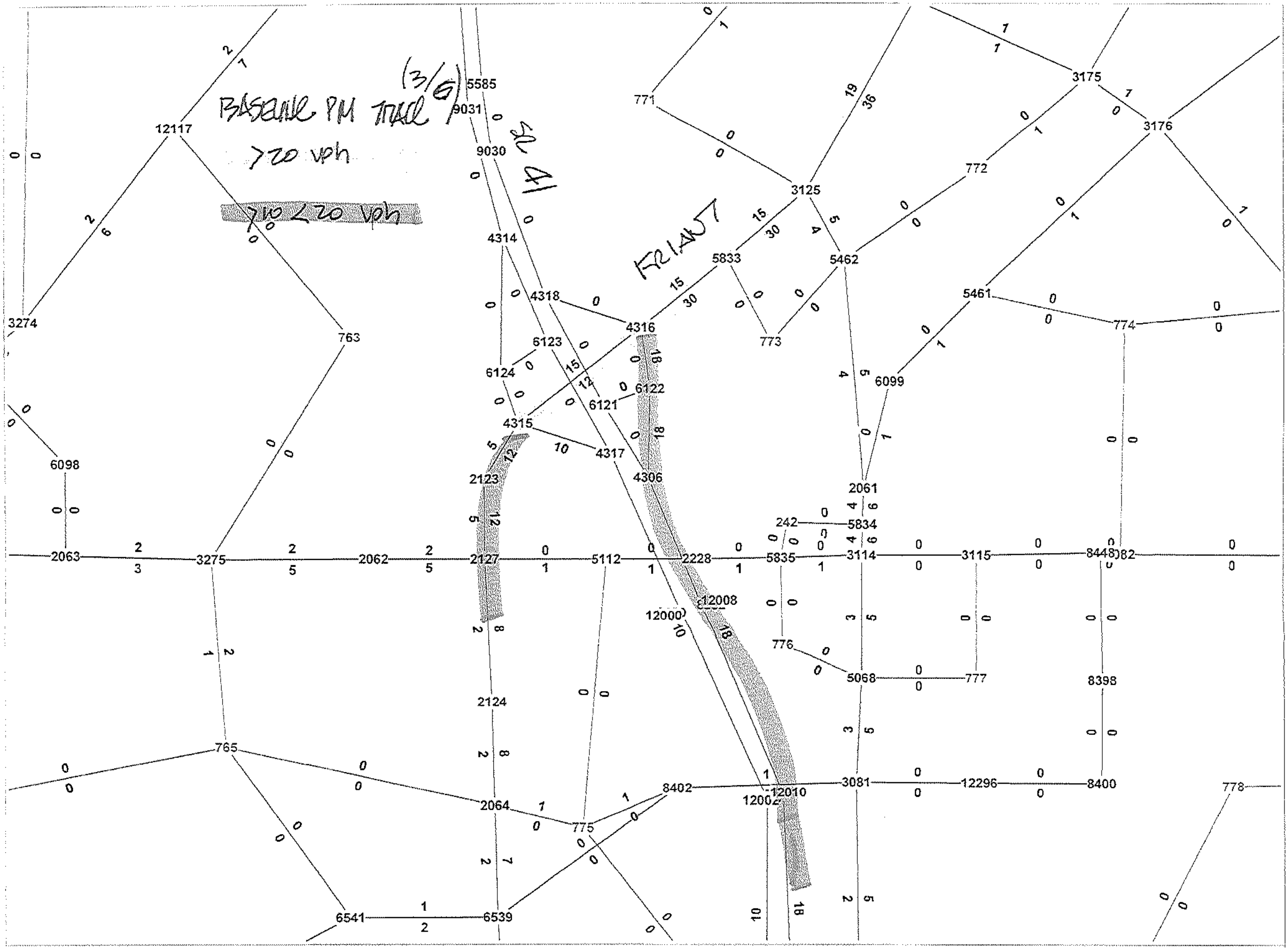
>20 vph

>10<20 vph



Viper Software by Citilabs

Licensed to KDAnderson Transportation Engineers



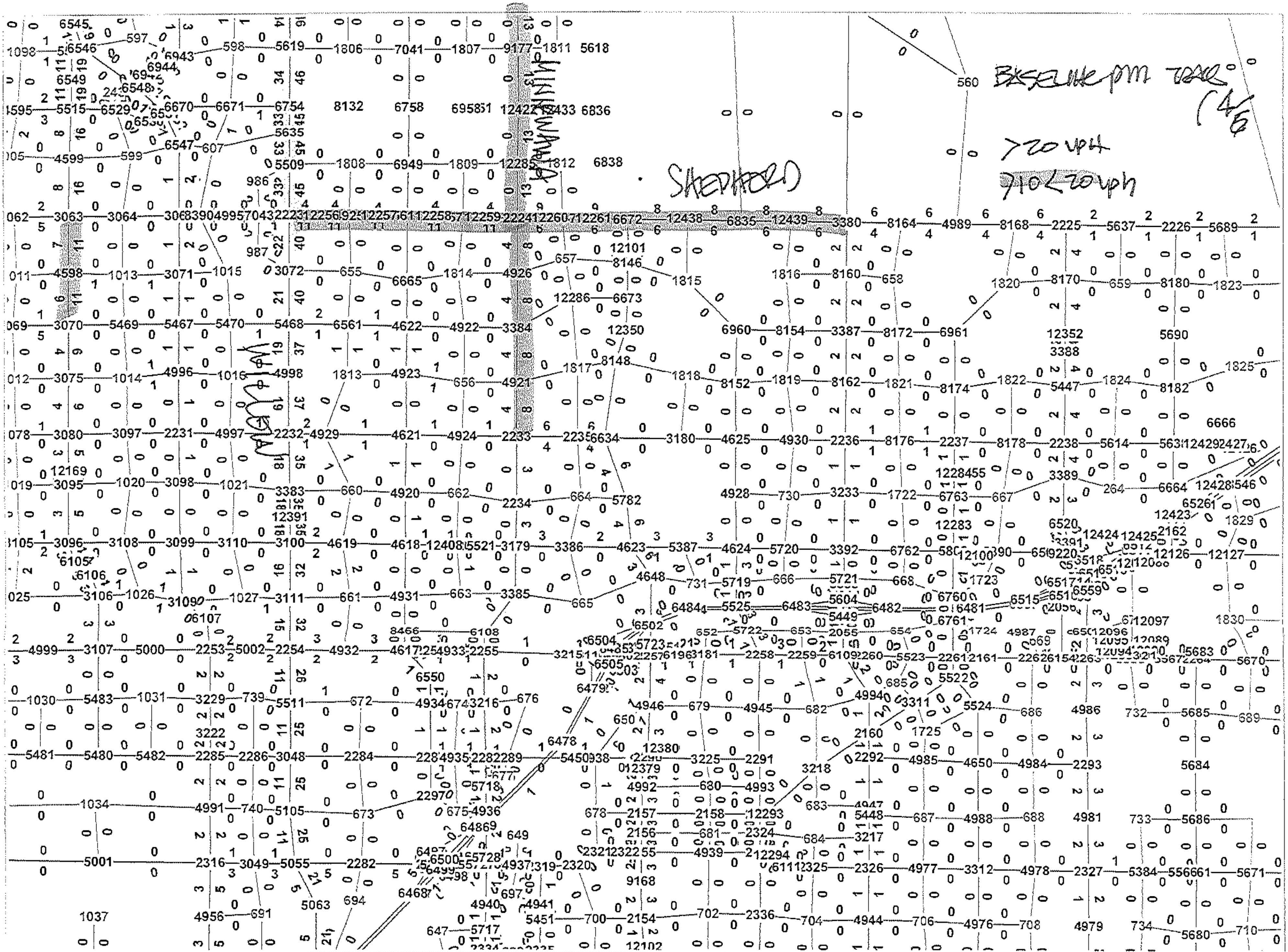
BASELINE PM TRUCK (3/6)

>20 vph

>10 < 20 vph

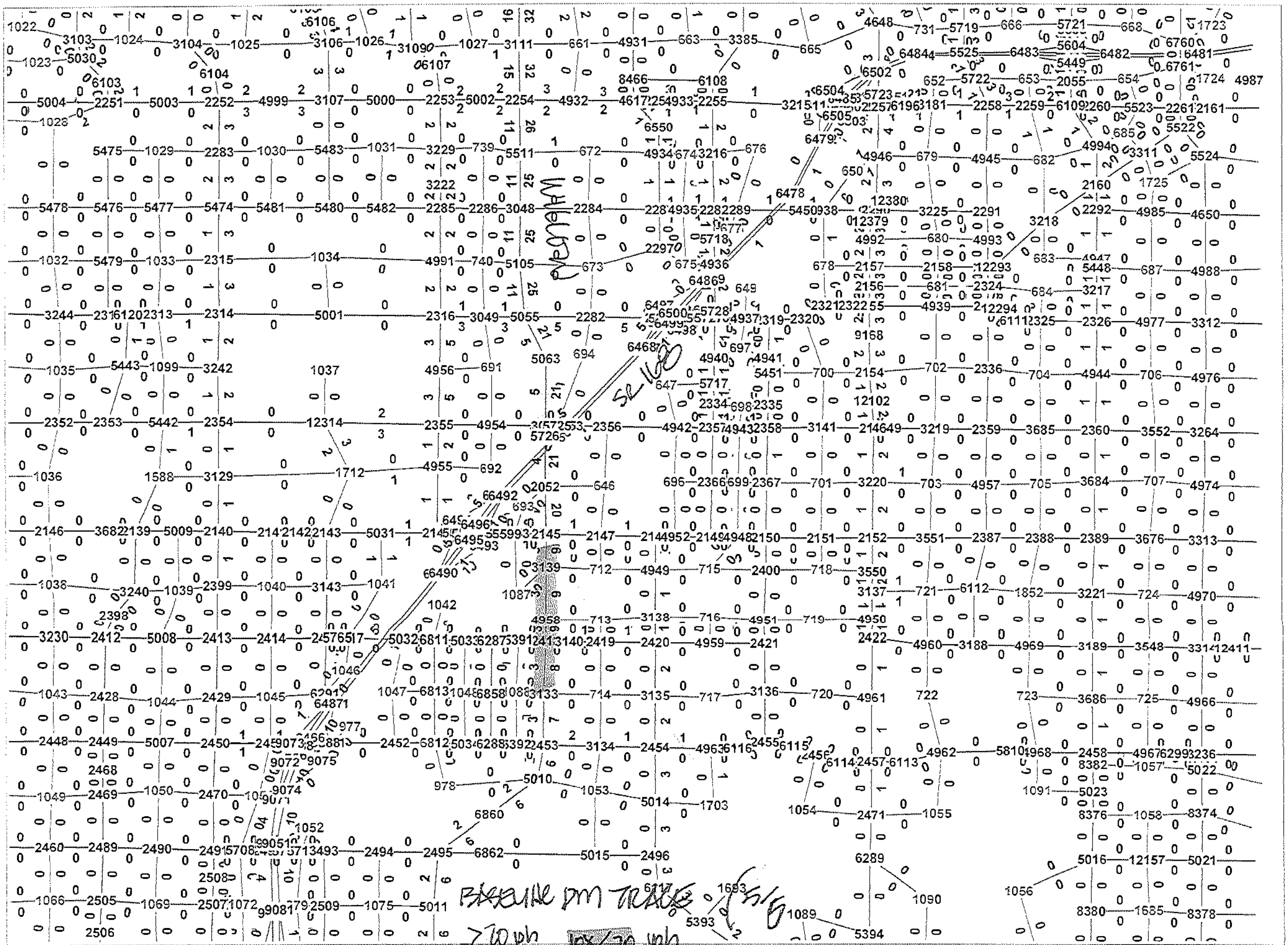
Viper Software by Citilabs

Licensed to KDAnderson Transportation Engineers



Viper Software by Citilabs

Licensed to KDAnderson Transportation Engineers



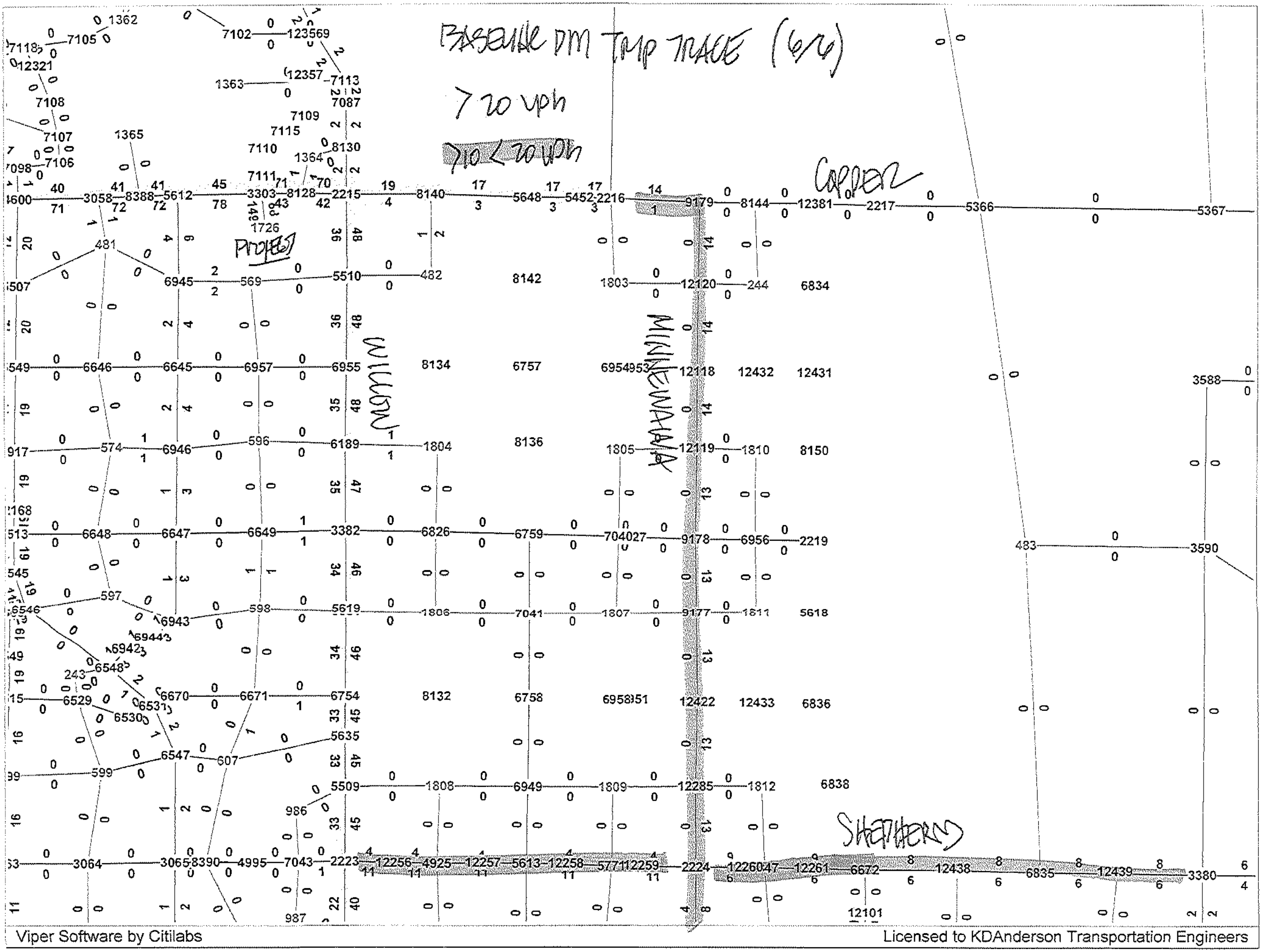
Baseline PM Traffic (5/6)

>70 vph

10X<70 vph

Viper Software by Citilabs

Licensed to KDAnderson Transportation Engineers


BASELINE PM TMP TRAFFIC (6/6)
>20 vph
>10 < 20 vph
COPPER
MINNEWAWA
WILLOW
PROJECT
SHEPHERD
Viper Software by Citilabs
Licensed to KDAnderson Transportation Engineers

KD Anderson & Associates, Inc.
Transportation Engineers

November 21, 2018

Mr. Keith A. Jolly, P.E.
MORTON & PITALO, INC.
7643 N. Ingram Avenue, Suite 105
Fresno, CA 93711

RE: PROPOSAL TO PROVIDE TRAFFIC ENGINEERING CONSULTANT SERVICES RELATING TO TENTATIVE PARCEL MAP 6249, FRESNO, CALIFORNIA

Dear Mr. Jolly:

Thank you for contacting our firm regarding the traffic study required for Tentative Map No. 6249 in the City of Fresno, California. As we understand, the proposed project involves construction of 239 single family lots on an 85 acre parcel located on E. Copper Avenue near the N. Willow Avenue intersection. The existing General Plan designation is MDR/BP and because RS-5 Single Family designation is proposed a GPA is proposed. The City of Fresno will require a traffic impact study to identify the impacts of the project under Existing, Existing plus Other Approved Projects and Long Term Cumulative conditions. City staff will also request input from adjoining jurisdictions and Caltrans with regards to the study scope.

<u>Analysis Approach.</u> We are familiar with City of Fresno guidelines for traffic studies and with the requirements for scoping a traffic impact analysis. We have suggested study area limits but our task will be preparation of a trip generation, distribution and assignment analysis for submittal to the City of Fresno as well as City of Clovis, County of Fresno and Caltrans staff to obtain their comments and confirm the limits of the study area, analysis time periods, and study scenarios.

Under our base proposal we assume that as a result of the scoping process we will address up to ten (10) intersections, including but not necessarily limited to:

1. E. Copper Avenue / N. Friant Road
2. E. Copper Avenue / N. Millbrook Avenue
3. E. Copper Avenue / N. Maple Avenue
4. E. Copper Avenue / N. Chestnut Avenue
5. E. Copper Avenue / N. Willow Avenue
6. E. International Avenue / N. Chestnut Avenue
7. E. International Avenue / N. Willow Avenue
8. E. Behymer Avenue / N. Chestnut Avenue
9. E. Behymer Avenue / N. Willow Avenue

The study will also address the project access on E. Copper Avenue.

The study will address weekday AM/PM peak hour conditions under the following study scenarios:

1. Existing Conditions when area schools are in session
2. Existing Plus Project Alone

3. Existing Plus Other Approved Projects (EPAP)
4. EPAP Plus Project
5. Long Term Cumulative without the Project under the FCOG regional travel demand forecasting model (Current GP designations)
6. Long Term with the Project

We will provide the results of FCOG model select zone "trip trace" analysis to Caltrans, City of Clovis and Fresno County and ask for confirmation that analysis within their jurisdiction is not required. If either Clovis, Fresno County or Caltrans asks for additional study locations our cost would increase, and our schedule could also be affected depending on when they provide input. To deal with this issue we have identified an additive task that would allow us to evaluate up to three (3) additional intersections if required by these agencies.

Scope of Work. To complete this assignment we anticipate the following tasks:

Task 1 – Identify Project Characteristics. We will identify the project's daily and peak hour trip generation based on rates published by the Institute of Transportation Engineers (ITE). That forecast will be compared to an estimate based on current General Plan land use designations. We will identify the directional distribution of project trips based on current travel patterns at study intersections, through review of the assumptions made for other development in this area of the community and/or via select link analysis using the FCOG traffic model.

Task 2 – Select Zone Analysis. We will ask FCOG to conduct a select zone "Trip Trace" analysis for the project to identify the routes that its trips will take and to confirm study area limits with other agencies. An exhibit illustrating these results will be included in our report to defend the choice of study area as applicable. FCOG's cost for this service is a separate cost in our budget.

Task 3 – Identify Current Background Traffic Conditions at Study Locations. We will identify daily, weekday a.m. (7:00 to 9:00 a.m.) and p.m. (4:00 to 6:00 p.m.) peak hour traffic volumes and determine the current operating Level of Service at the study intersections using HCM, 6th Edition methodology. We have assumed that new traffic counts will be required at all intersections, but current information approved by the City of Fresno will be re-used if available. We will make a visit to the site in order to collect the information needed to determine operating Levels of Service and to describe the pedestrian, bicycle and transit facilities that are available to serve this project. Peak hour traffic signal warrants will be reviewed at un-signalized intersections and 95th percentile queue lengths would be identified at signalized intersections.

Task 4 – Identify Project Specific Impacts. We will develop "Existing plus Project Alone" traffic volumes and determine whether resulting Levels of Service will satisfy minimum City of Fresno or other agency requirements prescribed under their General Plan. Pedestrian, transit and bicycle impacts will be identified. If needed, mitigation measures will be identified and resulting Levels of Service will be calculated.

Task 5 – Evaluate Existing Plus Approved Projects – Short Term Impacts. We will ask the City of Clovis and City of Fresno for information regarding other approved projects that can be expected to be occupied in the short term horizon. We will obtain the traffic studies completed for those projects to identify their contribution to study locations. Where data is not available we will conduct an applicable

KDA

trip generation, distribution and assignment analysis. Project trips will be superimposed onto the background condition to create EPAP plus Project volumes. Improvements associated with approved projects will be determined in consultation with City staff. Resulting Levels of Service will be calculated and compared to adopted measures of significance. If needed, mitigation measures will be identified and resulting Levels of Service will be calculated.

Task 6 – Evaluate Long Term Cumulative Impacts. We will use FCOG regional travel demand forecasting model forecasts to create long term traffic volume projections with and without the proposed project. We will use that data to create intersection turning movement forecasts using the technical approach accepted by the City of Clovis and the City of Fresno. Planned long term improvements will be identified in consultation with City staff. This information will be used to calculate operating Levels of Service with and without the proposed project. Improvements that are needed to meet minimum City of Clovis / Fresno Level of Service standards will be determined.

Task 7 – Prepare Draft Report. We will summarize our analysis, assumptions, and conclusions in a summary report. The report will specifically note significant impacts and mitigation requirements. The report will be made available to the client for review prior to submittal to the City in draft form.

Task 8 – Respond to City Comments. The City of Fresno may comment on our report. The Draft Report will be finalized once in response to one (1) consolidated set of City of Fresno comments. This work does not include, however, evaluation of new study locations or alternative scenarios.

Task 9 – Respond to other Agency Comments. The City of Clovis, Fresno County and Caltrans may comment on the draft traffic study. The Draft Report will be finalized once in response to one (1) consolidated set of agency comments. This work does not include, however, evaluation of new study locations or alternative scenarios.

Task 10 – Address Expanded Study Area (Optional). If required by commenting agencies and approved by the client, we will evaluate up to five (5) additional intersections under all study scenarios. The additive cost for this task is identified in our budget.

Task 11 – Attend Meetings. We will not attend any meetings with City staff or any public hearings under our base proposal. If requested by the client, we will attend meetings on a Time & Materials basis.

<u>Schedule.</u> We propose to begin this work immediately upon authorization to proceed, but any new traffic counts would need to be conducted when area schools are in session. We expect to complete this study and deliver our draft report to you within **twelve (12) weeks** of receiving authorization to proceed, but this schedule assumes any new traffic counts can be made before CUSD begins finals week at Clovis North HS and Clovis Community College begins finals week on December 10th.

KDA

Ken Anderson

From: Ken Anderson
Sent: Friday, February 08, 2019 10:17 AM
To: 'David Padilla (dave.padilla@dot.ca.gov)'
Subject: FW: Tract 6249 Fresno
Attachments: Tract 6249 Scoping Letter 1 25 2019.pdf

Dave:

I am following up on the traffic study scoping letter we transmitted on January 25th for the Tract 6249 subdivision near the Willow / Copper intersection in the City of Fresno. Do you have an idea of when the District will know whether they have any comments on the scope of work?

Thanks!

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Laura Terry <LTerry@kdanderson.com>
Sent: Friday, January 25, 2019 5:13 PM
To: Jill Gormley (jill.gormley@fresno.gov) <jill.gormley@fresno.gov>
Cc: Harpreet Kooner (hkooner@fresnocountyca.gov) <hkooner@fresnocountyca.gov>; David Padilla (dave.padilla@dot.ca.gov) <dave.padilla@dot.ca.gov>; Ken Anderson <KAnderson@kdanderson.com>
Subject: Tract 6249 Fresno

Good Afternoon,
Attached is a letter from Ken Anderson. Please contact him if you have questions.

Sincerely,

Laura Terry, Office Manager
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
(916) 660-1555

Ken Anderson

From: Ken Anderson
Sent: Wednesday, February 13, 2019 10:21 AM
To: 'bspaunhurst@fresnocountyca.gov.'
Cc: 'Jill Gormley'
Subject: FW: Tract 6249 Fresno
Attachments: Tract 6249 Scoping Letter 1 25 2019.pdf

Brian:

I am told you have taken over for Harpreet with regard to review of traffic studies in other jurisdictions. This one is a subdivision in the City of Fresno just north of Clovis North HS. we are interested in learning if the County has any comments on the Scope of work.

Thanks for your help!

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Ken Anderson
Sent: Friday, February 08, 2019 10:19 AM
To: 'Kooner, Harpreet' <HKooner@fresnocountyca.gov>
Subject: FW: Tract 6249 Fresno

Harpreet:

I am following up on the scooping letter we transmitted on January 25th for the Tract 6249 subdivision at the Copper / Willow intersection in the City of Fresno. Do you have an idea of when the County may be able to provide comments on the traffic study scope of work?

Thanks!

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

Ken Anderson

From: Ken Anderson
Sent: Friday, February 15, 2019 11:14 AM
To: 'Spaunhurst, Brian'
Cc: 'Jill Gormley'; 'Keith Jolly'
Subject: RE: Tract 6249 Fresno

Brian: Thanks for your quick help on this.

I am not yet at the stage of trying to identify the approved projects.

I will pass along your request to the City.

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Spaunhurst, Brian <bspaunhurst@fresnocountyca.gov>
Sent: Friday, February 15, 2019 10:35 AM
To: Ken Anderson <KAnderson@kdanderson.com>
Subject: RE: Tract 6249 Fresno

Good Morning Ken,

Could you please provide your list of Other Approved Projects? There are a large number of projects occurring in this area and we want to ensure the cumulative impacts are properly accounted for.

In the interest of capturing cumulative project impacts, I am requesting the addition of the intersection of Friant and Willow. I believe there is also another proposed road that stems off of Willow between Copper and Friant, just east of the golf course. I don't recall the name, however the City should be able to provide that to you. As that intersection will largely be placed in their jurisdiction I will leave that up to them to include that intersection or not.

Should you have any questions please feel free to contact me.

Respectfully,

Brian Spaunhurst | **Planner II**
Department of Public Works and Planning | Design Division
2220 Tulare St. 6th Floor Fresno, CA 93721
Main Office: (559) 600-4532 | Direct: (559) 600-4532
Email: bspaunhurst@FresnoCountyCa.gov
Your input matters! Customer Service Survey

From: Ken Anderson
Sent: Tuesday, February 19, 2019 11:00 AM
To: 'Padilla, Dave@DOT'
Cc: 'Jill Gormley'; 'kjolly@mpengr.com'
Subject: RE: Tract 6249 Fresno
Attachments: tract 6249.pdf

David:

As requested, attached are the results of FCOG's AM (red) /PM (blue) peak hour trip trace for the project under 2035 conditions.

The first page is the assignment at the project's access on Copper.

The second is the SR 41 / Friant Road interchange.

Please let me know if this information is adequate or if you need anything more.

Thanks!

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Padilla, Dave@DOT <dave.padilla@dot.ca.gov>
Sent: Tuesday, February 19, 2019 10:46 AM
To: Ken Anderson <KAnderson@kdanderson.com>
Cc: kjolly@mpengr.com
Subject: RE: Tract 6249 Fresno

We just need the AM and PM peak hours.

Thanks Ken.

DAVID PADILLA
Associate Transportation Planner
Caltrans
Office of Planning & Local Assistance
1352 W. Olive Avenue

Fresno, CA 93778-2616
Office: (559) 444-2493, Fax: (559) 445-5875

From: Ken Anderson <KAnderson@kdanderson.com>
Sent: Tuesday, February 19, 2019 10:45 AM
To: Padilla, Dave@DOT <dave.padilla@dot.ca.gov>
Cc: kjolly@mpengr.com
Subject: RE: Tract 6249 Fresno

Thanks David.

I will send you the trace for that intersection. what time period Daily/AM/PM is applicable?

Thanks

ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Padilla, Dave@DOT <dave.padilla@dot.ca.gov>
Sent: Tuesday, February 19, 2019 10:42 AM
To: Ken Anderson <KAnderson@kdanderson.com>
Subject: RE: Tract 6249 Fresno

Good Morning Ken,

Sorry for the delayed response. We would just need a trip trace to the SR 41/Friant Road interchange. We have a cost per trip for future improvement needs.

Thank you

DAVID PADILLA
Associate Transportation Planner
Caltrans
Office of Planning & Local Assistance
1352 W. Olive Avenue
Fresno, CA 93778-2616
Office: (559) 444-2493, Fax: (559) 445-5875

From: Ken Anderson <KAnderson@kdanderson.com>
Sent: Friday, February 08, 2019 10:17 AM
To: Padilla, Dave@DOT <dave.padilla@dot.ca.gov>
Subject: FW: Tract 6249 Fresno

Dave:

I am following up on the traffic study scoping letter we transmitted on January 25th for the Tract 6249 subdivision near the Willow / Copper intersection in the City of Fresno. Do you have an idea of when the District will know whether they have any comments on the scope of work?

Thanks!

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

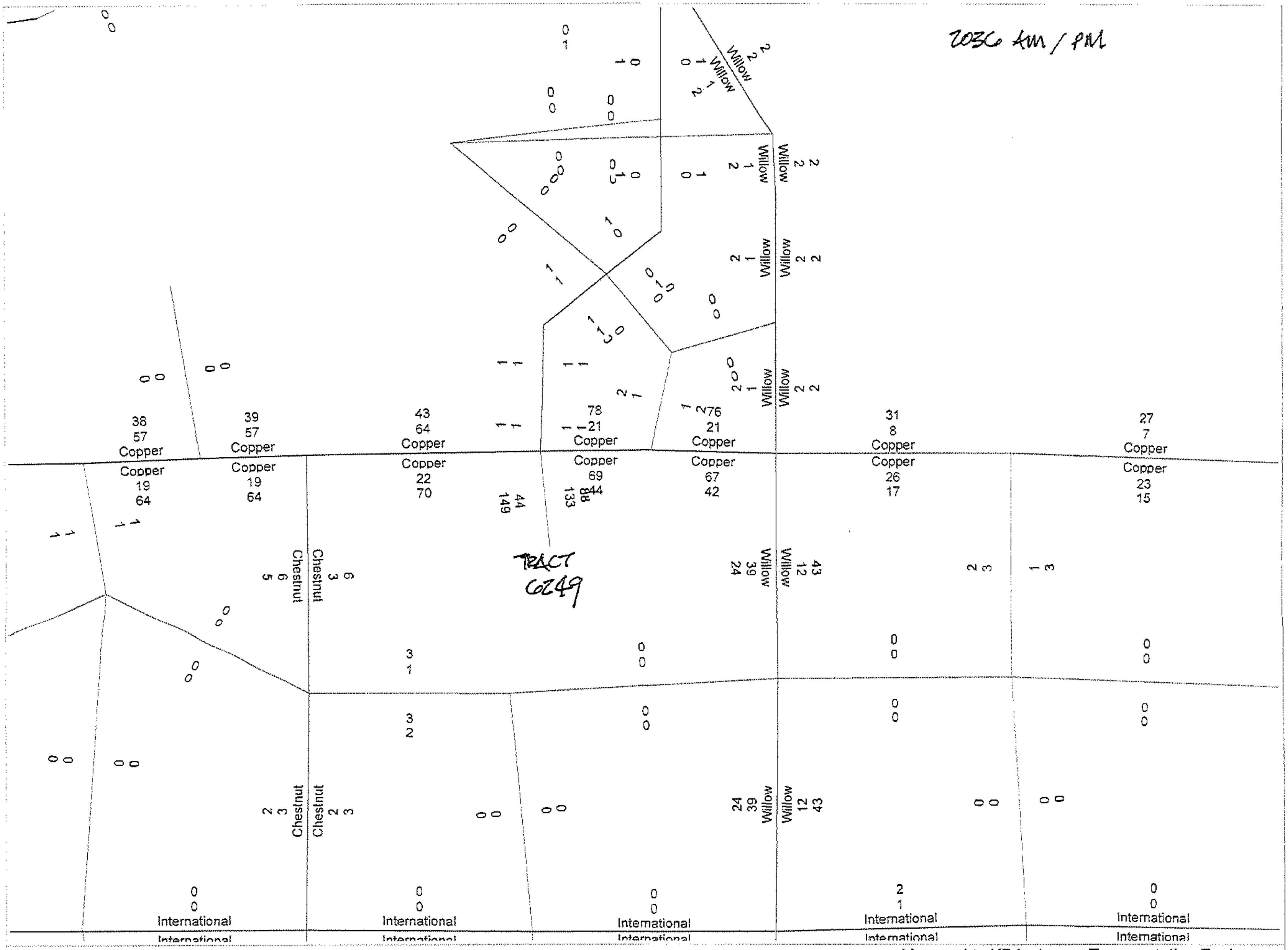
From: Laura Terry <LTerry@kdanderson.com>
Sent: Friday, January 25, 2019 5:13 PM
To: Jill Gormley (jill.gormley@fresno.gov) <jill.gormley@fresno.gov>
Cc: Harpreet Kooner (hkooner@fresnocountyca.gov) <hkooner@fresnocountyca.gov>; David Padilla (dave.padilla@dot.ca.gov) <dave.padilla@dot.ca.gov>; Ken Anderson <KAnderson@kdanderson.com>
Subject: Tract 6249 Fresno

Good Afternoon,
Attached is a letter from Ken Anderson. Please contact him if you have questions.

Sincerely,

Laura Terry, Office Manager
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
(916) 660-1555

2036 AM / PM

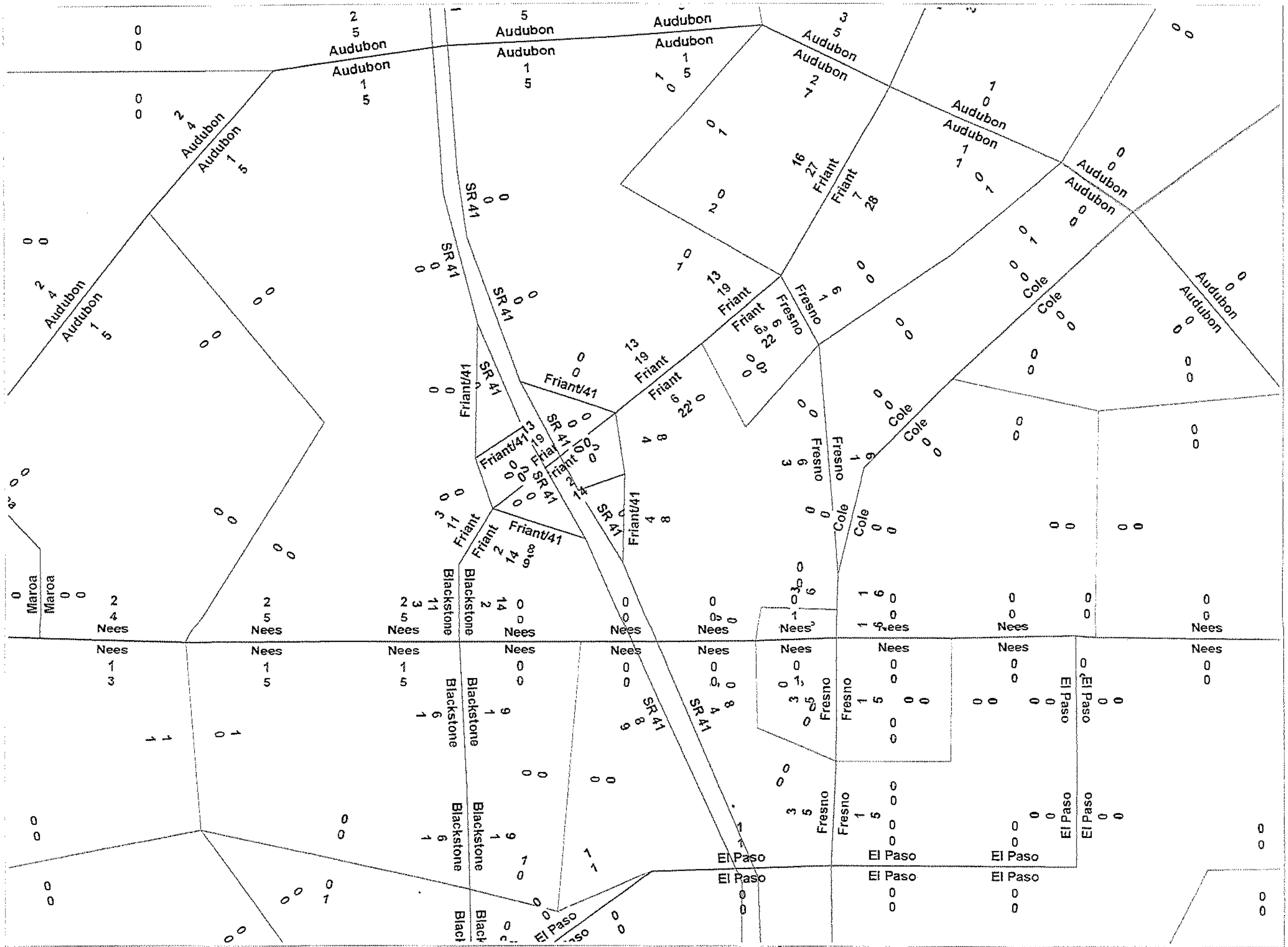


TRACT 6249

Viper Software by Citilabs

Licensed to KDAnderson Transportation Engineers

KDA 2-19-2019



2036 AM/PM TRACE for TRACT 6249

KDA 2-19-2019

From: Sean Smith <SeanS@ci.clovis.ca.us>
Sent: Monday, April 22, 2019 10:42 AM
To: Ken Anderson
Cc: Mike Harrison; Gene Abella
Subject: RE: Tract 6249 Fresno
Attachments: Tract 6249 Scoping Letter 1 25 2019.pdf

Ken,
The City of Clovis is agreeable to the scoping changes by the City of Fresno. I am curious to know their rationale, but it's just my curiosity and it's not required that you provide that to us. Thank you for the update.

Please note that our counter is open from 8am – 3pm; staff is available for appointments only after 3pm.

Sean Smith, RCE, QSD
Associate Engineer / DRU Manager
City of Clovis
www.cityofclovis.com
1033 Fifth Street ■ Clovis, CA 93612
T 559.324.2363 ■ C 559.765.7505
email seans@cityofclovis.com

cc: project file

From: Ken Anderson [mailto:KAnderson@kdanderson.com]
Sent: Thursday, April 18, 2019 11:12 AM
To: Sean Smith <SeanS@ci.clovis.ca.us>
Subject: RE: Tract 6249 Fresno

Sean;

The City ultimately pulled back on the scope of work, so we are only looking at these intersections. It occurs to me that I didn't pass that information that along to you.

Chestnut Avenue / International Avenue intersection
Chestnut Avenue / Behymer Avenue intersection
Friant Road / Willow Avenue intersection
Copper Avenue / N. Millbrook Avenue intersection
Copper Avenue / Chestnut Avenue intersection
Copper Avenue / Willow Avenue intersection

I wanted to make sure we are still okay with you.

Thanks

ken

Kenneth D. Anderson, P.E.

KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Sean Smith <SeanS@ci.clovis.ca.us>
Sent: Wednesday, February 13, 2019 10:14 AM
To: Ken Anderson <KAnderson@kdanderson.com>
Cc: Jill. Gormley (Jill.Gormley@fresno.gov) <Jill.Gormley@fresno.gov>; Gene Abella <genea@ci.clovis.ca.us>
Subject: RE: Tract 6249 Fresno

Ken,
The City of Clovis agrees with the scope of the study, thank you. Please forward a copy of the draft report when it is available.

Please note that our counter is open from 8am – 3pm; staff is available for appointments only after 3pm.

Sean Smith, RCE, QSD
Associate Engineer / DRU Manager
City of Clovis
www.cityofclovis.com
1033 Fifth Street ▪ Clovis, CA 93612
T 559.324.2363 ▪ C 559.765.7505
email seans@cityofclovis.com

cc: project file

From: Ken Anderson [mailto:KAnderson@kdanderson.com]
Sent: Saturday, February 9, 2019 8:46 AM
To: Sean Smith <SeanS@ci.clovis.ca.us>
Subject: RE: Tract 6249 Fresno

Thanks!

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Sean Smith <SeanS@ci.clovis.ca.us>
Sent: Saturday, February 09, 2019 7:33 AM
To: Ken Anderson <KAnderson@kdanderson.com>
Subject: RE: Tract 6249 Fresno

Ken,
I've reviewed it and just need to confirm with the City Engineer before sending our comments.
Thanks,
Sean

From: Ken Anderson [mailto:KAnderson@kdanderson.com]
Sent: Friday, February 8, 2019 10:05 AM
To: Sean Smith <SeanS@ci.clovis.ca.us>
Subject: RE: Tract 6249 Fresno

Sean:

I was just checking to see whether the City of Clovis had any comments on this project. I can forward the City of Fresno's comments if you would like to see what they have asked for.

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Sean Smith <SeanS@ci.clovis.ca.us>
Sent: Sunday, January 27, 2019 9:07 AM
To: Ken Anderson <KAnderson@kdanderson.com>
Cc: 'Jill.Gormley@fresno.gov' <Jill.Gormley@fresno.gov>
Subject: RE: Tract 6249 Fresno

Ken,
Thanks for including me on this. Yes, the City of Clovis is interested in reviewing this TIS. We will review and return comments, if any.

Please note that counter hours are 8am – 3pm daily, staff are available for appointments only outside these hours.

Sean Smith, RCE, QSD
Associate Engineer / DRU Manager
City of Clovis
www.cityofclovis.com
1033 Fifth Street ■ Clovis, CA 93612
T 559.324.2363 ■ C 559.765.7505
email seans@cityofclovis.com

cc: project file

From: Ken Anderson [mailto:KAnderson@kdanderson.com]
Sent: Sunday, January 27, 2019 8:33 AM
To: Sean Smith <SeanS@ci.clovis.ca.us>
Cc: Jill.Gormley@fresno.gov
Subject: FW: Tract 6249 Fresno

Sean:

I have prepared this draft scope of work for a Subdivision in Fresno north of Clovis North HS. The City of Fresno is looking it over. While the area around the site is in the County today it occurs to me that the Clovis SOI goes north along Willow to Copper. Therefore I probably need to ask that the City of Clovis also take a look at what we are doing and let me know if we are okay or if you have any comments.

Thanks for you help!

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Laura Terry <LTerry@kdanderson.com>
Sent: Friday, January 25, 2019 5:13 PM
To: Jill Gormley (jill.gormley@fresno.gov) <jill.gormley@fresno.gov>
Cc: Harpreet Kooner (hkooner@fresnocountyca.gov) <hkooner@fresnocountyca.gov>; David Padilla (dave.padilla@dot.ca.gov) <dave.padilla@dot.ca.gov>; Ken Anderson <KAnderson@kdanderson.com>
Subject: Tract 6249 Fresno

Good Afternoon,
Attached is a letter from Ken Anderson. Please contact him if you have questions.

Sincerely,

Laura Terry, Office Manager
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
(916) 660-1555

From: Jill Gormley <Jill.Gormley@fresno.gov>
Sent: Tuesday, April 09, 2019 5:48 PM
To: Ken Anderson
Cc: Katie Fenters; Harmanjit Dhaliwal
Subject: RE: Tract 6249 Fresno: Approved Projects

I think a lot would not need to be included. The apartments on the SWC of Copper/Chestnut should be included

The following list should also be included. I believe they were used in the TIA I sent over earlier today. I'd be okay with you using the information as shown in that document.

SWC Chestnut/Copper - D-17-048 64 Unit Multi Family
NEC Chestnut/Copper - Tract 6106 65 Single Family Residential
11075 N Knotting Hill – 28,000 SF Two Story Office
11110 N Knotting Hill – Tract 6132 21 Single Family Residential
11261 N Chestnut Ave – Tract 6135 13 Single Family Residential
NEC Alicante/Crest View – Tract 6126 94 Single Family Residential
11871 N Alicante – Tract 6153 41 Single Family Residential
11860 N Alicante – Tract 6185 26 Single Family Residential
11341 N Alicante – Tract 6231 89 Single Family Residential
11291 N Alicante - Tract 62017 44 Single Family Residential
NWC Copper/Maple - P18-03235 77,000 SF Commercial and 87,000 SF Senior Care Facility
2711/2797/2917 E Copper – 150 Unit Multi Family & 89 Single Family
11479 N Willow – Tract 6238 47 Single Family Residential
Alicante Btw. Crest View and Willow – 146 Single Family Residential

jmg

From: Ken Anderson [mailto:KAnderson@kdanderson.com]
Sent: Tuesday, April 09, 2019 4:13 PM
To: Jill Gormley
Cc: Katie Fenters; Harmanjit Dhaliwal
Subject: RE: Tract 6249 Fresno: Approved Projects

Jill:

that might mean they are not "Approved" and should not be included in my report?

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Jill Gormley <Jill.Gormley@fresno.gov>
Sent: Tuesday, April 09, 2019 3:54 PM
To: Ken Anderson <KAnderson@kdanderson.com>

Cc: Katie Fenters <kfenters@mpengr.com>; Harmanjit Dhaliwal <Harmanjit.Dhaliwal@fresno.gov>
Subject: RE: Tract 6249 Fresno: Approved Projects

Hi Ken,

Sorry for taking so long.

I looked at the list you sent and I don't have studies for a lot of the projects. It looks like a large number are in the very early stages and haven't come in with their applications and/or traffic impact studies yet.

I've attached the study I do have for 491 multi-family units.

jmg

From: Ken Anderson [mailto:KAnderson@kdanderson.com]
Sent: Wednesday, April 03, 2019 1:09 PM
To: Jill Gormley
Cc: Katie Fenters
Subject: RE: Tract 6249 Fresno: Approved Projects

Jill:

I was just checking to see if you had time to respond to my email about available traffic studies for approved projects?

Thanks

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Ken Anderson
Sent: Thursday, March 28, 2019 8:58 AM
To: 'Jill Gormley' <Jill.Gormley@fresno.gov>; 'Spaunhurst, Brian' <bspaunhurst@fresnocountyca.gov>
Cc: David Padilla (dave.padilla@dot.ca.gov) <dave.padilla@dot.ca.gov>; Harmanjit Dhaliwal <Harmanjit.Dhaliwal@fresno.gov>; 'Katie Fenters' <kfenters@mpengr.com>
Subject: RE: Tract 6249 Fresno: Approved Projects

Jill:

We asked the City for a list of projects within two miles of our site. That list is attached. We identified those project that should be included based on status. They are noted in yellow and then identified in the attached pdf's .
Does the list look acceptable; to you? If so, I would appreciate copies of the traffic studies completed for any of these projects.

Brian:

You also asked for out approved projects list. We will appreciate any comments you may have.

Thanks!

Ken

Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
916-660-1555 (office)
916-764-5478 (cell)

From: Jill Gormley <Jill.Gormley@fresno.gov>
Sent: Friday, February 01, 2019 8:11 PM
To: Laura Terry <LTerry@kdanderson.com>; Ken Anderson <KAnderson@kdanderson.com>
Cc: Harpreet Kooner (hkooner@fresnocountyca.gov) <hkooner@fresnocountyca.gov>; David Padilla (dave.padilla@dot.ca.gov) <dave.padilla@dot.ca.gov>; Harmanjit Dhaliwal <Harmanjit.Dhaliwal@fresno.gov>
Subject: RE: Tract 6249 Fresno

Hi Ken,

The intersections the City would like to see included in the study are:

1. Copper/Millbrook
2. Copper/Chestnut
3. Copper/Willow
4. International/Chestnut
5. Behymer/Chestnut

The study should also include both the AM and PM peak hours and the following:

1. Queuing analysis for all movements at all study locations.
2. Peak hour traffic signal warrants at all unsignalized locations.
3. Include a 5-year collision analysis at all study locations using either TIMS or SWITRS data. The analysis should include the number of collisions, types, parties involved (vehicles, bikes, pedestrians) and severity.
4. Include a qualitative analysis of the existing and planned bicycle and pedestrian facilities.
5. Analyze the on-site circulation and identify where traffic calming should be considered.
6. Is the project proposing a General Plan Amendment? If not, the City would not require the cumulative year no project scenario.
7. Please provide a list of the approved projects being used in the study.

Let me know if you have questions.

Have a good weekend!

Jill Gormley, TE
City Traffic Engineer / Traffic Operations & Planning Manager
City of Fresno, Public Works Department
2600 Fresno Street, 4th Floor
Fresno, CA 93721-3623

www.fresno.gov/publicworks/traffic-engineering

P: 559/621-8792
F: 559/457-1107

From: Laura Terry [mailto:LTerry@kdanderson.com]
Sent: Friday, January 25, 2019 5:13 PM
To: Jill Gormley
Cc: Harpreet Kooner (hkooner@fresnocountyca.gov); David Padilla (dave.padilla@dot.ca.gov); Ken Anderson
Subject: Tract 6249 Fresno

Good Afternoon,
Attached is a letter from Ken Anderson. Please contact him if you have questions.

Sincerely,

Laura Terry, Office Manager
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650
(916) 660-1555

From: Lang Yu <Yu@fresnocog.org>
Sent: Thursday, January 24, 2019 9:19 AM
To: Ken Anderson
Subject: RE: FCOG Traffic model assistance map 6249
Attachments: Deliverables.zip; Invoice_Copper.pdf

Importance: High

Good morning Ken,

I have attached the modeling results and invoice for this project.

Please let me know if there are any issues.

Thanks
Lang

From: Ken Anderson [mailto:KAnderson@kdanderson.com]
Sent: Friday, January 11, 2019 9:51 AM
To: Lang Yu
Subject: FCOG Traffic model assistance map 6249

Lang:

I trust you enjoyed a pleasant holiday!

I need to request your assistance on another project. This one sits immediately north of Clovis North HS in the City of Fresno. (please see attached aerial) They plan MDR on a site that has existing GP designations of BP to the east and MDR on the west. The yield will be 239 MDR units (please see attached Tentative map). . At the current ITE rates we will achieve 2,256 daily, 177 am and 237 pm trips.

I need the normal deliverables:

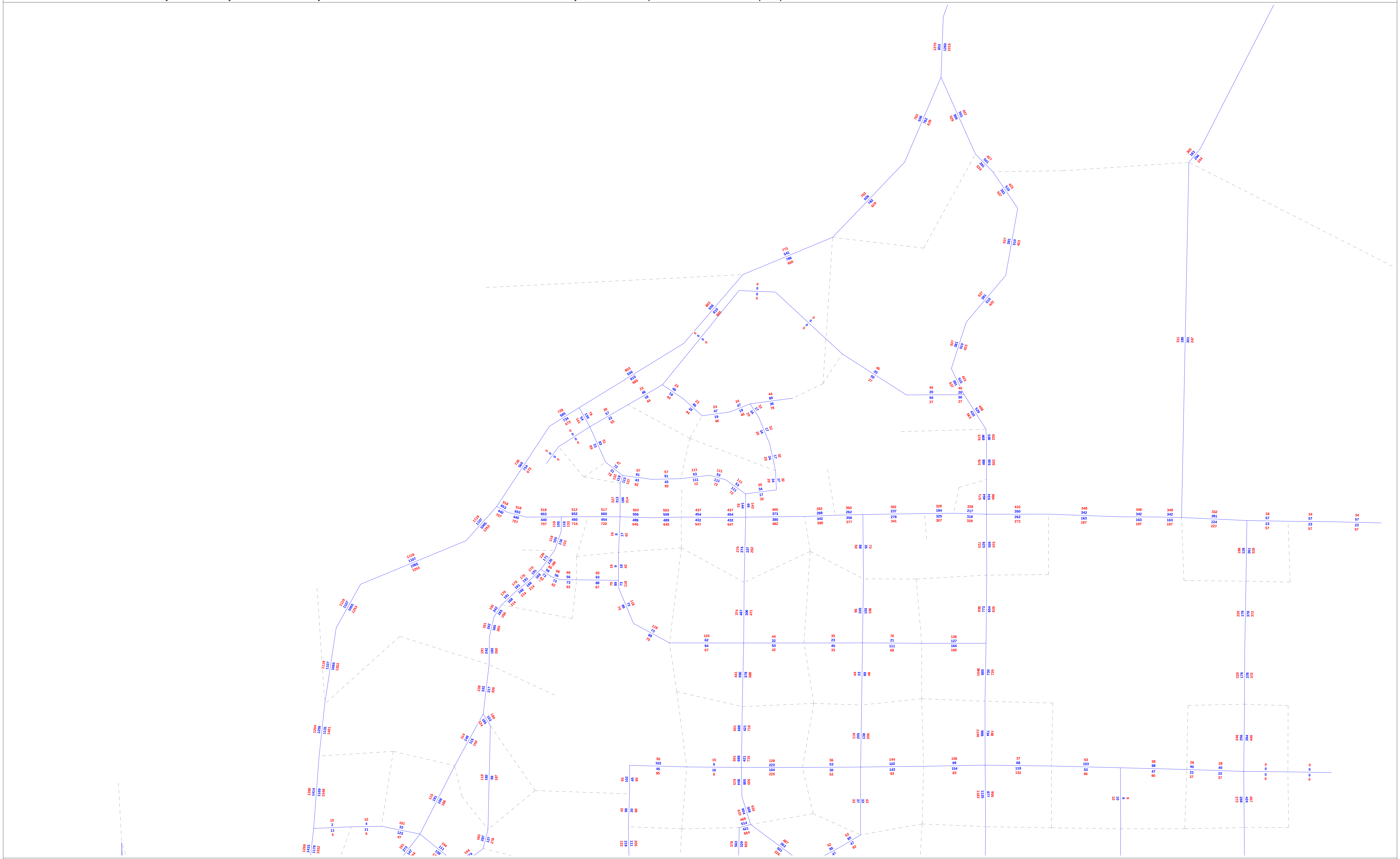
1. Add project to baseline model and run a trip trace. In this case the site sits in TAZ 569 which has access on all four sides. I would prefer to load the project just to Copper and cut TAZ 569's connection to Copper. This looks to be okay since most of the balance of TAZ 569 is the HS and it has no access to Copper.
2. Current 2035 / 2040 model with the same link changes but with the current BP/residential uses on the site
3. Year 3045/2040 model with link changes and the proposed land uses,, including a trip trace.

I trust that this all make sense, but feel free to contact me if you have any questions.

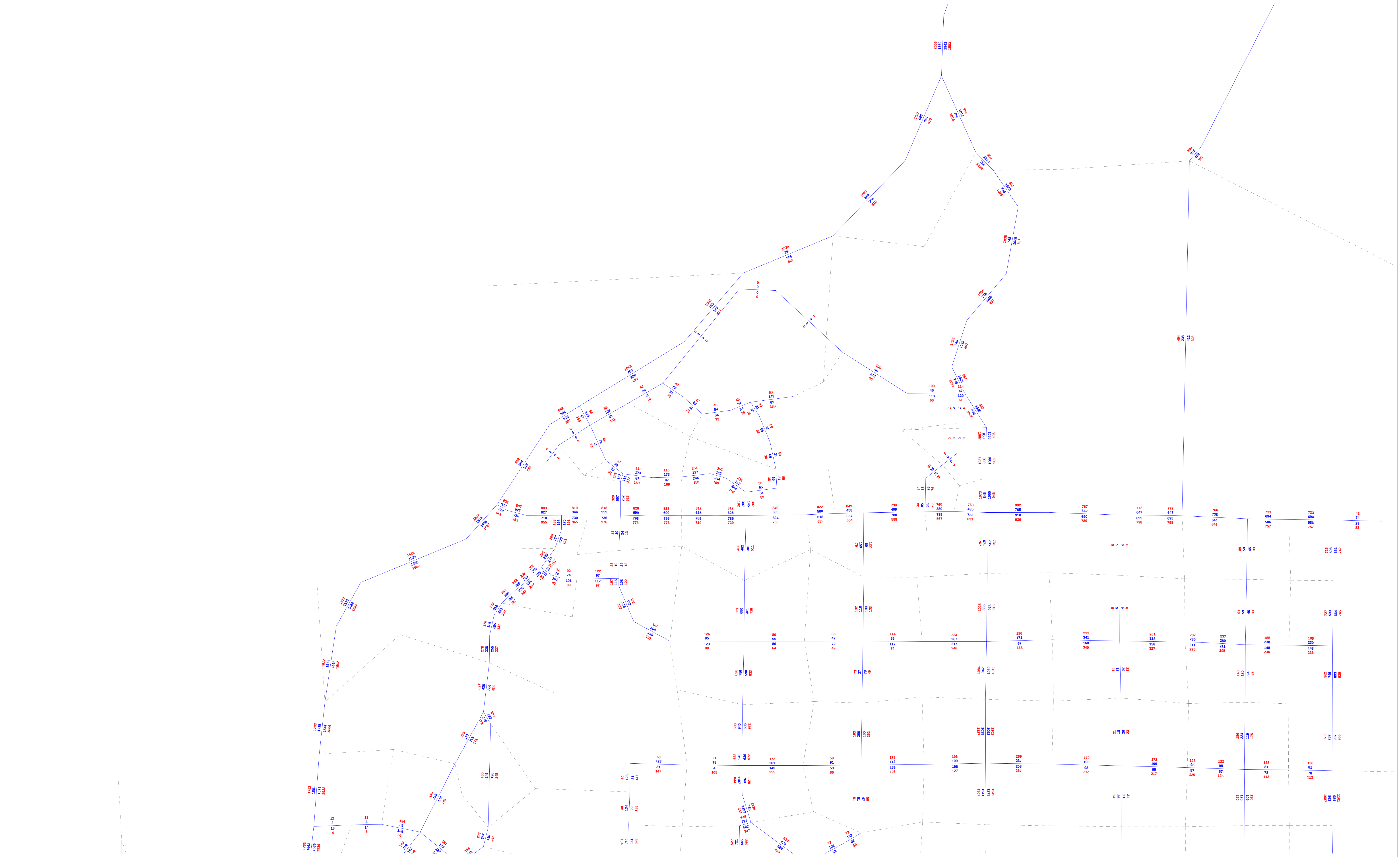
Thanks!

Ken
Kenneth D. Anderson, P.E.
KD Anderson & Associates, Inc.
3853 Taylor Road, Suite G
Loomis, CA 95650

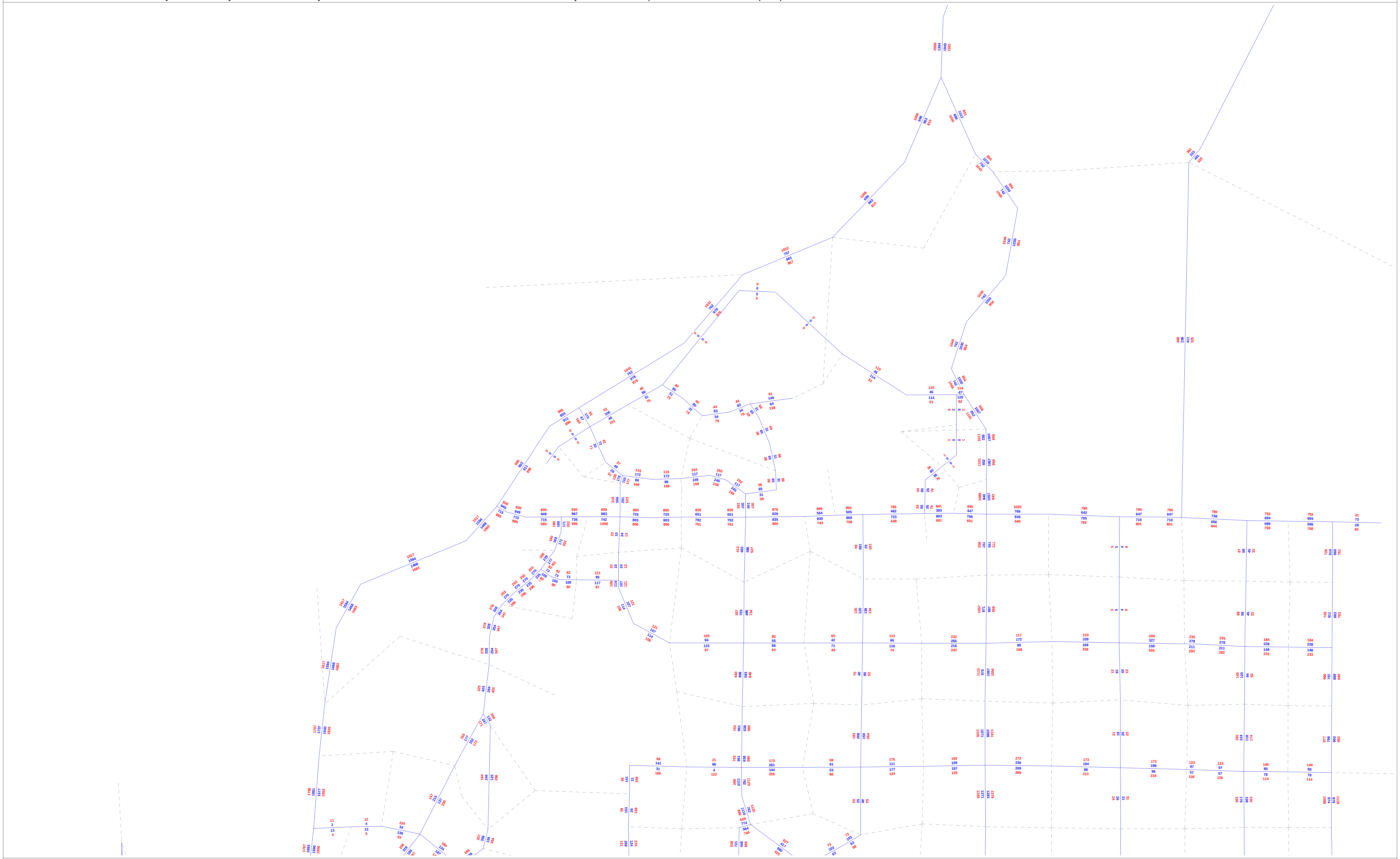
4/23/2019 F:\00 Ken Files\From Wayne\Fresno May 6249\2019 Plus Project\FC19LDALLF.NET - Fresno COG Model - 2019 Plus Project. Blue = a.m. peak hour volume. Red = p.m. peak hour volume.



4/23/2019 F:\00 Ken Files\From Wayne\Fresno May 6249\2035 No Project\FC35_LDALL.NET - Fresno COG Model - 2035 No Project. Blue = a.m. peak hour volume. Red = p.m. peak hour volume.



4/23/2019 F:\00 Ken Files\From Wayne\Fresno May 6249\2035 Plus Project\FC35LDALLF.NET - Fresno COG Model - 2035 Plus Project. Blue = a.m. peak hour volume. Red = p.m. peak hour volume.



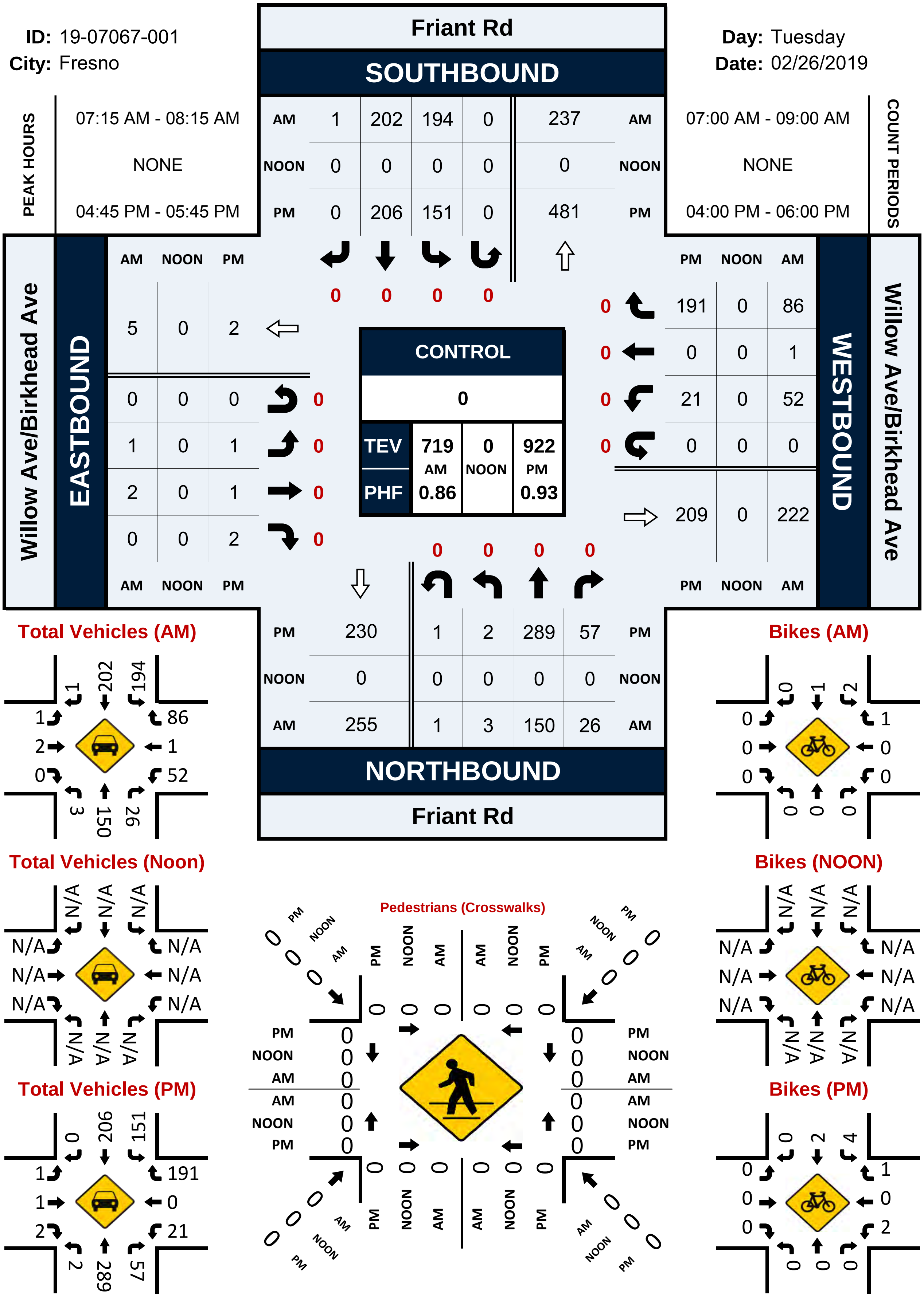
Prepared by National Data & Surveying Services

Friant Rd & Willow Ave/Birkhead Ave

Peak Hour Turning Movement Count

ID: 19-07067-001
City: Fresno

Day: Tuesday
Date: 02/26/2019



PEAK HOURS	
AM	07:15 AM - 08:15 AM
NOON	NONE
PM	04:45 PM - 05:45 PM

COUNT PERIODS	
AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

Friant Rd
SOUTHBOUND

	↲	↓	↳	⮍	⇧
AM	1	202	194	0	237
NOON	0	0	0	0	0
PM	0	206	151	0	481
	0	0	0	0	

Willow Ave/Birkhead Ave
WESTBOUND

		PM	NOON	AM
↰	0	191	0	86
←	0	0	0	1
↲	0	21	0	52
⮎	0	0	0	0
⇨		209	0	222

Willow Ave/Birkhead Ave
EASTBOUND

AM	NOON	PM		
5	0	2	⇦	
0	0	0	⮌	0
1	0	1	↱	0
2	0	1	→	0
0	0	2	↴	0

CONTROL
0

TEV	719 AM	0 NOON	922 PM
PHF	0.86		0.93

	⇩	⮏	↰	↑	↱
		0	0	0	0
PM	230	1	2	289	57
NOON	0	0	0	0	0
AM	255	1	3	150	26

NORTHBOUND
Friant Rd

Total Vehicles (AM)

Southbound	1	202	194
Westbound	86	1	52
Northbound	3	150	26
Eastbound	1	2	0

Bikes (AM)

Southbound	0	1	2
Westbound	1	0	0
Northbound	0	0	0
Eastbound	0	0	0

Total Vehicles (Noon)

Southbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A

Bikes (NOON)

Southbound	N/A	N/A	N/A
Westbound	N/A	N/A	N/A
Northbound	N/A	N/A	N/A
Eastbound	N/A	N/A	N/A

Total Vehicles (PM)

Southbound	0	206	151
Westbound	191	0	21
Northbound	2	289	57
Eastbound	1	1	2

Bikes (PM)

Southbound	0	2	4
Westbound	1	0	2
Northbound	0	0	0
Eastbound	0	0	0

Pedestrians (Crosswalks)

	PM	NOON	AM
North leg, west side	0	0	0
North leg, east side	0	0	0
West leg, north side	0	0	0
West leg, south side	0	0	0
East leg, north side	0	0	0
East leg, south side	0	0	0
South leg, west side	0	0	0
South leg, east side	0	0	0
Northwest diagonal	0	0	0
Northeast diagonal	0	0	0
Southwest diagonal	0	0	0
Southeast diagonal	0	0	0

National Data & Surveying Services

Intersection Turning Movement Count

Location: Friant Rd & Willow Ave/Birkhead Ave
City: Fresno
Control:

Project ID: 19-07067-001
Date: 2/26/2019

Total

NS/EW Streets:	Friant Rd				Friant Rd				Willow Ave/Birkhead Ave				Willow Ave/Birkhead Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	16	5	0	29	51	0	0	0	0	3	0	9	1	15	0	129
7:15 AM	0	28	9	0	57	53	0	0	0	1	0	0	11	0	17	0	176
7:30 AM	0	44	9	0	65	61	0	0	1	1	0	0	9	0	19	0	209
7:45 AM	1	31	3	0	43	32	1	0	0	0	0	0	17	1	22	0	151
8:00 AM	2	47	5	1	29	56	0	0	0	0	0	0	15	0	28	0	183
8:15 AM	1	59	9	0	29	33	0	0	0	0	1	0	5	0	35	0	172
8:30 AM	0	47	3	0	29	36	1	0	0	0	0	0	10	1	18	0	145
8:45 AM	2	48	6	0	32	24	0	0	0	0	0	0	7	0	23	0	142
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	6	320	49	1	313	346	2	0	1	2	4	0	83	3	177	0	1307
APPROACH %'s :	1.60%	85.11%	13.03%	0.27%	47.35%	52.34%	0.30%	0.00%	14.29%	28.57%	57.14%	0.00%	31.56%	1.14%	67.30%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	3	150	26	1	194	202	1	0	1	2	0	0	52	1	86	0	719
PEAK HR FACTOR :	0.375	0.798	0.722	0.250	0.746	0.828	0.250	0.000	0.250	0.500	0.000	0.000	0.765	0.250	0.768	0.000	0.860
	0.818				0.788				0.375				0.808				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	51	14	0	39	53	0	0	0	2	0	0	3	1	39	0	202
4:15 PM	2	58	10	0	26	71	1	0	0	0	1	0	5	1	39	0	214
4:30 PM	2	72	13	0	35	45	0	0	0	4	3	0	2	0	34	0	210
4:45 PM	0	72	8	1	23	48	0	0	0	1	0	0	4	0	55	0	212
5:00 PM	0	80	16	0	44	56	0	0	0	0	0	0	3	0	45	0	244
5:15 PM	1	61	17	0	46	47	0	0	0	0	1	0	6	0	38	0	217
5:30 PM	1	76	16	0	38	55	0	0	1	0	1	0	8	0	53	0	249
5:45 PM	1	74	23	0	37	39	0	0	0	0	1	0	1	0	32	0	208
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	7	544	117	1	288	414	1	0	1	7	7	0	32	2	335	0	1756
APPROACH %'s :	1.05%	81.32%	17.49%	0.15%	40.97%	58.89%	0.14%	0.00%	6.67%	46.67%	46.67%	0.00%	8.67%	0.54%	90.79%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	2	289	57	1	151	206	0	0	1	1	2	0	21	0	191	0	922
PEAK HR FACTOR :	0.500	0.903	0.838	0.250	0.821	0.920	0.000	0.000	0.250	0.250	0.500	0.000	0.656	0.000	0.868	0.000	0.926
	0.909				0.893				0.500				0.869				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Friant Rd & Willow Ave/Birkhead Ave
City: Fresno
Control: 0

Project ID: 19-07067-001
Date: 2/26/2019

Bikes

NS/EW Streets:	Friant Rd				Friant Rd				Willow Ave/Birkhead Ave				Willow Ave/Birkhead Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	3
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	2	1	0	2	1	0	0	0	0	0	0	0	0	1	0	7
APPROACH %'s :	0.00%	66.67%	33.33%	0.00%	66.67%	33.33%	0.00%	0.00%					0.00%	0.00%	100.00%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	0	0	0	2	1	0	0	0	0	0	0	0	0	1	0	4
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.333
					0.375								0.250				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5
4:15 PM	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3
4:30 PM	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	5
4:45 PM	0	0	0	0	1	1	0	0	0	0	0	0	1	0	1	0	4
5:00 PM	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
5:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	3	0	0	7	4	0	0	0	0	0	0	2	0	6	0	22
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	63.64%	36.36%	0.00%	0.00%					25.00%	0.00%	75.00%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	4	2	0	0	0	0	0	0	2	0	1	0	9
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.333	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.250	0.000	0.563
					0.500								0.375				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Friant Rd & Willow Ave/Birkhead Ave
City: Fresno
Project ID: 19-07067-001
Date: 2/26/2019

Pedestrians (Crosswalks)

NS/EW Streets:	Friant Rd		Friant Rd		Willow Ave/Birkhead Ave		Willow Ave/Birkhead Ave		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0
APPROACH %'s :									
PEAK HR :	07:15 AM - 08:15 AM								TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :									

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0
APPROACH %'s :									
PEAK HR :	04:45 PM - 05:45 PM								TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :									

Prepared by National Data & Surveying Services

Willow Ave & Copper Ave

Peak Hour Turning Movement Count

ID: 19-07067-002
City: Fresno

Day: Tuesday
Date: 02/26/2019

PEAK HOURS	COUNT PERIODS
07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NONE	NONE
04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

Willow Ave

SOUTHBOUND

AM	41	193	47	0	120	AM
NOON	0	0	0	0	0	NOON
PM	25	131	65	0	245	PM
	0	0	0	0		

Copper Ave

EASTBOUND

	AM	NOON	PM	
	315	0	212	
	0	0	0	0
	20	0	34	0
	157	0	179	0
	139	0	75	0
	AM	NOON	PM	

CONTROL

0

TEV	1126 AM	0 NOON	1050 PM
PHF	0.79		0.93

Copper Ave

WESTBOUND

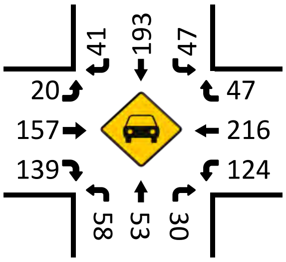
	PM	NOON	AM
0	59	0	47
0	116	0	216
0	75	0	124
0	0	0	0
	312	0	234
	PM	NOON	AM

NORTHBOUND

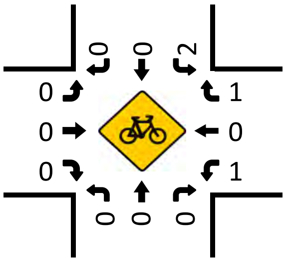
Willow Ave

		0	0	0	0	
PM	281	0	71	152	68	PM
NOON	0	0	0	0	0	NOON
AM	457	1	58	53	30	AM

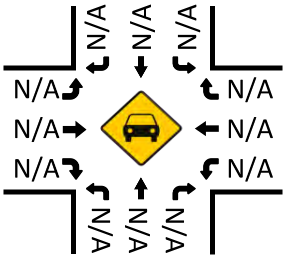
Total Vehicles (AM)



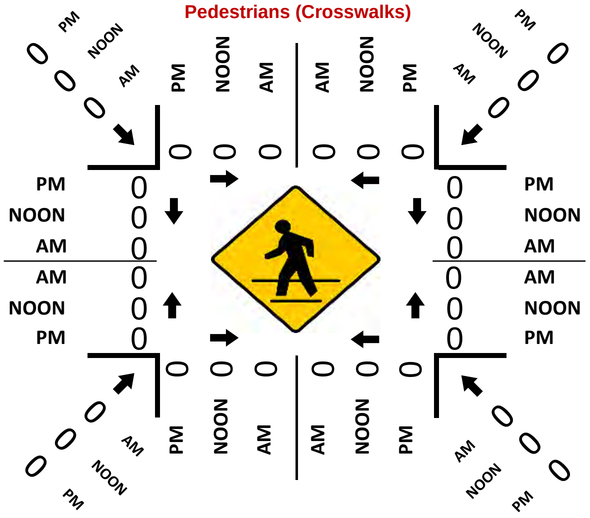
Bikes (AM)



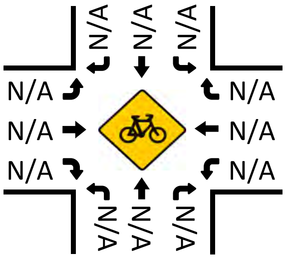
Total Vehicles (Noon)



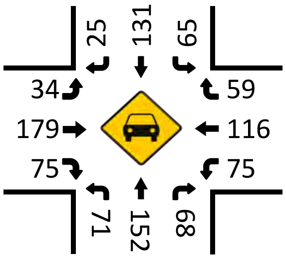
Pedestrians (Crosswalks)



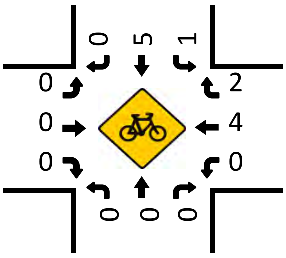
Bikes (NOON)



Total Vehicles (PM)



Bikes (PM)



National Data & Surveying Services

Intersection Turning Movement Count

Location: Willow Ave & Copper Ave
City: Fresno
Control:

Project ID: 19-07067-002
Date: 2/26/2019

Total

NS/EW Streets:	Willow Ave				Willow Ave				Copper Ave				Copper Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	6	11	3	0	18	23	2	0	3	26	10	0	14	33	14	0	163
7:15 AM	11	8	5	0	15	35	6	0	3	32	34	0	23	49	9	0	230
7:30 AM	19	15	5	1	13	66	10	0	3	37	62	0	55	63	8	0	357
7:45 AM	21	15	10	0	9	65	12	0	11	58	37	0	26	58	13	0	335
8:00 AM	7	15	10	0	10	27	13	0	3	30	6	0	20	46	17	0	204
8:15 AM	13	24	3	0	7	25	6	0	2	21	14	0	14	38	21	0	188
8:30 AM	16	15	11	0	14	29	2	0	5	28	15	0	20	29	8	0	192
8:45 AM	7	21	10	0	10	27	2	0	7	30	13	0	15	40	15	0	197
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	100	124	57	1	96	297	53	0	37	262	191	0	187	356	105	0	1866
APPROACH %'s :	35.46%	43.97%	20.21%	0.35%	21.52%	66.59%	11.88%	0.00%	7.55%	53.47%	38.98%	0.00%	28.86%	54.94%	16.20%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	58	53	30	1	47	193	41	0	20	157	139	0	124	216	47	0	1126
PEAK HR FACTOR :	0.690	0.883	0.750	0.250	0.783	0.731	0.788	0.000	0.455	0.677	0.560	0.000	0.564	0.857	0.691	0.000	0.789
	0.772				0.789				0.745				0.768				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	11	29	21	0	16	28	4	0	8	38	13	0	15	24	12	0	219
4:15 PM	8	23	12	0	15	34	2	0	4	36	6	0	23	36	13	0	212
4:30 PM	19	32	20	0	12	24	2	0	7	32	15	0	12	36	13	0	224
4:45 PM	22	41	21	0	14	22	5	0	7	42	21	0	11	25	16	0	247
5:00 PM	17	32	12	0	6	30	5	0	8	55	26	0	20	28	15	0	254
5:15 PM	13	38	19	0	26	46	9	0	9	44	11	0	20	36	12	0	283
5:30 PM	19	41	16	0	19	33	6	0	10	38	17	0	24	27	16	0	266
5:45 PM	12	28	11	0	12	41	8	0	8	47	14	0	16	34	11	0	242
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	121	264	132	0	120	258	41	0	61	332	123	0	141	246	108	0	1947
APPROACH %'s :	23.40%	51.06%	25.53%	0.00%	28.64%	61.58%	9.79%	0.00%	11.82%	64.34%	23.84%	0.00%	28.48%	49.70%	21.82%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	71	152	68	0	65	131	25	0	34	179	75	0	75	116	59	0	1050
PEAK HR FACTOR :	0.807	0.927	0.810	0.000	0.625	0.712	0.694	0.000	0.850	0.814	0.721	0.000	0.781	0.806	0.922	0.000	0.928
	0.866				0.682				0.809				0.919				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Willow Ave & Copper Ave
City: Fresno
Control: 0

Project ID: 19-07067-002
Date: 2/26/2019

Bikes

NS/EW Streets:	Willow Ave				Willow Ave				Copper Ave				Copper Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	3
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	3	0	0	2	0	0	0	0	0	0	0	1	0	1	0	7
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%					50.00%	0.00%	50.00%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	0	0	0	2	0	0	0	0	0	0	0	1	0	1	0	4
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.333
					0.250								0.500				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	1	0	0	1	1	0	0	0	0	0	0	0	0	2	0	5
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	1	2	0	0	0	0	0	0	0	0	1	0	4
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	3	0	0	0	0	0	0	0	2	0	0	5
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1	0	0	2	6	0	0	1	0	0	0	0	4	4	0	18
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%	25.00%	75.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	50.00%	50.00%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	1	5	0	0	0	0	0	0	0	4	2	0	12
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.250	0.417	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.500	0.000	0.600
					0.500								0.500				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Willow Ave & Copper Ave
City: Fresno

Project ID: 19-07067-002
Date: 2/26/2019

Pedestrians (Crosswalks)

NS/EW Streets:	Willow Ave		Willow Ave		Copper Ave		Copper Ave		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0
APPROACH %'s :									
PEAK HR :	07:15 AM - 08:15 AM								TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :									

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0
APPROACH %'s :									
PEAK HR :	04:45 PM - 05:45 PM								TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0
PEAK HR FACTOR :									

Prepared by National Data & Surveying Services

Chestnut Ave & Copper Ave

Peak Hour Turning Movement Count

ID: 19-07067-003
City: Fresno

Day: Tuesday
Date: 02/26/2019

PEAK HOURS		COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

Chestnut Ave
SOUTHBOUND

	↲	↓	↳	U	⇧
AM	25	8	7	0	21
NOON	0	0	0	0	0
PM	10	2	4	0	29
	0	0	0	0	

Copper Ave
EASTBOUND

	AM	NOON	PM	
⇦	450	0	320	
U	5	0	15	0
↰	12	0	19	0
→	236	0	226	0
↴	197	0	119	0

CONTROL

0

	AM	NOON	PM
TEV	1051	0	761
PHF	0.75		0.88

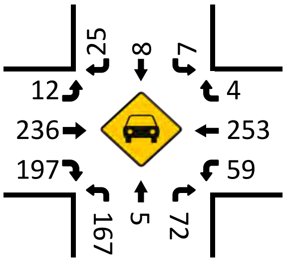
WESTBOUND
Copper Ave

		PM	NOON	AM
0	↰	6	0	4
0	←	190	0	253
0	↱	12	0	59
0	U	0	0	1
	⇨	279	0	316

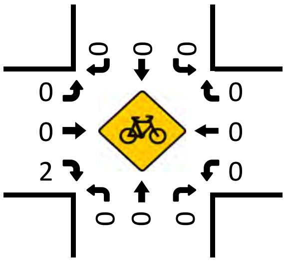
	⇩	U	↰	↑	↱
		0	0	0	0
PM	133	0	105	4	49
NOON	0	0	0	0	0
AM	264	0	167	5	72

NORTHBOUND
Chestnut Ave

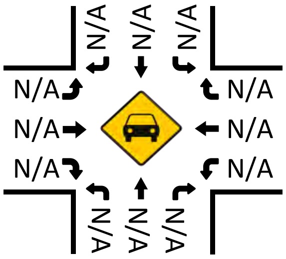
Total Vehicles (AM)



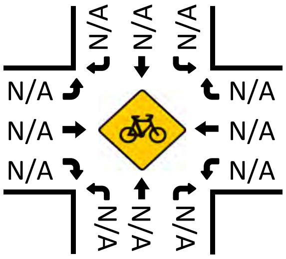
Bikes (AM)



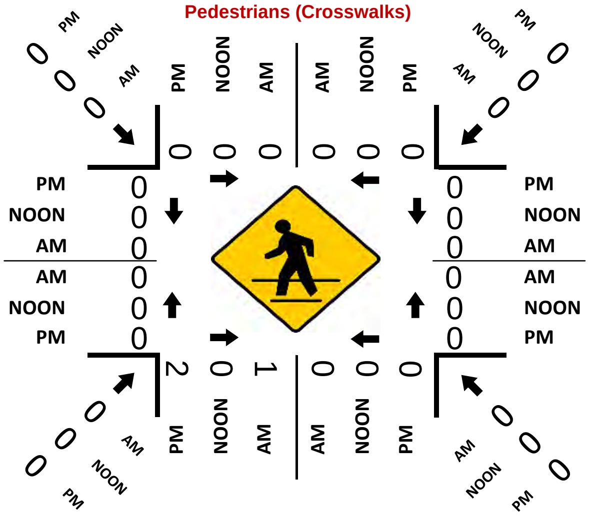
Total Vehicles (Noon)



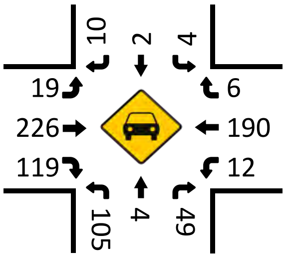
Bikes (NOON)



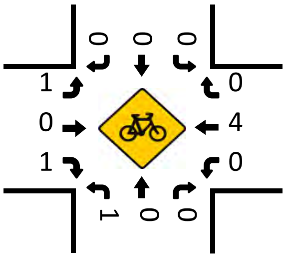
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



National Data & Surveying Services

Intersection Turning Movement Count

Location: Chestnut Ave & Copper Ave
City: Fresno
Control:

Project ID: 19-07067-003
Date: 2/26/2019

Total

NS/EW Streets:	Chestnut Ave				Chestnut Ave				Copper Ave				Copper Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	21	0	8	0	1	0	6	0	0	28	15	0	3	37	0	0	119
7:15 AM	19	0	6	0	0	1	1	0	2	69	51	0	13	53	0	0	215
7:30 AM	53	2	29	0	1	4	1	0	3	74	92	1	34	56	2	0	352
7:45 AM	80	1	34	0	4	1	6	0	4	59	41	2	9	80	2	0	323
8:00 AM	15	2	3	0	2	2	17	0	3	34	13	2	3	64	0	1	161
8:15 AM	10	0	2	0	0	0	4	0	5	32	19	0	4	51	1	0	128
8:30 AM	7	0	4	0	1	0	3	0	3	43	7	1	4	39	3	0	115
8:45 AM	9	0	6	0	4	1	3	0	0	39	10	2	2	48	2	0	126
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	214	5	92	0	13	9	41	0	20	378	248	8	72	428	10	1	1539
APPROACH %'s :	68.81%	1.61%	29.58%	0.00%	20.63%	14.29%	65.08%	0.00%	3.06%	57.80%	37.92%	1.22%	14.09%	83.76%	1.96%	0.20%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	167	5	72	0	7	8	25	0	12	236	197	5	59	253	4	1	1051
PEAK HR FACTOR :	0.522	0.625	0.529	0.000	0.438	0.500	0.368	0.000	0.750	0.797	0.535	0.625	0.434	0.791	0.500	0.250	0.746
	0.530				0.476				0.662				0.861				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	6	6	8	0	0	3	0	0	3	48	6	0	3	35	0	0	118
4:15 PM	9	1	2	0	0	1	0	0	1	40	22	1	3	40	2	0	122
4:30 PM	17	2	3	0	4	2	2	0	3	55	22	3	7	43	3	0	166
4:45 PM	29	0	14	0	1	0	2	0	4	51	43	4	5	47	2	0	202
5:00 PM	29	1	11	0	1	1	2	0	3	77	39	4	1	44	2	0	215
5:15 PM	17	1	11	0	1	1	3	0	8	47	14	4	3	52	1	0	163
5:30 PM	30	2	13	0	1	0	3	0	4	51	23	3	3	47	1	0	181
5:45 PM	10	0	6	0	1	0	1	0	7	62	18	2	1	50	1	0	159
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	147	13	68	0	9	8	13	0	33	431	187	21	26	358	12	0	1326
APPROACH %'s :	64.47%	5.70%	29.82%	0.00%	30.00%	26.67%	43.33%	0.00%	4.91%	64.14%	27.83%	3.13%	6.57%	90.40%	3.03%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	105	4	49	0	4	2	10	0	19	226	119	15	12	190	6	0	761
PEAK HR FACTOR :	0.875	0.500	0.875	0.000	1.000	0.500	0.833	0.000	0.594	0.734	0.692	0.938	0.600	0.913	0.750	0.000	0.885
	0.878				0.800				0.770				0.929				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chestnut Ave & Copper Ave
City: Fresno
Control: 0

Project ID: 19-07067-003
Date: 2/26/2019

Bikes

NS/EW Streets:	Chestnut Ave	Chestnut Ave	Copper Ave	Copper Ave

AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
APPROACH %'s :									0.00%	0.00%	100.00%	0.00%					
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.250
									0.250								

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	4
4:45 PM	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
5:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	2	0	0	0	0	0	1	0	1	1	5	0	0	4	0	0	14
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	14.29%	14.29%	71.43%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	1	0	0	0	0	0	0	0	1	0	1	0	0	4	0	0	7
PEAK HR FACTOR :	0.25	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.500	0.000	0.000	0.875
	0.250								0.500				0.500				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chestnut Ave & Copper Ave
City: Fresno

Project ID: 19-07067-003
Date: 2/26/2019

Pedestrians (Crosswalks)

NS/EW Streets:	Chestnut Ave		Chestnut Ave		Copper Ave		Copper Ave		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	0	0	1	0	0	0	0	0	1
7:15 AM	0	0	1	0	0	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	0	0	2	0	0	0	0	0	2
APPROACH %'s :			100.00%	0.00%					
PEAK HR :	07:15 AM - 08:15 AM								TOTAL
PEAK HR VOL :	0	0	1	0	0	0	0	0	1
PEAK HR FACTOR :			0.250						0.250
			0.250						

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	0	0	2	0	3	0	0	0	5
4:15 PM	0	0	17	0	0	0	0	0	17
4:30 PM	0	0	3	2	0	0	2	0	7
4:45 PM	0	0	2	0	0	0	0	0	2
5:00 PM	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	1	0	0	0	1	1	3
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	0	0	25	2	3	0	3	1	34
APPROACH %'s :			92.59%	7.41%	100.00%	0.00%	75.00%	25.00%	
PEAK HR :	04:45 PM - 05:45 PM								TOTAL
PEAK HR VOL :	0	0	2	0	0	0	0	0	2
PEAK HR FACTOR :			0.250						0.250
			0.250						

Prepared by National Data & Surveying Services

Millbrook Ave & Copper Ave

Peak Hour Turning Movement Count

ID: 19-07067-004
City: Fresno

Day: Tuesday
Date: 02/26/2019

PEAK HOURS		COUNT PERIODS
AM	07:15 AM - 08:15 AM	07:00 AM - 09:00 AM
NOON	NONE	NONE
PM	04:45 PM - 05:45 PM	04:00 PM - 06:00 PM

Millbrook Ave SOUTHBOUND

	↲	↓	↳	↶	⇧
AM	6	5	2	0	19
NOON	0	0	0	0	0
PM	2	0	0	0	18
	0	0	0	0	

Copper Ave EASTBOUND

	AM	NOON	PM	
⇦	430	0	229	
↶	0	0	1	0
↱	8	0	12	0
→	260	0	501	0
↴	18	0	20	0

Copper Ave WESTBOUND

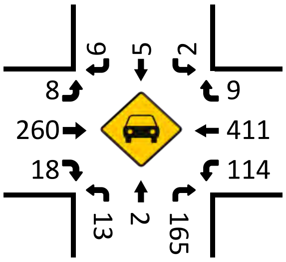
	PM	NOON	AM	
↰	3	0	9	0
←	205	0	411	0
↲	61	0	114	0
↶	0	0	0	0
⇨	635	0	427	

Millbrook Ave NORTHBOUND

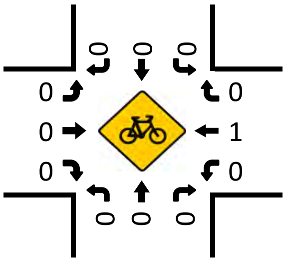
	⇩	↶	↰	↑	↱
		0	0	0	0
PM	81	0	21	3	134
NOON	0	0	0	0	0
AM	137	0	13	2	165

CONTROL			
	0		
TEV	1013 AM	0 NOON	963 PM
PHF	0.88		0.93

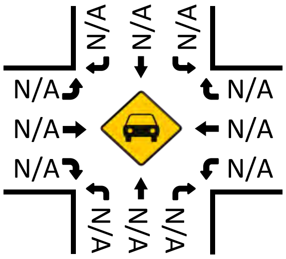
Total Vehicles (AM)



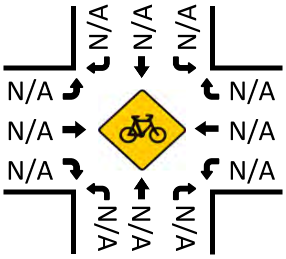
Bikes (AM)



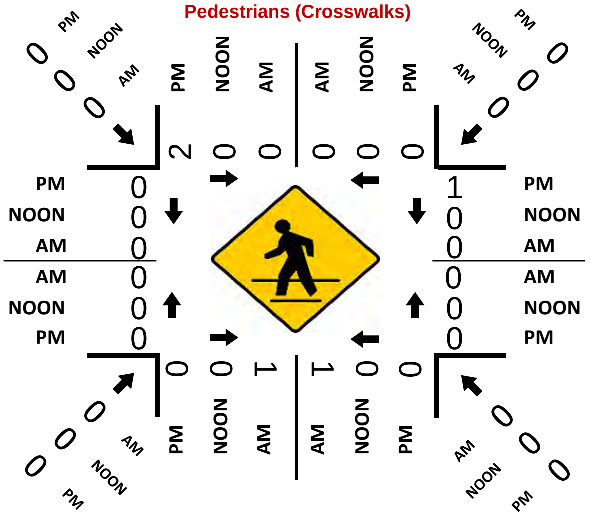
Total Vehicles (Noon)



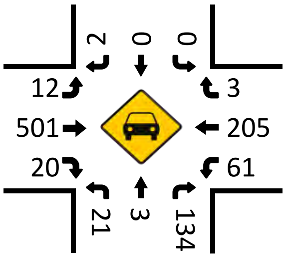
Bikes (NOON)



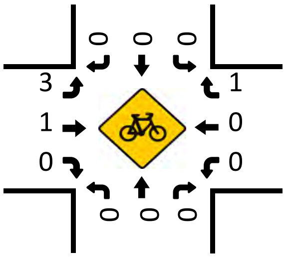
Pedestrians (Crosswalks)



Total Vehicles (PM)



Bikes (PM)



National Data & Surveying Services

Intersection Turning Movement Count

Location: Millbrook Ave & Copper Ave
City: Fresno
Control:

Project ID: 19-07067-004
Date: 2/26/2019

Total

NS/EW Streets:	Millbrook Ave				Millbrook Ave				Copper Ave				Copper Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	3	3	14	0	0	1	3	0	2	39	0	0	13	89	3	0	170
7:15 AM	3	0	28	0	1	0	2	0	1	81	3	0	22	88	2	0	231
7:30 AM	2	0	39	0	1	2	2	0	3	83	4	0	37	115	1	0	289
7:45 AM	3	0	32	0	0	3	2	0	2	59	4	0	37	110	1	0	253
8:00 AM	5	2	66	0	0	0	0	0	2	37	7	0	18	98	5	0	240
8:15 AM	9	0	65	0	2	0	0	0	3	43	3	0	16	74	3	0	218
8:30 AM	2	1	16	0	1	1	1	0	0	42	1	0	24	51	1	1	142
8:45 AM	1	0	20	0	0	2	4	0	1	58	3	0	11	54	4	0	158
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	28	6	280	0	5	9	14	0	14	442	25	0	178	679	20	1	1701
APPROACH %'s :	8.92%	1.91%	89.17%	0.00%	17.86%	32.14%	50.00%	0.00%	2.91%	91.89%	5.20%	0.00%	20.27%	77.33%	2.28%	0.11%	
PEAK HR :	**07:15 AM - 08:15 AM**																TOTAL
PEAK HR VOL :	13	2	165	0	2	5	6	0	8	260	18	0	114	411	9	0	1013
PEAK HR FACTOR :	0.650	0.250	0.625	0.000	0.500	0.417	0.750	0.000	0.667	0.783	0.643	0.000	0.770	0.893	0.450	0.000	0.876
	0.616				0.650				0.794				0.873				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	2	1	29	0	2	0	0	0	0	72	4	1	13	42	2	1	169
4:15 PM	4	3	32	0	1	1	1	0	4	106	6	0	14	30	0	0	202
4:30 PM	2	0	45	0	1	0	3	0	0	99	2	0	17	54	2	0	225
4:45 PM	9	1	30	0	0	0	0	0	5	122	4	1	13	55	0	0	240
5:00 PM	4	1	30	0	0	0	1	0	2	142	3	0	15	59	1	0	258
5:15 PM	5	1	39	0	0	0	1	0	3	111	6	0	18	49	1	0	234
5:30 PM	3	0	35	0	0	0	0	0	2	126	7	0	15	42	1	0	231
5:45 PM	1	1	29	0	0	2	3	0	5	122	8	1	19	28	0	0	219
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	30	8	269	0	4	3	9	0	21	900	40	3	124	359	7	1	1778
APPROACH %'s :	9.77%	2.61%	87.62%	0.00%	25.00%	18.75%	56.25%	0.00%	2.18%	93.36%	4.15%	0.31%	25.25%	73.12%	1.43%	0.20%	
PEAK HR :	**04:45 PM - 05:45 PM**																TOTAL
PEAK HR VOL :	21	3	134	0	0	0	2	0	12	501	20	1	61	205	3	0	963
PEAK HR FACTOR :	0.583	0.750	0.859	0.000	0.000	0.000	0.500	0.000	0.600	0.882	0.714	0.250	0.847	0.869	0.750	0.000	0.933
	0.878				0.500				0.908				0.897				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Millbrook Ave & Copper Ave
City: Fresno
Control: 0

Project ID: 19-07067-004
Date: 2/26/2019

Bikes

NS/EW Streets:	Millbrook Ave				Millbrook Ave				Copper Ave				Copper Ave				
	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	3
APPROACH %'s :					0.00%	0.00%	100.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250
													0.250				

	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
4:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	2
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	1	0	0	0	3	2	0	0	0	2	2	0	10
APPROACH %'s :					100.00%	0.00%	0.00%	0.00%	60.00%	40.00%	0.00%	0.00%	0.00%	50.00%	50.00%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	3	1	0	0	0	0	1	0	5
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.000	0.250	0.000	0.417
									0.333				0.250				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Millbrook Ave & Copper Ave
City: Fresno

Project ID: 19-07067-004
Date: 2/26/2019

Pedestrians (Crosswalks)

NS/EW Streets:	Millbrook Ave		Millbrook Ave		Copper Ave		Copper Ave		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	1	0	0	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	1	0	0	0	0	1
8:15 AM	3	0	0	0	0	0	0	0	3
8:30 AM	0	2	0	0	0	0	0	0	2
8:45 AM	1	0	0	0	0	0	0	0	1
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	4	2	1	1	0	0	0	0	8
APPROACH %'s :	66.67%	33.33%	50.00%	50.00%					
PEAK HR :	**07:15 AM - 08:15 AM**								TOTAL
PEAK HR VOL :	0	0	1	1	0	0	0	0	2
PEAK HR FACTOR :			0.250	0.250					0.500
			0.500						

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	22	13	0	0	0	0	0	0	35
4:15 PM	1	10	0	1	0	0	0	0	12
4:30 PM	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	1	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0
5:15 PM	1	0	0	0	0	0	0	0	1
5:30 PM	1	0	0	0	0	0	0	0	1
5:45 PM	0	1	0	0	0	0	0	0	1
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	25	24	0	1	0	1	0	0	51
APPROACH %'s :	51.02%	48.98%	0.00%	100.00%	0.00%	100.00%			
PEAK HR :	**04:45 PM - 05:45 PM**								TOTAL
PEAK HR VOL :	2	0	0	0	0	1	0	0	3
PEAK HR FACTOR :	0.500					0.250			0.750
	0.500				0.250				

Prepared by National Data & Surveying Services

Chestnut Ave & International Ave

Peak Hour Turning Movement Count

ID: 19-07067-005
City: Fresno

Day: Tuesday
Date: 02/26/2019

PEAK HOURS		COUNT PERIODS
07:00 AM - 08:00 AM	AM	07:00 AM - 09:00 AM
NONE	NOON	NONE
04:45 PM - 05:45 PM	PM	04:00 PM - 06:00 PM

Chestnut Ave
SOUTHBOUND

	↲	↓	↳	⤸	⇧	
AM	66	90	43	0	521	AM
NOON	0	0	0	0	0	NOON
PM	125	135	73	0	234	PM
	0	0	0	0		

International Ave
EASTBOUND

	AM	NOON	PM	
⇦	414	0	335	
⤺	0	0	0	0
↱	200	0	72	0
→	423	0	166	0
↴	28	0	23	0

International Ave
WESTBOUND

	PM	NOON	AM
0 ⮤	41	0	84
0 ←	188	0	344
0 ↰	70	0	176
0 ⤹	29	0	33
⇨	329	0	661

CONTROL

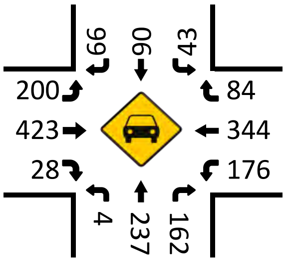
0

TEV	1890 AM	0 NOON	1126 PM
PHF	0.61		0.88

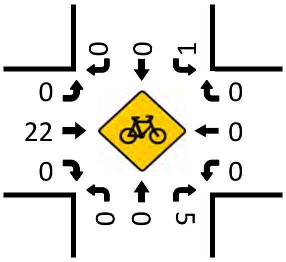
	⇩	⤺	↰	↑	↱	
		0	0	0	0	
PM	228	0	22	121	61	PM
NOON	0	0	0	0	0	NOON
AM	294	0	4	237	162	AM

NORTHBOUND
Chestnut Ave

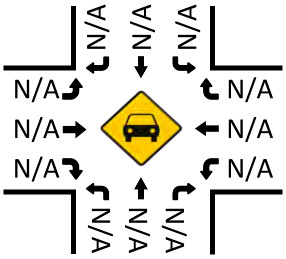
Total Vehicles (AM)



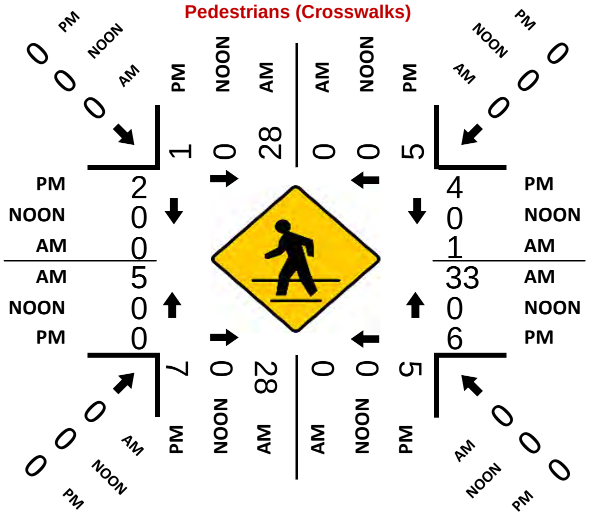
Bikes (AM)



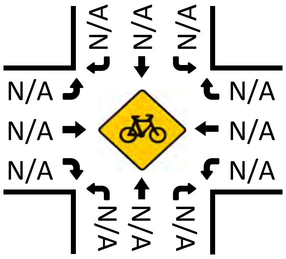
Total Vehicles (Noon)



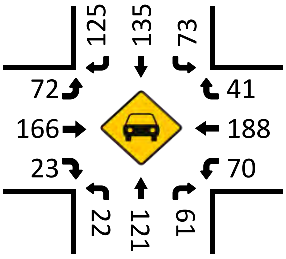
Pedestrians (Crosswalks)



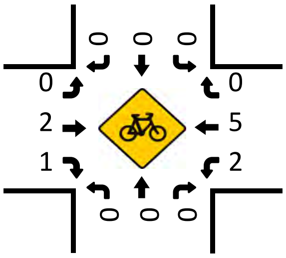
Bikes (NOON)



Total Vehicles (PM)



Bikes (PM)



National Data & Surveying Services

Intersection Turning Movement Count

Location: Chestnut Ave & International Ave
City: Fresno
Control:

Project ID: 19-07067-005
Date: 2/26/2019

Total

NS/EW Streets:	Chestnut Ave				Chestnut Ave				International Ave				International Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	25	31	0	3	9	5	0	12	30	5	0	12	14	4	2	152
7:15 AM	3	65	50	0	12	8	11	0	60	73	7	0	34	41	12	6	382
7:30 AM	0	97	36	0	15	35	24	0	92	224	12	0	65	131	32	12	775
7:45 AM	1	50	45	0	13	38	26	0	36	96	4	0	65	158	36	13	581
8:00 AM	3	10	7	0	5	16	9	0	4	37	4	0	3	25	4	3	130
8:15 AM	4	7	15	0	5	12	5	0	5	28	6	0	5	5	2	0	99
8:30 AM	2	8	14	0	3	6	1	0	9	35	3	0	5	10	2	4	102
8:45 AM	1	16	15	0	4	5	2	0	5	32	3	0	9	12	8	1	113
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	14	278	213	0	60	129	83	0	223	555	44	0	198	396	100	41	2334
APPROACH %'s :	2.77%	55.05%	42.18%	0.00%	22.06%	47.43%	30.51%	0.00%	27.13%	67.52%	5.35%	0.00%	26.94%	53.88%	13.61%	5.58%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	4	237	162	0	43	90	66	0	200	423	28	0	176	344	84	33	1890
PEAK HR FACTOR :	0.333	0.611	0.810	0.000	0.717	0.592	0.635	0.000	0.543	0.472	0.583	0.000	0.677	0.544	0.583	0.635	0.610
	0.758				0.646				0.496				0.585				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	3	15	11	0	9	23	6	0	5	24	4	0	20	33	8	5	166
4:15 PM	8	13	4	0	8	16	4	0	8	33	4	0	16	28	5	3	150
4:30 PM	4	24	13	0	11	26	13	0	17	24	8	0	20	37	3	3	203
4:45 PM	5	47	18	0	16	24	29	0	28	43	6	0	20	44	8	6	294
5:00 PM	9	32	11	0	22	32	35	0	30	39	2	0	28	58	16	6	320
5:15 PM	3	19	13	0	16	35	35	0	9	35	10	0	14	45	8	11	253
5:30 PM	5	23	19	0	19	44	26	0	5	49	5	0	8	41	9	6	259
5:45 PM	7	14	15	0	10	13	9	0	13	37	2	0	6	32	6	6	170
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	44	187	104	0	111	213	157	0	115	284	41	0	132	318	63	46	1815
APPROACH %'s :	13.13%	55.82%	31.04%	0.00%	23.08%	44.28%	32.64%	0.00%	26.14%	64.55%	9.32%	0.00%	23.61%	56.89%	11.27%	8.23%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	22	121	61	0	73	135	125	0	72	166	23	0	70	188	41	29	1126
PEAK HR FACTOR :	0.611	0.644	0.803	0.000	0.830	0.767	0.893	0.000	0.600	0.847	0.575	0.000	0.625	0.810	0.641	0.659	0.880
	0.729				0.935				0.847				0.759				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chestnut Ave & International Ave
City: Fresno
Control: 0

Project ID: 19-07067-005
Date: 2/26/2019

Bikes

NS/EW Streets:	Chestnut Ave				Chestnut Ave				International Ave				International Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4
7:15 AM	0	0	4	0	0	0	0	0	0	3	0	0	0	0	0	0	7
7:30 AM	0	0	1	0	1	0	0	0	0	12	0	0	0	0	0	0	14
7:45 AM	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
8:00 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	5	0	1	0	0	0	0	23	0	0	0	0	0	0	29
APPROACH %'s :	0.00%	0.00%	100.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%					
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	0	0	5	0	1	0	0	0	0	22	0	0	0	0	0	0	28
PEAK HR FACTOR :	0.000	0.000	0.313	0.000	0.250	0.000	0.000	0.000	0.000	0.458	0.000	0.000	0.000	0.000	0.000	0.000	0.500
	0.313				0.250				0.458								

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
4:45 PM	0	0	0	0	0	0	0	0	0	2	0	0	1	1	0	0	4
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	4
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	4
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	1	0	1	0	0	4	1	0	4	8	0	0	19
APPROACH %'s :					50.00%	0.00%	50.00%	0.00%	0.00%	80.00%	20.00%	0.00%	33.33%	66.67%	0.00%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	2	1	0	2	5	0	0	10
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.500	0.625	0.000	0.000	0.625
									0.375				0.583				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chestnut Ave & International Ave
City: Fresno

Project ID: 19-07067-005
Date: 2/26/2019

Pedestrians (Crosswalks)

NS/EW Streets:	Chestnut Ave		Chestnut Ave		International Ave		International Ave		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	0	0	2	0	7	0	0	0	9
7:15 AM	4	0	7	0	3	0	2	0	16
7:30 AM	16	0	18	0	16	1	2	0	53
7:45 AM	8	0	1	0	7	0	1	0	17
8:00 AM	0	0	1	0	0	0	0	1	2
8:15 AM	0	0	1	0	0	0	0	0	1
8:30 AM	2	0	0	1	0	0	1	0	4
8:45 AM	0	2	0	0	0	0	0	0	2
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	30	2	30	1	33	1	6	1	104
APPROACH %'s :	93.75%	6.25%	96.77%	3.23%	97.06%	2.94%	85.71%	14.29%	
PEAK HR :	**07:00 AM - 08:00 AM**								TOTAL
PEAK HR VOL :	28	0	28	0	33	1	5	0	95
PEAK HR FACTOR :	0.438		0.389		0.516	0.250	0.625		0.448
	0.438		0.389		0.500		0.625		

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	3	2	0	3	0	4	0	1	13
4:15 PM	0	0	0	0	0	0	0	2	2
4:30 PM	0	1	1	0	0	0	0	1	3
4:45 PM	0	0	3	1	4	0	0	0	8
5:00 PM	0	0	3	2	0	3	0	0	8
5:15 PM	1	2	1	1	2	1	0	0	8
5:30 PM	0	3	0	1	0	0	0	2	6
5:45 PM	0	0	0	1	3	0	0	1	5
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	4	8	8	9	9	8	0	7	53
APPROACH %'s :	33.33%	66.67%	47.06%	52.94%	52.94%	47.06%	0.00%	100.00%	
PEAK HR :	**04:45 PM - 05:45 PM**								TOTAL
PEAK HR VOL :	1	5	7	5	6	4	0	2	30
PEAK HR FACTOR :	0.250	0.417	0.583	0.625	0.375	0.333		0.250	0.938
	0.500		0.600		0.625		0.250		

Prepared by National Data & Surveying Services

Chestnut Ave & Behymer Ave

Peak Hour Turning Movement Count

ID: 19-07067-006
City: Fresno

Day: Tuesday
Date: 02/26/2019

PEAK HOURS			COUNT PERIODS
AM	07:15 AM - 08:15 AM	AM	07:00 AM - 09:00 AM
NOON	NONE	NOON	NONE
PM	04:45 PM - 05:45 PM	PM	04:00 PM - 06:00 PM

Chestnut Ave SOUTHBOUND

	↲	↓	↳	U		⇧
AM	52	184	138	0		360
NOON	0	0	0	0		0
PM	72	130	88	0		231
	0	0	0	0		

Behymer Ave EASTBOUND

	AM	NOON	PM	
⇦	291	0	375	
U	23	0	27	0
↰	101	0	45	0
→	247	0	175	0
↴	39	0	15	0

Behymer Ave WESTBOUND

		PM	NOON	AM
0	↰	57	0	65
0	←	244	0	165
0	↱	35	0	63
0	U	3	0	20
	⇨	348	0	540

CONTROL

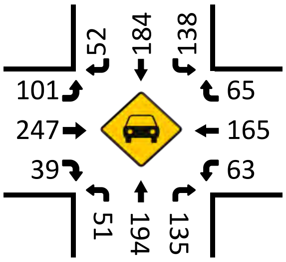
0

	AM	NOON	PM
TEV	1477	0	1134
PHF	0.76		0.89

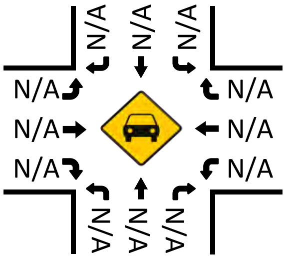
Chestnut Ave NORTHBOUND

			0	0	0	0
	⇩		U	↰	↑	↱
PM	180		0	32	129	82
NOON	0		0	0	0	0
AM	286		0	51	194	135

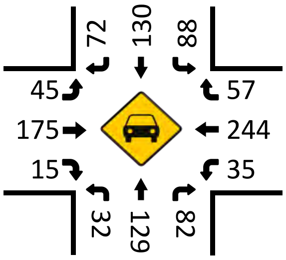
Total Vehicles (AM)



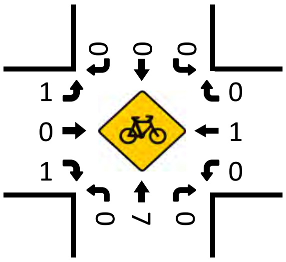
Total Vehicles (Noon)



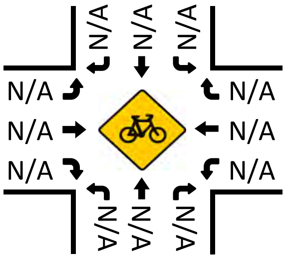
Total Vehicles (PM)



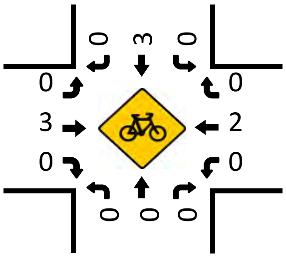
Bikes (AM)



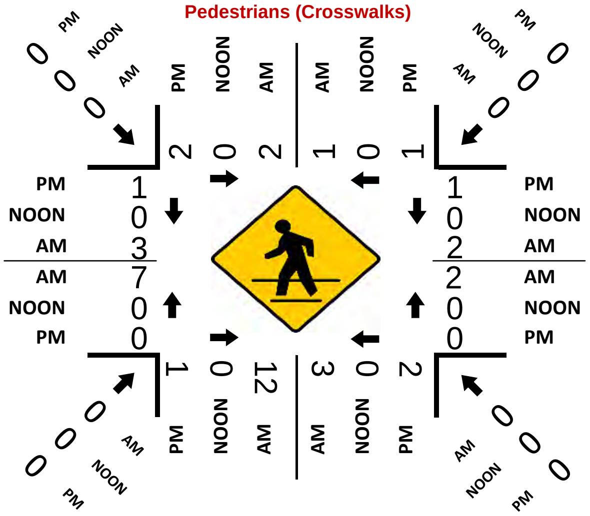
Bikes (NOON)



Bikes (PM)



Pedestrians (Crosswalks)



National Data & Surveying Services

Intersection Turning Movement Count

Location: Chestnut Ave & Behymer Ave
City: Fresno
Control:

Project ID: 19-07067-006
Date: 2/26/2019

Total

NS/EW Streets:	Chestnut Ave				Chestnut Ave				Behymer Ave				Behymer Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	4	35	3	0	14	15	10	0	12	28	2	3	2	20	6	0	154
7:15 AM	3	77	10	0	22	40	11	0	34	46	5	6	3	30	15	1	303
7:30 AM	9	74	54	0	54	60	19	0	49	75	2	0	10	50	29	4	489
7:45 AM	10	27	26	0	40	66	18	0	10	75	7	10	22	52	14	3	380
8:00 AM	29	16	45	0	22	18	4	0	8	51	25	7	28	33	7	12	305
8:15 AM	36	20	51	0	10	14	6	0	3	36	11	4	13	25	5	12	246
8:30 AM	11	15	11	0	8	14	10	0	12	36	5	2	3	22	6	1	156
8:45 AM	3	15	11	0	7	13	2	0	7	36	4	4	6	30	3	2	143
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	105	279	211	0	177	240	80	0	135	383	61	36	87	262	85	35	2176
APPROACH %'s :	17.65%	46.89%	35.46%	0.00%	35.61%	48.29%	16.10%	0.00%	21.95%	62.28%	9.92%	5.85%	18.55%	55.86%	18.12%	7.46%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	51	194	135	0	138	184	52	0	101	247	39	23	63	165	65	20	1477
PEAK HR FACTOR :	0.440	0.630	0.625	0.000	0.639	0.697	0.684	0.000	0.515	0.823	0.390	0.575	0.563	0.793	0.560	0.417	0.755
		0.693				0.703				0.813				0.841			

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	2	24	6	0	13	34	6	0	6	24	5	2	8	23	4	0	157
4:15 PM	4	15	11	0	16	22	9	0	6	29	6	2	6	61	9	7	203
4:30 PM	11	26	25	0	21	32	15	0	6	42	2	4	12	61	13	5	275
4:45 PM	6	54	13	0	17	30	17	0	12	38	5	5	15	50	11	0	273
5:00 PM	6	27	16	0	15	45	19	0	9	30	3	8	6	65	18	0	267
5:15 PM	11	23	18	0	34	24	20	0	11	44	2	7	8	61	12	2	277
5:30 PM	9	25	35	0	22	31	16	0	13	63	5	7	6	68	16	1	317
5:45 PM	4	25	18	0	14	19	4	0	10	54	6	5	10	56	15	1	241
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	53	219	142	0	152	237	106	0	73	324	34	40	71	445	98	16	2010
APPROACH %'s :	12.80%	52.90%	34.30%	0.00%	30.71%	47.88%	21.41%	0.00%	15.50%	68.79%	7.22%	8.49%	11.27%	70.63%	15.56%	2.54%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	32	129	82	0	88	130	72	0	45	175	15	27	35	244	57	3	1134
PEAK HR FACTOR :	0.727	0.597	0.586	0.000	0.647	0.722	0.900	0.000	0.865	0.694	0.750	0.844	0.583	0.897	0.792	0.375	0.894
		0.832				0.918				0.744				0.931			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chestnut Ave & Behymer Ave
City: Fresno
Control: 0

Project ID: 19-07067-006
Date: 2/26/2019

Bikes

NS/EW Streets:	Chestnut Ave				Chestnut Ave				Behymer Ave				Behymer Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
7:30 AM	0	4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	7	0	0	0	0	0	0	1	0	1	0	0	1	0	0	10
APPROACH %'s :	0.00%	100.00%	0.00%	0.00%					50.00%	0.00%	50.00%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	0	7	0	0	0	0	0	0	1	0	1	0	0	1	0	0	10
PEAK HR FACTOR :	0.000	0.438	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.500
	0.438								0.500				0.250				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
4:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
4:45 PM	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	3
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	3
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	6	0	0	0	3	0	0	0	3	0	0	12
APPROACH %'s :					0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	3	0	0	0	3	0	0	0	2	0	0	8
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.250	0.000	0.000	0.667
					0.375				0.375				0.250				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chestnut Ave & Behymer Ave
City: Fresno

Project ID: 19-07067-006
Date: 2/26/2019

Pedestrians (Crosswalks)

NS/EW Streets:	Chestnut Ave		Chestnut Ave		Behymer Ave		Behymer Ave		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	0	0	1	0	3	0	0	0	4
7:15 AM	2	0	0	0	1	0	2	0	5
7:30 AM	0	0	0	0	1	0	4	0	5
7:45 AM	0	0	7	3	0	0	1	3	14
8:00 AM	0	1	5	0	0	2	0	0	8
8:15 AM	0	0	16	3	0	0	0	3	22
8:30 AM	0	0	1	1	0	0	0	1	3
8:45 AM	0	0	0	0	0	0	0	0	0
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	2	1	30	7	5	2	7	7	61
APPROACH %'s :	66.67%	33.33%	81.08%	18.92%	71.43%	28.57%	50.00%	50.00%	
PEAK HR :	**07:15 AM - 08:15 AM**								TOTAL
PEAK HR VOL :	2	1	12	3	2	2	7	3	32
PEAK HR FACTOR :	0.250	0.250	0.429	0.250	0.500	0.250	0.438	0.250	0.571
	0.375		0.375		0.500		0.625		

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0
4:15 PM	2	0	0	0	1	3	0	1	7
4:30 PM	0	0	1	2	1	0	1	1	6
4:45 PM	0	0	0	0	0	0	0	0	0
5:00 PM	2	1	0	1	0	1	0	0	5
5:15 PM	0	0	1	0	0	0	0	1	2
5:30 PM	0	0	0	1	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	4	1	2	4	2	4	1	3	21
APPROACH %'s :	80.00%	20.00%	33.33%	66.67%	33.33%	66.67%	25.00%	75.00%	
PEAK HR :	**04:45 PM - 05:45 PM**								TOTAL
PEAK HR VOL :	2	1	1	2	0	1	0	1	8
PEAK HR FACTOR :	0.250	0.250	0.250	0.500		0.250		0.250	0.400
	0.250		0.750		0.250		0.250		

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Vol, veh/h	1	2	0	52	1	86	4	150	26	194	202	1
Future Vol, veh/h	1	2	0	52	1	86	4	150	26	194	202	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	300	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	2	0	60	1	100	5	174	30	226	235	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	786	902	118	770	887	-	236	0	0	204	0	0
Stage 1	688	688	-	199	199	-	-	-	-	-	-	-
Stage 2	98	214	-	571	688	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	283	276	912	290	282	0	1328	-	-	1365	-	-
Stage 1	403	445	-	784	735	0	-	-	-	-	-	-
Stage 2	898	724	-	473	445	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	245	229	912	251	234	-	1328	-	-	1365	-	-
Mov Cap-2 Maneuver	245	229	-	251	234	-	-	-	-	-	-	-
Stage 1	401	371	-	781	732	-	-	-	-	-	-	-
Stage 2	893	721	-	392	371	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.6	23.9	0.2	4
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1328	-	-	234	251	-	1365	-	-
HCM Lane V/C Ratio	0.004	-	-	0.015	0.246	-	0.165	-	-
HCM Control Delay (s)	7.7	-	-	20.6	23.9	0	8.2	-	-
HCM Lane LOS	A	-	-	C	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.9	-	0.6	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	8	260	18	114	411	9	13	2	165	6	5	2
Future Vol, veh/h	8	260	18	114	411	9	13	2	165	6	5	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	9	295	20	130	467	10	15	2	188	7	6	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	477	0	0	315	0	0	810	1050	148	894	1060	234
Stage 1	-	-	-	-	-	-	313	313	-	727	727	-
Stage 2	-	-	-	-	-	-	497	737	-	167	333	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1082	-	-	1242	-	-	271	226	872	236	223	768
Stage 1	-	-	-	-	-	-	672	656	-	381	427	-
Stage 2	-	-	-	-	-	-	523	423	-	818	642	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1082	-	-	1242	-	-	242	201	872	168	198	768
Mov Cap-2 Maneuver	-	-	-	-	-	-	242	201	-	168	198	-
Stage 1	-	-	-	-	-	-	667	651	-	378	382	-
Stage 2	-	-	-	-	-	-	460	379	-	635	637	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.8	11.2	23.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	242	201	872	1082	-	-	1242	-	-	168	198	768
HCM Lane V/C Ratio	0.061	0.011	0.215	0.008	-	-	0.104	-	-	0.041	0.029	0.003
HCM Control Delay (s)	20.8	23.1	10.3	8.4	-	-	8.2	-	-	27.3	23.7	9.7
HCM Lane LOS	C	C	B	A	-	-	A	-	-	D	C	A
HCM 95th %tile Q(veh)	0.2	0	0.8	0	-	-	0.3	-	-	0.1	0.1	0

Intersection	
Intersection Delay, s/veh	40.2
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✣	
Traffic Vol, veh/h	17	236	197	60	253	4	167	5	72	7	8	25
Future Vol, veh/h	17	236	197	60	253	4	167	5	72	7	8	25
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	315	263	80	337	5	223	7	96	9	11	33
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	69.5	20.2	16.5	12.7
HCM LOS	F	C	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	100%	0%	17%
Vol Thru, %	0%	6%	0%	55%	0%	98%	20%
Vol Right, %	0%	94%	0%	45%	0%	2%	62%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	167	77	17	433	60	257	40
LT Vol	167	0	17	0	60	0	7
Through Vol	0	5	0	236	0	253	8
RT Vol	0	72	0	197	0	4	25
Lane Flow Rate	223	103	23	577	80	343	53
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.498	0.196	0.046	1.033	0.165	0.656	0.122
Departure Headway (Hd)	8.227	7.04	7.28	6.443	7.574	7.05	8.477
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	441	513	495	566	477	517	426
Service Time	5.927	4.74	4.98	4.143	5.274	4.75	6.477
HCM Lane V/C Ratio	0.506	0.201	0.046	1.019	0.168	0.663	0.124
HCM Control Delay	18.8	11.4	10.3	71.8	11.8	22.2	12.7
HCM Lane LOS	C	B	B	F	B	C	B
HCM 95th-tile Q	2.7	0.7	0.1	15.9	0.6	4.7	0.4

Intersection	
Intersection Delay, s/veh	45.1
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	20	157	139	124	216	47	59	53	30	47	193	41
Future Vol, veh/h	20	157	139	124	216	47	59	53	30	47	193	41
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	199	176	157	273	59	75	67	38	59	244	52
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	37.1	69.7	18.4	33.6
HCM LOS	E	F	C	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	42%	6%	32%	17%
Vol Thru, %	37%	50%	56%	69%
Vol Right, %	21%	44%	12%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	142	316	387	281
LT Vol	59	20	124	47
Through Vol	53	157	216	193
RT Vol	30	139	47	41
Lane Flow Rate	180	400	490	356
Geometry Grp	1	1	1	1
Degree of Util (X)	0.434	0.826	1.005	0.778
Departure Headway (Hd)	8.696	7.435	7.389	7.874
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	412	484	490	459
Service Time	6.793	5.511	5.46	5.948
HCM Lane V/C Ratio	0.437	0.826	1	0.776
HCM Control Delay	18.4	37.1	69.7	33.6
HCM Lane LOS	C	E	F	D
HCM 95th-tile Q	2.1	8	13.6	6.8

5: E INTERNATIONAL AVE & N CHESTNUT AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	328	693	46	343	564	138	7	389	266	70	148	108
v/c Ratio	0.81	0.79	0.10	0.82	0.62	0.29	0.06	0.80	0.55	0.44	0.12	0.18
Control Delay	57.5	46.4	0.5	58.0	40.6	9.8	57.5	52.9	24.6	61.4	26.0	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	46.4	0.5	58.0	40.6	9.8	57.5	52.9	24.6	61.4	26.0	6.6
Queue Length 50th (ft)	231	258	0	241	197	6	5	271	89	50	36	0
Queue Length 95th (ft)	234	218	0	245	176	12	15	259	87	72	50	8
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	537	1050	521	537	1058	542	136	618	584	209	1460	705
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.66	0.09	0.64	0.53	0.25	0.05	0.63	0.46	0.33	0.10	0.15

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	200	423	28	209	344	84	4	237	162	43	90	66
Future Volume (veh/h)	200	423	28	209	344	84	4	237	162	43	90	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	328	693	46	343	564	138	7	389	266	70	148	108
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	368	928	399	383	957	413	16	512	418	91	1122	498
Arrive On Green	0.21	0.26	0.26	0.22	0.27	0.27	0.01	0.27	0.27	0.05	0.32	0.32
Sat Flow, veh/h	1781	3554	1530	1781	3554	1532	1781	1870	1528	1781	3554	1578
Grp Volume(v), veh/h	328	693	46	343	564	138	7	389	266	70	148	108
Grp Sat Flow(s),veh/h/ln	1781	1777	1530	1781	1777	1532	1781	1870	1528	1781	1777	1578
Q Serve(g_s), s	17.4	17.4	2.2	18.2	13.4	7.0	0.4	18.6	14.9	3.8	2.9	4.9
Cycle Q Clear(g_c), s	17.4	17.4	2.2	18.2	13.4	7.0	0.4	18.6	14.9	3.8	2.9	4.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	368	928	399	383	957	413	16	512	418	91	1122	498
V/C Ratio(X)	0.89	0.75	0.12	0.90	0.59	0.33	0.44	0.76	0.64	0.77	0.13	0.22
Avail Cap(c_a), veh/h	540	1015	437	540	1015	437	137	611	499	210	1307	580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.5	33.0	27.4	37.2	30.9	28.6	48.0	32.4	31.1	45.7	23.8	24.5
Incr Delay (d2), s/veh	12.3	2.8	0.1	13.4	0.8	0.5	18.3	4.6	2.0	12.9	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.5	7.5	0.8	9.0	5.6	2.5	0.2	8.8	5.5	2.0	1.2	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.8	35.8	27.5	50.6	31.7	29.0	66.3	37.0	33.1	58.6	23.8	24.7
LnGrp LOS	D	D	C	D	C	C	E	D	C	E	C	C
Approach Vol, veh/h		1067			1045			662			326	
Approach Delay, s/veh		39.8			37.6			35.7			31.6	
Approach LOS		D			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	31.9	25.4	30.6	5.4	36.0	24.6	31.4
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	5.8	20.6	20.2	19.4	2.4	6.9	19.4	15.4
Green Ext Time (p_c), s	0.1	2.6	0.7	2.9	0.0	1.2	0.7	3.2

Intersection Summary	
HCM 6th Ctrl Delay	37.3
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

6: N CHESTNUT AVE & E BEHYMER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	325	51	109	217	86	67	255	178	68	239	182
v/c Ratio	0.44	0.39	0.11	0.36	0.30	0.19	0.26	0.50	0.32	0.25	0.46	0.32
Control Delay	33.8	25.5	0.5	37.0	28.4	0.9	38.1	27.8	6.3	37.1	26.5	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.8	25.5	0.5	37.0	28.4	0.9	38.1	27.8	6.3	37.1	26.5	6.1
Queue Length 50th (ft)	55	57	0	37	38	0	23	85	0	23	79	0
Queue Length 95th (ft)	151	116	0	116	89	0	80	193	27	80	176	26
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	808	1651	799	521	1076	595	413	1111	1016	485	1157	1052
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.20	0.06	0.21	0.20	0.14	0.16	0.23	0.18	0.14	0.21	0.17

Intersection Summary

HCM 6th Signalized Intersection Summary
6: N CHESTNUT AVE & E BEHYMER AVE

EX AM
06/05/2019

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	124	247	39	83	165	65	51	194	135	52	182	138
Future Volume (veh/h)	124	247	39	83	165	65	51	194	135	52	182	138
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	163	325	51	109	217	86	67	255	178	68	239	182
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	219	626	279	154	495	221	116	412	349	117	413	350
Arrive On Green	0.12	0.18	0.18	0.09	0.14	0.14	0.06	0.22	0.22	0.07	0.22	0.22
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	163	325	51	109	217	86	67	255	178	68	239	182
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	3.7	3.4	1.1	2.5	2.3	2.0	1.5	5.1	4.1	1.5	4.7	4.2
Cycle Q Clear(g_c), s	3.7	3.4	1.1	2.5	2.3	2.0	1.5	5.1	4.1	1.5	4.7	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	219	626	279	154	495	221	116	412	349	117	413	350
V/C Ratio(X)	0.74	0.52	0.18	0.71	0.44	0.39	0.58	0.62	0.51	0.58	0.58	0.52
Avail Cap(c_a), veh/h	968	1871	835	624	1185	528	495	1423	1206	581	1513	1283
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	15.5	14.5	18.4	16.3	16.2	18.8	14.6	14.2	18.8	14.4	14.2
Incr Delay (d2), s/veh	4.9	0.7	0.3	5.9	0.6	1.1	4.5	1.5	1.2	4.5	1.3	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.2	0.3	1.1	0.8	0.7	0.7	1.9	1.2	0.7	1.7	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.4	16.1	14.8	24.3	16.9	17.3	23.3	16.1	15.3	23.3	15.7	15.4
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		539			412			500			489	
Approach Delay, s/veh		17.9			19.0			16.8			16.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.2	13.6	8.1	12.5	7.2	13.6	9.6	11.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	3.5	7.1	4.5	5.4	3.5	6.7	5.7	4.3
Green Ext Time (p_c), s	0.1	2.0	0.2	1.9	0.1	2.0	0.4	1.0

Intersection Summary	
HCM 6th Ctrl Delay	17.5
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues EX AM IMPROVED

3: N CHESTNUT AVE & E COPPER AVE

06/05/2019

	↗	→	↘	↙	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	23	315	263	80	337	5	223	103	9	11	33
v/c Ratio	0.11	0.58	0.41	0.31	0.46	0.01	0.54	0.17	0.04	0.04	0.09
Control Delay	39.2	28.1	5.7	37.9	21.4	0.0	33.6	5.9	39.4	29.8	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	28.1	5.7	37.9	21.4	0.0	33.6	5.9	39.4	29.8	0.5
Queue Length 50th (ft)	9	109	0	30	81	0	80	2	3	4	0
Queue Length 95th (ft)	35	221	25	86	230	0	186	23	19	17	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	261	1602	1398	331	1631	1402	680	883	261	516	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.20	0.19	0.24	0.21	0.00	0.33	0.12	0.03	0.02	0.06

Intersection Summary

HCM 6th Signalized Intersection Summary
3: N CHESTNUT AVE & E COPPER AVE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↑	↱
Traffic Volume (veh/h)	17	236	197	60	253	4	167	5	72	7	8	25
Future Volume (veh/h)	17	236	197	60	253	4	167	5	72	7	8	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	23	315	263	80	337	5	223	7	96	9	11	33
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	49	475	403	125	555	470	292	27	370	21	178	151
Arrive On Green	0.03	0.25	0.25	0.07	0.30	0.30	0.16	0.25	0.25	0.01	0.10	0.10
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	109	1493	1781	1870	1585
Grp Volume(v), veh/h	23	315	263	80	337	5	223	0	103	9	11	33
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1602	1781	1870	1585
Q Serve(g_s), s	0.6	6.8	6.7	2.0	6.9	0.1	5.4	0.0	2.3	0.2	0.2	0.9
Cycle Q Clear(g_c), s	0.6	6.8	6.7	2.0	6.9	0.1	5.4	0.0	2.3	0.2	0.2	0.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.93	1.00		1.00
Lane Grp Cap(c), veh/h	49	475	403	125	555	470	292	0	397	21	178	151
V/C Ratio(X)	0.46	0.66	0.65	0.64	0.61	0.01	0.76	0.00	0.26	0.43	0.06	0.22
Avail Cap(c_a), veh/h	297	2490	2110	377	2573	2181	773	0	874	297	521	441
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.5	15.0	15.0	20.3	13.6	11.2	17.9	0.0	13.6	22.0	18.5	18.8
Incr Delay (d2), s/veh	6.6	1.6	1.8	5.3	1.1	0.0	4.1	0.0	0.3	13.1	0.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.3	1.9	0.8	2.2	0.0	2.2	0.0	0.7	0.2	0.1	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.2	16.6	16.8	25.6	14.6	11.2	22.1	0.0	13.9	35.2	18.6	19.5
LnGrp LOS	C	B	B	C	B	B	C	A	B	D	B	B
Approach Vol, veh/h		601			422			326			53	
Approach Delay, s/veh		17.1			16.7			19.5			22.0	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.0	15.6	7.7	16.6	11.9	8.8	5.7	18.5
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.2	4.3	4.0	8.8	7.4	2.9	2.6	8.9
Green Ext Time (p_c), s	0.0	0.5	0.1	2.6	0.5	0.1	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

4: N WILLOW AVE & COPPER AVE

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	38	375	157	332	75	108	59	296
v/c Ratio	0.22	0.75	0.57	0.45	0.36	0.24	0.31	0.67
Control Delay	45.1	37.5	47.0	24.6	44.9	24.4	45.0	38.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	37.5	47.0	24.6	44.9	24.4	45.0	38.4
Queue Length 50th (ft)	19	166	78	136	38	36	30	141
Queue Length 95th (ft)	52	266	154	232	83	77	70	227
Internal Link Dist (ft)		1168		2435		1529		9418
Turn Bay Length (ft)	300		300		300		300	
Base Capacity (vph)	298	788	346	863	346	608	705	955
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.48	0.45	0.38	0.22	0.18	0.08	0.31

Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	30	157	139	124	216	47	59	53	32	47	193	41
Future Volume (veh/h)	30	157	139	124	216	47	59	53	32	47	193	41
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	199	176	157	273	59	75	67	41	59	244	52
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	71	248	220	203	515	111	108	242	148	95	321	68
Arrive On Green	0.04	0.27	0.27	0.11	0.35	0.35	0.06	0.22	0.22	0.05	0.22	0.22
Sat Flow, veh/h	1781	915	809	1781	1490	322	1781	1086	665	1781	1495	319
Grp Volume(v), veh/h	38	0	375	157	0	332	75	0	108	59	0	296
Grp Sat Flow(s),veh/h/ln	1781	0	1725	1781	0	1812	1781	0	1751	1781	0	1813
Q Serve(g_s), s	1.2	0.0	11.6	4.9	0.0	8.4	2.4	0.0	2.9	1.9	0.0	8.8
Cycle Q Clear(g_c), s	1.2	0.0	11.6	4.9	0.0	8.4	2.4	0.0	2.9	1.9	0.0	8.8
Prop In Lane	1.00		0.47	1.00		0.18	1.00		0.38	1.00		0.18
Lane Grp Cap(c), veh/h	71	0	468	203	0	627	108	0	390	95	0	390
V/C Ratio(X)	0.54	0.00	0.80	0.77	0.00	0.53	0.69	0.00	0.28	0.62	0.00	0.76
Avail Cap(c_a), veh/h	389	0	987	451	0	1101	451	0	727	917	0	1228
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.0	0.0	19.4	24.7	0.0	15.0	26.4	0.0	18.4	26.6	0.0	21.1
Incr Delay (d2), s/veh	6.2	0.0	3.2	6.1	0.0	0.7	7.7	0.0	0.4	6.5	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	4.2	2.1	0.0	2.8	1.1	0.0	1.0	0.9	0.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.2	0.0	22.7	30.8	0.0	15.7	34.0	0.0	18.8	33.1	0.0	24.2
LnGrp LOS	C	A	C	C	A	B	C	A	B	C	A	C
Approach Vol, veh/h		413			489			183			355	
Approach Delay, s/veh		23.6			20.5			25.1			25.6	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.5	18.0	11.0	20.8	8.0	17.5	6.8	25.0
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	3.9	4.9	6.9	13.6	4.4	10.8	3.2	10.4
Green Ext Time (p_c), s	0.1	0.4	0.2	2.0	0.1	1.6	0.0	1.7

Intersection Summary	
HCM 6th Ctrl Delay	23.3
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			↰	↱	↰	↑↱		↰	↑↱	
Traffic Vol, veh/h	1	1	2	21	0	191	3	289	57	151	206	0
Future Vol, veh/h	1	1	2	21	0	191	3	289	57	151	206	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	300	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1	2	23	0	205	3	311	61	162	222	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	708	924	111	784	894	-	222	0	0	372	0	0
Stage 1	546	546	-	348	348	-	-	-	-	-	-	-
Stage 2	162	378	-	436	546	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	322	268	921	283	279	0	1344	-	-	1183	-	-
Stage 1	490	516	-	641	633	0	-	-	-	-	-	-
Stage 2	824	614	-	569	516	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	288	231	921	251	240	-	1344	-	-	1183	-	-
Mov Cap-2 Maneuver	288	231	-	251	240	-	-	-	-	-	-	-
Stage 1	489	445	-	640	632	-	-	-	-	-	-	-
Stage 2	822	613	-	489	445	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.1	20.8	0.1	3.6
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1344	-	-	401	251	-	1183	-	-
HCM Lane V/C Ratio	0.002	-	-	0.011	0.09	-	0.137	-	-
HCM Control Delay (s)	7.7	-	-	14.1	20.8	0	8.5	-	-
HCM Lane LOS	A	-	-	B	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	-	0.5	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	13	501	20	61	205	3	21	3	134	0	0	2
Future Vol, veh/h	13	501	20	61	205	3	21	3	134	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	539	22	66	220	3	23	3	144	0	0	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	223	0	0	561	0	0	809	922	270	651	941	110
Stage 1	-	-	-	-	-	-	567	567	-	352	352	-
Stage 2	-	-	-	-	-	-	242	355	-	299	589	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1343	-	-	1006	-	-	272	269	728	354	262	922
Stage 1	-	-	-	-	-	-	476	505	-	638	630	-
Stage 2	-	-	-	-	-	-	740	628	-	685	494	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1343	-	-	1006	-	-	256	249	728	265	242	922
Mov Cap-2 Maneuver	-	-	-	-	-	-	256	249	-	265	242	-
Stage 1	-	-	-	-	-	-	471	500	-	632	588	-
Stage 2	-	-	-	-	-	-	690	587	-	540	489	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2	12.6	8.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	256	249	728	1343	-	-	1006	-	-	-	-	922
HCM Lane V/C Ratio	0.088	0.013	0.198	0.01	-	-	0.065	-	-	-	-	0.002
HCM Control Delay (s)	20.4	19.6	11.2	7.7	-	-	8.8	-	-	0	0	8.9
HCM Lane LOS	C	C	B	A	-	-	A	-	-	A	A	A
HCM 95th %tile Q(veh)	0.3	0	0.7	0	-	-	0.2	-	-	-	-	0

Intersection	
Intersection Delay, s/veh	12.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✥	
Traffic Vol, veh/h	34	226	119	12	190	6	105	4	49	4	2	10
Future Vol, veh/h	34	226	119	12	190	6	105	4	49	4	2	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	254	134	13	213	7	118	4	55	4	2	11
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	13.7	11.2	10.6	9.5
HCM LOS	B	B	B	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	100%	0%	25%
Vol Thru, %	0%	8%	0%	66%	0%	97%	12%
Vol Right, %	0%	92%	0%	34%	0%	3%	62%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	53	34	345	12	196	16
LT Vol	105	0	34	0	12	0	4
Through Vol	0	4	0	226	0	190	2
RT Vol	0	49	0	119	0	6	10
Lane Flow Rate	118	60	38	388	13	220	18
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.222	0.093	0.062	0.551	0.023	0.345	0.031
Departure Headway (Hd)	6.764	5.603	5.967	5.219	6.159	5.632	6.294
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	533	642	604	694	585	643	570
Service Time	4.475	3.314	3.667	2.919	3.859	3.332	4.314
HCM Lane V/C Ratio	0.221	0.093	0.063	0.559	0.022	0.342	0.032
HCM Control Delay	11.4	8.9	9.1	14.1	9	11.3	9.5
HCM Lane LOS	B	A	A	B	A	B	A
HCM 95th-tile Q	0.8	0.3	0.2	3.4	0.1	1.5	0.1

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	34	179	75	75	116	59	71	152	68	65	131	25
Future Vol, veh/h	34	179	75	75	116	59	71	152	68	65	131	25
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	192	81	81	125	63	76	163	73	70	141	27
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	16.1	14.9	16.4	14.3
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	24%	12%	30%	29%
Vol Thru, %	52%	62%	46%	59%
Vol Right, %	23%	26%	24%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	291	288	250	221
LT Vol	71	34	75	65
Through Vol	152	179	116	131
RT Vol	68	75	59	25
Lane Flow Rate	313	310	269	238
Geometry Grp	1	1	1	1
Degree of Util (X)	0.54	0.531	0.471	0.427
Departure Headway (Hd)	6.218	6.173	6.309	6.469
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	579	582	570	554
Service Time	4.277	4.23	4.371	4.532
HCM Lane V/C Ratio	0.541	0.533	0.472	0.43
HCM Control Delay	16.4	16.1	14.9	14.3
HCM Lane LOS	C	C	B	B
HCM 95th-tile Q	3.2	3.1	2.5	2.1

5: E INTERNATIONAL AVE & N CHESTNUT AVE

06/05/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	82	189	26	113	214	47	25	138	69	83	153	142
v/c Ratio	0.28	0.26	0.07	0.35	0.27	0.11	0.11	0.33	0.17	0.30	0.13	0.23
Control Delay	34.5	25.4	0.3	33.7	24.0	0.6	38.2	27.4	3.3	36.0	19.2	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.5	25.4	0.3	33.7	24.0	0.6	38.2	27.4	3.3	36.0	19.2	6.0
Queue Length 50th (ft)	25	30	0	34	33	0	8	41	0	25	15	0
Queue Length 95th (ft)	106	84	0	135	91	0	47	131	14	112	67	42
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	1007	1982	894	1007	1998	900	280	1124	953	430	2313	1066
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.10	0.03	0.11	0.11	0.05	0.09	0.12	0.07	0.19	0.07	0.13

Intersection Summary

HCM 6th Signalized Intersection Summary
EXISTING PM
5: E INTERNATIONAL AVE & N CHESTNUT AVE
06/05/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	72	166	23	99	188	41	22	121	61	73	135	125
Future Volume (veh/h)	72	166	23	99	188	41	22	121	61	73	135	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.96	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	82	189	26	112	214	47	25	138	69	83	153	142
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	117	900	387	150	965	416	52	440	357	118	968	429
Arrive On Green	0.07	0.25	0.25	0.08	0.27	0.27	0.03	0.24	0.24	0.07	0.27	0.27
Sat Flow, veh/h	1781	3554	1529	1781	3554	1533	1781	1870	1518	1781	3554	1576
Grp Volume(v), veh/h	82	189	26	112	214	47	25	138	69	83	153	142
Grp Sat Flow(s),veh/h/ln	1781	1777	1529	1781	1777	1533	1781	1870	1518	1781	1777	1576
Q Serve(g_s), s	2.4	2.3	0.7	3.3	2.5	1.2	0.7	3.3	2.0	2.5	1.8	3.9
Cycle Q Clear(g_c), s	2.4	2.3	0.7	3.3	2.5	1.2	0.7	3.3	2.0	2.5	1.8	3.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	117	900	387	150	965	416	52	440	357	118	968	429
V/C Ratio(X)	0.70	0.21	0.07	0.75	0.22	0.11	0.48	0.31	0.19	0.70	0.16	0.33
Avail Cap(c_a), veh/h	979	1840	792	979	1840	794	249	1108	899	382	2370	1051
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.6	15.8	15.2	24.0	15.2	14.7	25.7	16.9	16.4	24.6	14.8	15.6
Incr Delay (d2), s/veh	7.4	0.1	0.1	7.2	0.1	0.1	6.9	0.4	0.3	7.5	0.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.8	0.2	1.5	0.9	0.4	0.4	1.3	0.6	1.2	0.6	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.9	15.9	15.3	31.3	15.3	14.8	32.5	17.4	16.7	32.0	14.9	16.1
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		297			373			232			378	
Approach Delay, s/veh		20.3			20.0			18.8			19.1	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	17.8	9.0	18.8	6.1	19.8	8.0	19.8
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	4.5	5.3	5.3	4.3	2.7	5.9	4.4	4.5
Green Ext Time (p_c), s	0.1	0.9	0.3	1.1	0.0	1.4	0.2	1.4

Intersection Summary			
HCM 6th Ctrl Delay			19.6
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
6: N CHESTNUT AVE & E BEHYMER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	77	188	16	41	262	61	34	139	88	77	140	95
v/c Ratio	0.20	0.16	0.03	0.12	0.27	0.11	0.10	0.26	0.15	0.20	0.22	0.14
Control Delay	30.7	19.3	0.1	33.1	22.6	0.4	33.8	22.8	0.5	31.0	19.0	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.7	19.3	0.1	33.1	22.6	0.4	33.8	22.8	0.5	31.0	19.0	0.5
Queue Length 50th (ft)	22	18	0	12	39	0	10	40	0	22	27	0
Queue Length 95th (ft)	97	82	0	62	116	0	55	122	0	98	116	0
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	1011	2044	962	777	1605	807	640	1283	1143	748	1321	1172
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.09	0.02	0.05	0.16	0.08	0.05	0.11	0.08	0.10	0.11	0.08

Intersection Summary

HCM 6th Signalized Intersection Summary
6: N CHESTNUT AVE & E BEHYMER AVE

EXISTING PM
06/05/2019

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	72	175	15	38	244	57	32	129	82	72	130	88
Future Volume (veh/h)	72	175	15	38	244	57	32	129	82	72	130	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	77	188	16	41	262	61	34	139	88	77	140	95
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	659	294	84	558	249	72	287	243	134	353	299
Arrive On Green	0.08	0.19	0.19	0.05	0.16	0.16	0.04	0.15	0.15	0.08	0.19	0.19
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	77	188	16	41	262	61	34	139	88	77	140	95
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	1.5	1.6	0.3	0.8	2.3	1.2	0.6	2.4	1.7	1.5	2.3	1.8
Cycle Q Clear(g_c), s	1.5	1.6	0.3	0.8	2.3	1.2	0.6	2.4	1.7	1.5	2.3	1.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	134	659	294	84	558	249	72	287	243	134	353	299
V/C Ratio(X)	0.57	0.29	0.05	0.49	0.47	0.25	0.47	0.48	0.36	0.57	0.40	0.32
Avail Cap(c_a), veh/h	1154	2231	995	744	1413	630	590	1697	1438	693	1805	1529
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.5	12.2	11.6	16.1	13.3	12.8	16.3	13.4	13.2	15.5	12.4	12.2
Incr Delay (d2), s/veh	3.8	0.2	0.1	4.4	0.6	0.5	4.8	1.3	0.9	3.8	0.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.5	0.1	0.3	0.7	0.3	0.3	0.9	0.5	0.6	0.8	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.3	12.4	11.7	20.5	13.9	13.3	21.1	14.7	14.1	19.3	13.1	12.8
LnGrp LOS	B	B	B	C	B	B	C	B	B	B	B	B
Approach Vol, veh/h		281			364			261			312	
Approach Delay, s/veh		14.2			14.6			15.3			14.5	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	9.8	6.1	11.6	5.9	11.0	7.1	10.7
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	3.5	4.4	2.8	3.6	2.6	4.3	3.5	4.3
Green Ext Time (p_c), s	0.1	1.0	0.0	1.0	0.0	1.1	0.1	1.1

Intersection Summary	
HCM 6th Ctrl Delay	14.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
3: N CHESTNUT AVE & E COPPER AVE

EXISTING PM
w improvements

	↗	→	↘	↙	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	45	301	159	16	253	8	140	70	5	3	13
v/c Ratio	0.12	0.32	0.18	0.04	0.30	0.01	0.28	0.12	0.01	0.01	0.03
Control Delay	30.2	16.5	4.8	31.8	18.6	0.0	24.9	6.0	33.8	24.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	16.5	4.8	31.8	18.6	0.0	24.9	6.0	33.8	24.0	0.1
Queue Length 50th (ft)	6	31	0	2	26	0	16	1	1	1	0
Queue Length 95th (ft)	54	203	26	26	170	0	117	20	13	7	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	462	1708	1464	585	1715	1468	1021	1148	462	871	816
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.18	0.11	0.03	0.15	0.01	0.14	0.06	0.01	0.00	0.02

Intersection Summary

HCM 6th Signalized Intersection Summary
3: N CHESTNUT AVE & E COPPER AVE

EXISTING PM
w improvements

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↑	↱
Traffic Volume (veh/h)	34	226	119	12	190	6	105	4	49	4	2	10
Future Volume (veh/h)	34	226	119	12	190	6	105	4	49	4	2	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	45	301	159	16	253	8	140	5	65	5	3	13
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	90	485	411	37	429	364	189	21	272	12	156	133
Arrive On Green	0.05	0.26	0.26	0.02	0.23	0.23	0.11	0.18	0.18	0.01	0.08	0.08
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	114	1488	1781	1870	1585
Grp Volume(v), veh/h	45	301	159	16	253	8	140	0	70	5	3	13
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1603	1781	1870	1585
Q Serve(g_s), s	0.9	5.0	2.9	0.3	4.2	0.1	2.7	0.0	1.3	0.1	0.1	0.3
Cycle Q Clear(g_c), s	0.9	5.0	2.9	0.3	4.2	0.1	2.7	0.0	1.3	0.1	0.1	0.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.93	1.00		1.00
Lane Grp Cap(c), veh/h	90	485	411	37	429	364	189	0	293	12	156	133
V/C Ratio(X)	0.50	0.62	0.39	0.44	0.59	0.02	0.74	0.00	0.24	0.41	0.02	0.10
Avail Cap(c_a), veh/h	379	3173	2689	480	3279	2779	985	0	1114	379	663	562
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.3	11.5	10.7	17.1	12.1	10.5	15.3	0.0	12.3	17.4	14.8	14.9
Incr Delay (d2), s/veh	4.2	1.3	0.6	8.0	1.3	0.0	5.7	0.0	0.4	21.1	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.4	0.7	0.2	1.3	0.0	1.2	0.0	0.4	0.1	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.5	12.8	11.3	25.0	13.4	10.5	21.0	0.0	12.7	38.5	14.9	15.2
LnGrp LOS	C	B	B	C	B	B	C	A	B	D	B	B
Approach Vol, veh/h		505			277			210			21	
Approach Delay, s/veh		13.0			14.0			18.2			20.7	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	4.7	10.9	5.2	14.3	8.2	7.4	6.3	13.3
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.1	3.3	2.3	7.0	4.7	2.3	2.9	6.2
Green Ext Time (p_c), s	0.0	0.3	0.0	2.1	0.3	0.0	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	14.5
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
4: N WILLOW AVE & COPPER AVE

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	37	273	81	188	76	236	70	168
v/c Ratio	0.16	0.58	0.30	0.33	0.29	0.55	0.27	0.39
Control Delay	35.4	29.1	34.4	20.6	34.6	29.5	34.6	27.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	29.1	34.4	20.6	34.6	29.5	34.6	27.7
Queue Length 50th (ft)	14	94	31	55	29	81	27	57
Queue Length 95th (ft)	51	212	89	134	85	187	80	138
Internal Link Dist (ft)		1168		2435		1529		9418
Turn Bay Length (ft)	300		300		300		300	
Base Capacity (vph)	421	1012	489	1047	489	815	935	1151
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.27	0.17	0.18	0.16	0.29	0.07	0.15

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	34	179	75	75	116	59	71	152	68	65	131	25
Future Volume (veh/h)	34	179	75	75	116	59	71	152	68	65	131	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	37	192	81	81	125	63	76	163	73	70	141	27
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	275	116	128	294	148	123	236	106	117	290	55
Arrive On Green	0.04	0.22	0.22	0.07	0.25	0.25	0.07	0.19	0.19	0.07	0.19	0.19
Sat Flow, veh/h	1781	1249	527	1781	1173	591	1781	1224	548	1781	1526	292
Grp Volume(v), veh/h	37	0	273	81	0	188	76	0	236	70	0	168
Grp Sat Flow(s),veh/h/ln	1781	0	1776	1781	0	1764	1781	0	1772	1781	0	1818
Q Serve(g_s), s	0.9	0.0	6.1	1.9	0.0	3.9	1.8	0.0	5.4	1.7	0.0	3.6
Cycle Q Clear(g_c), s	0.9	0.0	6.1	1.9	0.0	3.9	1.8	0.0	5.4	1.7	0.0	3.6
Prop In Lane	1.00		0.30	1.00		0.34	1.00		0.31	1.00		0.16
Lane Grp Cap(c), veh/h	74	0	390	128	0	442	123	0	342	117	0	345
V/C Ratio(X)	0.50	0.00	0.70	0.63	0.00	0.43	0.62	0.00	0.69	0.60	0.00	0.49
Avail Cap(c_a), veh/h	516	0	1348	598	0	1421	598	0	976	1217	0	1633
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.3	0.0	15.5	19.5	0.0	13.6	19.5	0.0	16.2	19.6	0.0	15.6
Incr Delay (d2), s/veh	5.2	0.0	2.3	5.1	0.0	0.7	4.9	0.0	2.5	4.8	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	2.0	0.8	0.0	1.2	0.8	0.0	1.8	0.7	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.4	0.0	17.8	24.5	0.0	14.2	24.5	0.0	18.7	24.4	0.0	16.7
LnGrp LOS	C	A	B	C	A	B	C	A	B	C	A	B
Approach Vol, veh/h		310			269			312			238	
Approach Delay, s/veh		18.7			17.3			20.1			19.0	
Approach LOS		B			B			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.3	13.5	7.6	14.7	7.5	13.4	6.3	16.0
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	3.7	7.4	3.9	8.1	3.8	5.6	2.9	5.9
Green Ext Time (p_c), s	0.1	1.0	0.1	1.4	0.1	0.8	0.0	0.9

Intersection Summary			
HCM 6th Ctrl Delay			18.8
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

1: N FRIANT RD & N WILLOW AVE

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰	↱	↰	↑↱		↰	↑↱	
Traffic Vol, veh/h	1	2	0	52	1	88	4	150	26	195	202	1
Future Vol, veh/h	1	2	0	52	1	88	4	150	26	195	202	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	600	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	2	0	60	1	102	5	174	30	227	235	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	788	904	118	772	889	-	236	0	0	204	0	0
Stage 1	690	690	-	199	199	-	-	-	-	-	-	-
Stage 2	98	214	-	573	690	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	282	275	912	289	281	0	1328	-	-	1365	-	-
Stage 1	401	444	-	784	735	0	-	-	-	-	-	-
Stage 2	898	724	-	472	444	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	244	229	912	249	234	-	1328	-	-	1365	-	-
Mov Cap-2 Maneuver	244	229	-	249	234	-	-	-	-	-	-	-
Stage 1	399	370	-	781	732	-	-	-	-	-	-	-
Stage 2	893	721	-	391	370	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.6	24.1	0.2	4
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1328	-	-	234	249	-	1365	-	-
HCM Lane V/C Ratio	0.004	-	-	0.015	0.248	-	0.166	-	-
HCM Control Delay (s)	7.7	-	-	20.6	24.1	0	8.2	-	-
HCM Lane LOS	A	-	-	C	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.9	-	0.6	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↱	
Traffic Vol, veh/h	8	273	18	116	437	9	13	2	166	6	5	2
Future Vol, veh/h	8	273	18	116	437	9	13	2	166	6	5	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	9	310	20	132	497	10	15	2	189	7	6	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	507	0	0	330	0	0	844	1099	155	935	1109	249
Stage 1	-	-	-	-	-	-	328	328	-	761	761	-
Stage 2	-	-	-	-	-	-	516	771	-	174	348	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1054	-	-	1226	-	-	256	211	863	220	208	751
Stage 1	-	-	-	-	-	-	659	646	-	364	412	-
Stage 2	-	-	-	-	-	-	510	408	-	811	633	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1054	-	-	1226	-	-	227	187	863	155	184	751
Mov Cap-2 Maneuver	-	-	-	-	-	-	227	187	-	155	184	-
Stage 1	-	-	-	-	-	-	653	640	-	361	368	-
Stage 2	-	-	-	-	-	-	447	364	-	626	627	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.7	11.3	24.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	227	187	863	1054	-	-	1226	-	-	155	235
HCM Lane V/C Ratio	0.065	0.012	0.219	0.009	-	-	0.108	-	-	0.044	0.034
HCM Control Delay (s)	22	24.5	10.3	8.4	-	-	8.3	-	-	29.3	20.9
HCM Lane LOS	C	C	B	A	-	-	A	-	-	D	C
HCM 95th %tile Q(veh)	0.2	0	0.8	0	-	-	0.4	-	-	0.1	0.1

Intersection	
Intersection Delay, s/veh	76
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↑	↱
Traffic Vol, veh/h	17	256	197	89	292	4	167	5	90	7	8	25
Future Vol, veh/h	17	256	197	89	292	4	167	5	90	7	8	25
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	341	263	119	389	5	223	7	120	9	11	33
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	3	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	3	2	2
HCM Control Delay	145.5	36.1	19.6	13.3
HCM LOS	F	E	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	5%	0%	57%	0%	99%	0%	100%	0%
Vol Right, %	0%	95%	0%	43%	0%	1%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	167	95	17	453	89	296	7	8	25
LT Vol	167	0	17	0	89	0	7	0	0
Through Vol	0	5	0	256	0	292	0	8	0
RT Vol	0	90	0	197	0	4	0	0	25
Lane Flow Rate	223	127	23	604	119	395	9	11	33
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.542	0.268	0.053	1.245	0.272	0.848	0.026	0.028	0.081
Departure Headway (Hd)	9.445	8.236	8.342	7.421	8.775	8.252	10.78	10.255	9.52
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	385	440	432	489	412	442	334	351	379
Service Time	7.145	5.936	6.042	5.221	6.475	5.952	8.48	7.955	7.22
HCM Lane V/C Ratio	0.579	0.289	0.053	1.235	0.289	0.894	0.027	0.031	0.087
HCM Control Delay	22.8	13.9	11.5	150.5	14.7	42.5	13.8	13.3	13.1
HCM Lane LOS	C	B	B	F	B	E	B	B	B
HCM 95th-tile Q	3.1	1.1	0.2	24	1.1	8.3	0.1	0.1	0.3

Intersection	
Intersection Delay, s/veh	68.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	22	167	195	126	219	47	77	53	32	47	193	42
Future Vol, veh/h	22	167	195	126	219	47	77	53	32	47	193	42
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	211	247	159	277	59	97	67	41	59	244	53
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	77.7	96.8	22.5	41.3
HCM LOS	F	F	C	E

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	48%	6%	32%	17%
Vol Thru, %	33%	43%	56%	68%
Vol Right, %	20%	51%	12%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	162	384	392	282
LT Vol	77	22	126	47
Through Vol	53	167	219	193
RT Vol	32	195	47	42
Lane Flow Rate	205	486	496	357
Geometry Grp	1	1	1	1
Degree of Util (X)	0.519	1.026	1.087	0.823
Departure Headway (Hd)	9.604	7.953	8.138	8.713
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	377	462	452	418
Service Time	7.604	5.953	6.138	6.713
HCM Lane V/C Ratio	0.544	1.052	1.097	0.854
HCM Control Delay	22.5	77.7	96.8	41.3
HCM Lane LOS	C	F	F	E
HCM 95th-tile Q	2.9	14	16	7.6

Queues
5: E INTERNATIONAL AVE & N CHESTNUT AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	328	693	46	346	570	164	7	392	266	111	152	108
v/c Ratio	0.83	0.82	0.10	0.85	0.65	0.34	0.07	0.83	0.56	0.66	0.12	0.17
Control Delay	61.5	49.6	0.5	62.5	42.6	9.7	58.0	56.6	25.0	71.2	25.7	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.5	49.6	0.5	62.5	42.6	9.7	58.0	56.6	25.0	71.2	25.7	6.4
Queue Length 50th (ft)	238	267	0	251	207	9	5	281	93	83	37	0
Queue Length 95th (ft)	234	218	0	247	178	12	15	261	88	104	51	8
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	488	959	485	488	968	522	124	563	542	190	1377	671
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.72	0.09	0.71	0.59	0.31	0.06	0.70	0.49	0.58	0.11	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	200	423	28	211	348	100	4	239	162	68	93	66
Future Volume (veh/h)	200	423	28	211	348	100	4	239	162	68	93	66
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	328	693	46	346	570	164	7	392	266	111	152	108
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	366	894	384	383	929	400	16	500	408	139	1196	531
Arrive On Green	0.21	0.25	0.25	0.22	0.26	0.26	0.01	0.27	0.27	0.08	0.34	0.34
Sat Flow, veh/h	1781	3554	1528	1781	3554	1530	1781	1870	1526	1781	3554	1578
Grp Volume(v), veh/h	328	693	46	346	570	164	7	392	266	111	152	108
Grp Sat Flow(s),veh/h/ln	1781	1777	1528	1781	1777	1530	1781	1870	1526	1781	1777	1578
Q Serve(g_s), s	18.5	18.7	2.4	19.5	14.5	9.1	0.4	20.0	15.9	6.3	3.1	5.0
Cycle Q Clear(g_c), s	18.5	18.7	2.4	19.5	14.5	9.1	0.4	20.0	15.9	6.3	3.1	5.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	366	894	384	383	929	400	16	500	408	139	1196	531
V/C Ratio(X)	0.90	0.78	0.12	0.90	0.61	0.41	0.45	0.78	0.65	0.80	0.13	0.20
Avail Cap(c_a), veh/h	510	958	412	510	958	413	130	577	471	199	1234	548
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.9	35.9	29.8	39.4	33.5	31.5	50.8	35.0	33.5	46.7	23.7	24.4
Incr Delay (d2), s/veh	14.5	3.8	0.1	15.9	1.1	0.7	18.6	6.1	2.6	13.8	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.3	8.3	0.9	9.9	6.2	3.3	0.3	9.7	6.0	3.3	1.3	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.4	39.7	29.9	55.3	34.6	32.2	69.4	41.1	36.1	60.6	23.8	24.5
LnGrp LOS	D	D	C	E	C	C	E	D	D	E	C	C
Approach Vol, veh/h		1067			1080			665			371	
Approach Delay, s/veh		43.8			40.9			39.4			35.0	
Approach LOS		D			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.5	32.8	26.7	31.1	5.4	39.9	25.7	32.1
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	8.3	22.0	21.5	20.7	2.4	7.0	20.5	16.5
Green Ext Time (p_c), s	0.1	2.4	0.7	2.6	0.0	1.3	0.7	3.2

Intersection Summary	
HCM 6th Ctrl Delay	40.9
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

6: N CHESTNUT AVE & E BEHYMER AVE

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	325	51	111	220	86	67	258	178	68	250	182
v/c Ratio	0.44	0.39	0.11	0.37	0.30	0.19	0.26	0.50	0.31	0.26	0.48	0.32
Control Delay	33.9	25.6	0.5	37.1	28.5	0.9	38.3	27.8	6.3	37.2	26.9	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	25.6	0.5	37.1	28.5	0.9	38.3	27.8	6.3	37.2	26.9	6.0
Queue Length 50th (ft)	56	58	0	38	40	0	23	87	0	24	83	0
Queue Length 95th (ft)	151	116	0	117	90	0	80	195	27	80	185	26
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	805	1644	797	518	1072	594	411	1107	1013	483	1153	1049
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.20	0.06	0.21	0.21	0.14	0.16	0.23	0.18	0.14	0.22	0.17

Intersection Summary

HCM 6th Signalized Intersection Summary
6: N CHESTNUT AVE & E BEHYMER AVE

AM EX PLUS PROJECT
06/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	124	247	39	84	167	65	51	196	135	52	190	138
Future Volume (veh/h)	124	247	39	84	167	65	51	196	135	52	190	138
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	163	325	51	111	220	86	67	258	178	68	250	182
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	219	625	279	155	496	221	115	415	352	117	416	353
Arrive On Green	0.12	0.18	0.18	0.09	0.14	0.14	0.06	0.22	0.22	0.07	0.22	0.22
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	163	325	51	111	220	86	67	258	178	68	250	182
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	3.7	3.4	1.1	2.5	2.4	2.1	1.5	5.2	4.1	1.5	5.0	4.2
Cycle Q Clear(g_c), s	3.7	3.4	1.1	2.5	2.4	2.1	1.5	5.2	4.1	1.5	5.0	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	219	625	279	155	496	221	115	415	352	117	416	353
V/C Ratio(X)	0.74	0.52	0.18	0.72	0.44	0.39	0.58	0.62	0.51	0.58	0.60	0.52
Avail Cap(c_a), veh/h	964	1864	831	621	1180	526	493	1418	1201	579	1508	1278
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.6	15.5	14.6	18.5	16.4	16.3	18.9	14.6	14.2	18.9	14.5	14.2
Incr Delay (d2), s/veh	4.9	0.7	0.3	6.1	0.6	1.1	4.6	1.5	1.1	4.6	1.4	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.2	0.3	1.1	0.8	0.7	0.7	1.9	1.2	0.7	1.9	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.5	16.2	14.9	24.6	17.0	17.4	23.4	16.1	15.3	23.4	15.9	15.4
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		539			417			503			500	
Approach Delay, s/veh		18.0			19.1			16.8			16.7	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.2	13.7	8.1	12.5	7.2	13.7	9.6	11.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	3.5	7.2	4.5	5.4	3.5	7.0	5.7	4.4
Green Ext Time (p_c), s	0.1	2.0	0.2	1.9	0.1	2.0	0.4	1.0

Intersection Summary	
HCM 6th Ctrl Delay	17.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Traffic Vol, veh/h	349	5	5	365	17	16
Future Vol, veh/h	349	5	5	365	17	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	92	92	79	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	465	5	5	462	18	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	470	0	940	468
Stage 1	-	-	-	-	468	-
Stage 2	-	-	-	-	472	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1092	-	293	595
Stage 1	-	-	-	-	630	-
Stage 2	-	-	-	-	628	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1092	-	291	595
Mov Cap-2 Maneuver	-	-	-	-	291	-
Stage 1	-	-	-	-	630	-
Stage 2	-	-	-	-	624	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	15.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	387	-	-	1092	-
HCM Lane V/C Ratio	0.093	-	-	0.005	-
HCM Control Delay (s)	15.3	-	-	8.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Traffic Vol, veh/h	348	17	17	320	50	50
Future Vol, veh/h	348	17	17	320	50	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	378	18	18	348	54	54

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	396	0	771	387
Stage 1	-	-	-	-	387	-
Stage 2	-	-	-	-	384	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1163	-	368	661
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	688	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1163	-	361	661
Mov Cap-2 Maneuver	-	-	-	-	361	-
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	675	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	467	-	-	1163	-
HCM Lane V/C Ratio	0.233	-	-	0.016	-
HCM Control Delay (s)	15	-	-	8.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0	-

3: N CHESTNUT AVE & E COPPER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	23	341	263	119	389	5	223	127	9	11	33
v/c Ratio	0.13	0.65	0.41	0.45	0.46	0.01	0.59	0.22	0.05	0.04	0.10
Control Delay	40.6	30.3	5.7	41.5	21.1	0.0	36.6	5.8	40.7	30.8	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	30.3	5.7	41.5	21.1	0.0	36.6	5.8	40.7	30.8	0.6
Queue Length 50th (ft)	9	124	0	46	98	0	84	2	4	4	0
Queue Length 95th (ft)	36	239	24	#134	267	0	191	25	19	17	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	217	1579	1382	276	1607	1384	566	774	217	437	481
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.22	0.19	0.43	0.24	0.00	0.39	0.16	0.04	0.03	0.07

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

3: N CHESTNUT AVE & E COPPER AVE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↑	↱
Traffic Volume (veh/h)	17	256	197	89	292	4	167	5	90	7	8	25
Future Volume (veh/h)	17	256	197	89	292	4	167	5	90	7	8	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	23	341	263	119	389	5	223	7	120	9	11	33
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	49	494	419	154	605	513	290	22	371	21	178	151
Arrive On Green	0.03	0.26	0.26	0.09	0.32	0.32	0.16	0.25	0.25	0.01	0.10	0.10
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	88	1510	1781	1870	1585
Grp Volume(v), veh/h	23	341	263	119	389	5	223	0	127	9	11	33
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1598	1781	1870	1585
Q Serve(g_s), s	0.6	7.8	7.0	3.1	8.5	0.1	5.7	0.0	3.1	0.2	0.3	0.9
Cycle Q Clear(g_c), s	0.6	7.8	7.0	3.1	8.5	0.1	5.7	0.0	3.1	0.2	0.3	0.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.94	1.00		1.00
Lane Grp Cap(c), veh/h	49	494	419	154	605	513	290	0	393	21	178	151
V/C Ratio(X)	0.47	0.69	0.63	0.77	0.64	0.01	0.77	0.00	0.32	0.43	0.06	0.22
Avail Cap(c_a), veh/h	280	2341	1984	354	2419	2050	727	0	820	280	489	415
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.9	15.8	15.5	21.4	13.8	11.0	19.1	0.0	14.8	23.5	19.7	20.0
Incr Delay (d2), s/veh	6.8	1.7	1.6	7.9	1.1	0.0	4.3	0.0	0.5	13.2	0.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.7	2.1	1.4	2.8	0.0	2.4	0.0	1.0	0.2	0.1	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.7	17.5	17.1	29.2	15.0	11.0	23.5	0.0	15.2	36.7	19.8	20.7
LnGrp LOS	C	B	B	C	B	B	C	A	B	D	B	C
Approach Vol, veh/h		627			513			350			53	
Approach Delay, s/veh		17.8			18.2			20.5			23.2	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.1	16.3	8.6	17.8	12.3	9.0	5.8	20.7
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.2	5.1	5.1	9.8	7.7	2.9	2.6	10.5
Green Ext Time (p_c), s	0.0	0.6	0.1	2.8	0.5	0.1	0.0	2.2

Intersection Summary	
HCM 6th Ctrl Delay	18.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
4: N WILLOW AVE & COPPER AVE

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	28	458	159	336	97	108	59	297
v/c Ratio	0.20	0.79	0.62	0.41	0.47	0.24	0.34	0.70
Control Delay	48.6	39.0	52.5	23.4	50.0	25.8	49.1	42.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.6	39.0	52.5	23.4	50.0	25.8	49.1	42.9
Queue Length 50th (ft)	17	228	93	144	58	43	35	168
Queue Length 95th (ft)	43	338	157	235	102	77	70	229
Internal Link Dist (ft)		1168		2435		1529		9418
Turn Bay Length (ft)	300		300		300		300	
Base Capacity (vph)	261	692	303	829	303	546	616	835
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.66	0.52	0.41	0.32	0.20	0.10	0.36

Intersection Summary

HCM 6th Signalized Intersection Summary
4: N WILLOW AVE & COPPER AVE

AM EX PLUS PROJECT
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	22	167	195	126	219	47	77	53	32	47	193	42
Future Volume (veh/h)	22	167	195	126	219	47	77	53	32	47	193	42
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	28	211	247	159	277	59	97	67	41	59	244	53
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	54	248	290	202	596	127	127	249	153	89	310	67
Arrive On Green	0.03	0.32	0.32	0.11	0.40	0.40	0.07	0.23	0.23	0.05	0.21	0.21
Sat Flow, veh/h	1781	785	919	1781	1495	318	1781	1086	665	1781	1489	323
Grp Volume(v), veh/h	28	0	458	159	0	336	97	0	108	59	0	297
Grp Sat Flow(s),veh/h/ln	1781	0	1705	1781	0	1813	1781	0	1751	1781	0	1812
Q Serve(g_s), s	1.0	0.0	16.7	5.8	0.0	9.1	3.6	0.0	3.4	2.2	0.0	10.3
Cycle Q Clear(g_c), s	1.0	0.0	16.7	5.8	0.0	9.1	3.6	0.0	3.4	2.2	0.0	10.3
Prop In Lane	1.00		0.54	1.00		0.18	1.00		0.38	1.00		0.18
Lane Grp Cap(c), veh/h	54	0	538	202	0	722	127	0	402	89	0	378
V/C Ratio(X)	0.52	0.00	0.85	0.79	0.00	0.47	0.77	0.00	0.27	0.66	0.00	0.79
Avail Cap(c_a), veh/h	335	0	841	388	0	948	388	0	626	790	0	1057
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.8	0.0	21.3	28.7	0.0	14.8	30.4	0.0	21.0	31.1	0.0	24.9
Incr Delay (d2), s/veh	7.5	0.0	5.1	6.6	0.0	0.5	9.2	0.0	0.4	8.2	0.0	3.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	6.3	2.6	0.0	3.1	1.7	0.0	1.2	1.0	0.0	4.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.2	0.0	26.4	35.3	0.0	15.2	39.6	0.0	21.4	39.2	0.0	28.6
LnGrp LOS	D	A	C	D	A	B	D	A	C	D	A	C
Approach Vol, veh/h		486			495			205			356	
Approach Delay, s/veh		27.2			21.7			30.0			30.4	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	20.5	12.1	26.2	9.2	19.1	6.5	31.7
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	4.2	5.4	7.8	18.7	5.6	12.3	3.0	11.1
Green Ext Time (p_c), s	0.1	0.4	0.2	2.2	0.1	1.5	0.0	1.7

Intersection Summary	
HCM 6th Ctrl Delay	26.5
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Vol, veh/h	1	1	2	21	0	194	3	289	57	155	206	0
Future Vol, veh/h	1	1	2	21	0	194	3	289	57	155	206	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	600	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1	2	23	0	209	3	311	61	167	222	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	718	934	111	794	904	-	222	0	0	372	0	0
Stage 1	556	556	-	348	348	-	-	-	-	-	-	-
Stage 2	162	378	-	446	556	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	316	264	921	279	275	0	1344	-	-	1183	-	-
Stage 1	483	511	-	641	633	0	-	-	-	-	-	-
Stage 2	824	614	-	561	511	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	281	226	921	247	236	-	1344	-	-	1183	-	-
Mov Cap-2 Maneuver	281	226	-	247	236	-	-	-	-	-	-	-
Stage 1	482	439	-	640	632	-	-	-	-	-	-	-
Stage 2	822	613	-	480	439	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.2	21	0.1	3.7
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1344	-	-	394	247	-	1183	-	-
HCM Lane V/C Ratio	0.002	-	-	0.011	0.091	-	0.141	-	-
HCM Control Delay (s)	7.7	-	-	14.2	21	0	8.5	-	-
HCM Lane LOS	A	-	-	B	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	-	0.5	-	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↱	
Traffic Vol, veh/h	13	564	20	64	232	3	21	3	138	2	0	0
Future Vol, veh/h	13	564	20	64	232	3	21	3	138	2	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	606	22	69	249	3	23	3	148	2	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	252	0	0	628	0	0	897	1024	303	720	1043	125
Stage 1	-	-	-	-	-	-	634	634	-	387	387	-
Stage 2	-	-	-	-	-	-	263	390	-	333	656	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1310	-	-	950	-	-	235	234	693	315	228	902
Stage 1	-	-	-	-	-	-	434	471	-	608	608	-
Stage 2	-	-	-	-	-	-	719	606	-	654	460	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1310	-	-	950	-	-	220	215	693	229	209	902
Mov Cap-2 Maneuver	-	-	-	-	-	-	220	215	-	229	209	-
Stage 1	-	-	-	-	-	-	429	466	-	601	564	-
Stage 2	-	-	-	-	-	-	667	562	-	505	455	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.9	13.3	20.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	220	215	693	1310	-	-	950	-	-	229	-
HCM Lane V/C Ratio	0.103	0.015	0.214	0.011	-	-	0.072	-	-	0.009	-
HCM Control Delay (s)	23.2	22	11.6	7.8	-	-	9.1	-	-	20.9	0
HCM Lane LOS	C	C	B	A	-	-	A	-	-	C	A
HCM 95th %tile Q(veh)	0.3	0	0.8	0	-	-	0.2	-	-	0	-

Intersection	
Intersection Delay, s/veh	21.6
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↑	↱
Traffic Vol, veh/h	34	322	119	16	231	6	105	4	78	4	2	10
Future Vol, veh/h	34	322	119	16	231	6	105	4	78	4	2	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	362	134	18	260	7	118	4	88	4	2	11
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	3	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	3	2	2
HCM Control Delay	29	15.4	12	10.5
HCM LOS	D	C	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	5%	0%	73%	0%	97%	0%	100%	0%
Vol Right, %	0%	95%	0%	27%	0%	3%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	82	34	441	16	237	4	2	10
LT Vol	105	0	34	0	16	0	4	0	0
Through Vol	0	4	0	322	0	231	0	2	0
RT Vol	0	78	0	119	0	6	0	0	10
Lane Flow Rate	118	92	38	496	18	266	4	2	11
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.253	0.167	0.071	0.821	0.036	0.492	0.011	0.005	0.022
Departure Headway (Hd)	7.726	6.534	6.662	5.968	7.181	6.657	8.442	7.928	7.209
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	462	545	536	605	496	538	427	454	500
Service Time	5.51	4.317	4.423	3.729	4.956	4.432	6.142	5.628	4.909
HCM Lane V/C Ratio	0.255	0.169	0.071	0.82	0.036	0.494	0.009	0.004	0.022
HCM Control Delay	13.1	10.6	9.9	30.5	10.2	15.8	11.2	10.7	10.1
HCM Lane LOS	B	B	A	D	B	C	B	B	B
HCM 95th-tile Q	1	0.6	0.2	8.4	0.1	2.7	0	0	0.1

Intersection	
Intersection Delay, s/veh	21.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	37	193	108	81	131	59	126	152	68	65	132	28
Future Vol, veh/h	37	193	108	81	131	59	126	152	68	65	132	28
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	40	208	116	87	141	63	135	163	73	70	142	30
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	23.4	19.2	25.2	17.2
HCM LOS	C	C	D	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	36%	11%	30%	29%
Vol Thru, %	44%	57%	48%	59%
Vol Right, %	20%	32%	22%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	346	338	271	225
LT Vol	126	37	81	65
Through Vol	152	193	131	132
RT Vol	68	108	59	28
Lane Flow Rate	372	363	291	242
Geometry Grp	1	1	1	1
Degree of Util (X)	0.711	0.684	0.572	0.49
Departure Headway (Hd)	6.88	6.779	7.065	7.287
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	525	531	510	494
Service Time	4.94	4.841	5.132	5.357
HCM Lane V/C Ratio	0.709	0.684	0.571	0.49
HCM Control Delay	25.2	23.4	19.2	17.2
HCM Lane LOS	D	C	C	C
HCM 95th-tile Q	5.7	5.2	3.5	2.7

5: E INTERNATIONAL AVE & N CHESTNUT AVE

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	82	189	26	113	215	70	25	147	69	83	158	142
v/c Ratio	0.28	0.26	0.07	0.35	0.27	0.17	0.11	0.35	0.17	0.30	0.13	0.23
Control Delay	34.7	25.5	0.3	33.9	24.1	3.3	38.3	27.6	3.2	36.2	19.2	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	25.5	0.3	33.9	24.1	3.3	38.3	27.6	3.2	36.2	19.2	6.0
Queue Length 50th (ft)	25	30	0	34	33	0	8	44	0	25	16	0
Queue Length 95th (ft)	106	84	0	135	91	14	47	139	14	112	68	42
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	1003	1975	891	1003	1991	897	279	1119	949	428	2303	1062
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.10	0.03	0.11	0.11	0.08	0.09	0.13	0.07	0.19	0.07	0.13

Intersection Summary

5: E INTERNATIONAL AVE & N CHESTNUT AVE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	⇈	↱	↰	⇈	↱	↰	↑	↱	↰	⇈	↱
Traffic Volume (veh/h)	72	166	23	99	189	62	22	129	61	73	139	125
Future Volume (veh/h)	72	166	23	99	189	62	22	129	61	73	139	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.96	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	82	189	26	112	215	70	25	147	69	83	158	142
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	117	897	386	150	963	415	52	446	362	117	979	434
Arrive On Green	0.07	0.25	0.25	0.08	0.27	0.27	0.03	0.24	0.24	0.07	0.28	0.28
Sat Flow, veh/h	1781	3554	1529	1781	3554	1532	1781	1870	1519	1781	3554	1576
Grp Volume(v), veh/h	82	189	26	112	215	70	25	147	69	83	158	142
Grp Sat Flow(s),veh/h/ln	1781	1777	1529	1781	1777	1532	1781	1870	1519	1781	1777	1576
Q Serve(g_s), s	2.4	2.3	0.7	3.3	2.5	1.9	0.7	3.5	2.0	2.5	1.8	3.9
Cycle Q Clear(g_c), s	2.4	2.3	0.7	3.3	2.5	1.9	0.7	3.5	2.0	2.5	1.8	3.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	117	897	386	150	963	415	52	446	362	117	979	434
V/C Ratio(X)	0.70	0.21	0.07	0.75	0.22	0.17	0.48	0.33	0.19	0.71	0.16	0.33
Avail Cap(c_a), veh/h	972	1828	786	972	1828	788	247	1101	894	379	2354	1044
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.7	15.9	15.4	24.2	15.3	15.0	25.8	17.0	16.4	24.7	14.8	15.6
Incr Delay (d2), s/veh	7.5	0.1	0.1	7.2	0.1	0.2	6.9	0.4	0.3	7.6	0.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.8	0.2	1.5	0.9	0.6	0.4	1.4	0.6	1.2	0.7	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.2	16.1	15.4	31.4	15.4	15.2	32.7	17.4	16.7	32.3	14.9	16.0
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		297			397			241			383	
Approach Delay, s/veh		20.5			19.9			18.8			19.1	
Approach LOS		C			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	18.1	9.0	18.8	6.1	20.1	8.0	19.8
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	4.5	5.5	5.3	4.3	2.7	5.9	4.4	4.5
Green Ext Time (p_c), s	0.1	1.0	0.3	1.1	0.0	1.4	0.2	1.4

Intersection Summary	
HCM 6th Ctrl Delay	19.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

6: N CHESTNUT AVE & E BEHYMER AVE

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	77	188	16	43	270	61	34	147	88	77	144	95
v/c Ratio	0.20	0.16	0.03	0.12	0.27	0.11	0.10	0.27	0.15	0.20	0.22	0.14
Control Delay	30.9	19.4	0.1	33.1	22.6	0.4	33.9	22.9	0.5	31.2	19.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	19.4	0.1	33.1	22.6	0.4	33.9	22.9	0.5	31.2	19.0	0.4
Queue Length 50th (ft)	23	18	0	13	41	0	10	42	0	23	28	0
Queue Length 95th (ft)	97	83	0	65	119	0	55	128	0	98	119	0
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	1005	2034	959	773	1597	804	641	1278	1140	744	1316	1168
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.09	0.02	0.06	0.17	0.08	0.05	0.12	0.08	0.10	0.11	0.08

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	72	175	15	40	251	57	32	137	82	72	134	88
Future Volume (veh/h)	72	175	15	40	251	57	32	137	82	72	134	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	77	188	16	43	270	61	34	147	88	77	144	95
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	659	294	87	565	252	72	295	250	134	361	306
Arrive On Green	0.08	0.19	0.19	0.05	0.16	0.16	0.04	0.16	0.16	0.08	0.19	0.19
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	77	188	16	43	270	61	34	147	88	77	144	95
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	1.5	1.6	0.3	0.8	2.4	1.2	0.7	2.5	1.7	1.5	2.4	1.8
Cycle Q Clear(g_c), s	1.5	1.6	0.3	0.8	2.4	1.2	0.7	2.5	1.7	1.5	2.4	1.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	134	659	294	87	565	252	72	295	250	134	361	306
V/C Ratio(X)	0.57	0.29	0.05	0.49	0.48	0.24	0.47	0.50	0.35	0.57	0.40	0.31
Avail Cap(c_a), veh/h	1142	2207	984	736	1397	623	584	1679	1422	685	1785	1513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.7	12.3	11.8	16.3	13.4	12.9	16.5	13.5	13.2	15.7	12.4	12.2
Incr Delay (d2), s/veh	3.8	0.2	0.1	4.3	0.6	0.5	4.8	1.3	0.8	3.8	0.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.5	0.1	0.4	0.8	0.3	0.3	0.9	0.5	0.6	0.8	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.5	12.5	11.8	20.6	14.1	13.4	21.3	14.8	14.0	19.5	13.1	12.7
LnGrp LOS	B	B	B	C	B	B	C	B	B	B	B	B
Approach Vol, veh/h		281			374			269			316	
Approach Delay, s/veh		14.4			14.7			15.4			14.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	10.0	6.2	11.7	5.9	11.3	7.1	10.8
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	3.5	4.5	2.8	3.6	2.7	4.4	3.5	4.4
Green Ext Time (p_c), s	0.1	1.1	0.0	1.0	0.0	1.1	0.1	1.2

Intersection Summary	
HCM 6th Ctrl Delay	14.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	↰↱	
Traffic Vol, veh/h	385	19	18	246	11	11
Future Vol, veh/h	385	19	18	246	11	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	418	21	20	267	12	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	439	0	736	429
Stage 1	-	-	-	-	429	-
Stage 2	-	-	-	-	307	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1121	-	386	626
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	746	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1121	-	378	626
Mov Cap-2 Maneuver	-	-	-	-	378	-
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	730	-

Approach	EB		WB		NB
HCM Control Delay, s	0		0.6		13.1
HCM LOS					B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	471	-	-	1121	-
HCM Lane V/C Ratio	0.051	-	-	0.017	-
HCM Control Delay (s)	13.1	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

8: PROJECT ACCESS EAST & E COPPER AVE

Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Traffic Vol, veh/h	339	57	55	230	34	32
Future Vol, veh/h	339	57	55	230	34	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	368	62	60	250	37	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	430	0	769	399
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	370	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1129	-	369	651
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	699	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1129	-	346	651
Mov Cap-2 Maneuver	-	-	-	-	346	-
Stage 1	-	-	-	-	678	-
Stage 2	-	-	-	-	656	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	14.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	448	-	-	1129	-
HCM Lane V/C Ratio	0.16	-	-	0.053	-
HCM Control Delay (s)	14.6	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Queues

PM EX PLUS PROJ

3: N CHESTNUT AVE & E COPPER AVE

W IMPROVEMENTS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	38	362	134	18	260	7	118	92	4	2	11
v/c Ratio	0.09	0.30	0.12	0.04	0.23	0.01	0.21	0.16	0.01	0.00	0.02
Control Delay	29.1	13.4	4.1	30.4	14.9	0.0	23.3	6.2	33.0	23.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	13.4	4.1	30.4	14.9	0.0	23.3	6.2	33.0	23.5	0.1
Queue Length 50th (ft)	5	38	0	2	25	0	13	1	1	0	0
Queue Length 95th (ft)	58	301	40	35	209	0	131	34	13	7	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	541	1699	1456	686	1706	1461	1151	1206	541	1008	922
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.21	0.09	0.03	0.15	0.00	0.10	0.08	0.01	0.00	0.01

Intersection Summary

HCM 6th Signalized Intersection Summary
3: N CHESTNUT AVE & E COPPER AVE

PM EX PLUS PROJ
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↑	↱
Traffic Volume (veh/h)	34	322	119	16	231	6	105	4	78	4	2	10
Future Volume (veh/h)	34	322	119	16	231	6	105	4	78	4	2	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	362	134	18	260	7	118	4	88	4	2	11
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	542	460	41	503	426	169	12	275	10	170	144
Arrive On Green	0.04	0.29	0.29	0.02	0.27	0.27	0.09	0.18	0.18	0.01	0.09	0.09
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	69	1526	1781	1870	1585
Grp Volume(v), veh/h	38	362	134	18	260	7	118	0	92	4	2	11
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1596	1781	1870	1585
Q Serve(g_s), s	0.8	6.3	2.4	0.4	4.4	0.1	2.4	0.0	1.9	0.1	0.0	0.2
Cycle Q Clear(g_c), s	0.8	6.3	2.4	0.4	4.4	0.1	2.4	0.0	1.9	0.1	0.0	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.96	1.00		1.00
Lane Grp Cap(c), veh/h	78	542	460	41	503	426	169	0	287	10	170	144
V/C Ratio(X)	0.49	0.67	0.29	0.44	0.52	0.02	0.70	0.00	0.32	0.41	0.01	0.08
Avail Cap(c_a), veh/h	359	3002	2544	454	3102	2629	932	0	1049	359	627	532
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.4	11.6	10.3	18.0	11.6	10.0	16.4	0.0	13.3	18.5	15.4	15.5
Incr Delay (d2), s/veh	4.7	1.4	0.3	7.4	0.8	0.0	5.2	0.0	0.6	25.7	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.8	0.6	0.2	1.3	0.0	1.0	0.0	0.6	0.1	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.1	13.1	10.6	25.4	12.4	10.0	21.5	0.0	13.9	44.2	15.4	15.7
LnGrp LOS	C	B	B	C	B	B	C	A	B	D	B	B
Approach Vol, veh/h		534			285			210			17	
Approach Delay, s/veh		13.1			13.1			18.2			22.4	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	4.7	11.2	5.3	16.0	8.0	7.9	6.1	15.2
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.1	3.9	2.4	8.3	4.4	2.2	2.8	6.4
Green Ext Time (p_c), s	0.0	0.4	0.0	2.5	0.2	0.0	0.0	1.4

Intersection Summary		
HCM 6th Ctrl Delay		14.3
HCM 6th LOS		B

Notes

User approved pedestrian interval to be less than phase max green.

4: N WILLOW AVE & COPPER AVE

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	40	324	87	204	135	236	70	172
v/c Ratio	0.19	0.63	0.33	0.33	0.44	0.55	0.28	0.45
Control Delay	38.2	29.9	37.2	20.8	37.6	31.3	37.4	32.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	29.9	37.2	20.8	37.6	31.3	37.4	32.3
Queue Length 50th (ft)	16	118	35	64	54	86	29	65
Queue Length 95th (ft)	57	259	99	149	142	199	84	153
Internal Link Dist (ft)		1168		2435		1529		9418
Turn Bay Length (ft)	300		300		300		300	
Base Capacity (vph)	394	968	457	1011	457	767	901	1103
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.33	0.19	0.20	0.30	0.31	0.08	0.16

Intersection Summary

HCM 6th Signalized Intersection Summary
4: N WILLOW AVE & COPPER AVE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	37	193	108	81	131	59	126	152	68	65	132	28
Future Volume (veh/h)	37	193	108	81	131	59	126	152	68	65	132	28
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	208	116	87	141	63	135	163	73	70	142	30
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	282	157	130	342	153	178	232	104	115	231	49
Arrive On Green	0.04	0.25	0.25	0.07	0.28	0.28	0.10	0.19	0.19	0.06	0.15	0.15
Sat Flow, veh/h	1781	1128	629	1781	1225	547	1781	1224	548	1781	1497	316
Grp Volume(v), veh/h	40	0	324	87	0	204	135	0	236	70	0	172
Grp Sat Flow(s),veh/h/ln	1781	0	1757	1781	0	1772	1781	0	1772	1781	0	1813
Q Serve(g_s), s	1.0	0.0	7.8	2.2	0.0	4.3	3.4	0.0	5.7	1.8	0.0	4.1
Cycle Q Clear(g_c), s	1.0	0.0	7.8	2.2	0.0	4.3	3.4	0.0	5.7	1.8	0.0	4.1
Prop In Lane	1.00		0.36	1.00		0.31	1.00		0.31	1.00		0.17
Lane Grp Cap(c), veh/h	78	0	439	130	0	495	178	0	336	115	0	280
V/C Ratio(X)	0.52	0.00	0.74	0.67	0.00	0.41	0.76	0.00	0.70	0.61	0.00	0.61
Avail Cap(c_a), veh/h	485	0	1256	563	0	1344	563	0	919	1145	0	1533
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.5	0.0	15.8	20.7	0.0	13.5	20.1	0.0	17.4	20.9	0.0	18.1
Incr Delay (d2), s/veh	5.2	0.0	2.4	5.8	0.0	0.5	6.5	0.0	2.7	5.2	0.0	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	2.6	0.9	0.0	1.3	1.4	0.0	2.0	0.8	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.7	0.0	18.3	26.5	0.0	14.0	26.6	0.0	20.0	26.1	0.0	20.3
LnGrp LOS	C	A	B	C	A	B	C	A	C	C	A	C
Approach Vol, veh/h		364			291			371			242	
Approach Delay, s/veh		19.2			17.8			22.4			22.0	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.5	13.9	7.9	16.7	9.1	12.3	6.5	18.0
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	3.8	7.7	4.2	9.8	5.4	6.1	3.0	6.3
Green Ext Time (p_c), s	0.1	1.0	0.1	1.7	0.2	0.9	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	20.3
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰	↱	↰	↑↱		↰	↑↱	
Traffic Vol, veh/h	1	2	0	52	1	88	4	156	26	195	205	1
Future Vol, veh/h	1	2	0	52	1	88	4	156	26	195	205	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	300	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	2	0	60	1	102	5	181	30	227	238	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	794	914	120	780	899	-	239	0	0	211	0	0
Stage 1	693	693	-	206	206	-	-	-	-	-	-	-
Stage 2	101	221	-	574	693	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	279	272	909	285	277	0	1325	-	-	1357	-	-
Stage 1	400	443	-	777	730	0	-	-	-	-	-	-
Stage 2	894	719	-	471	443	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	242	226	909	246	230	-	1325	-	-	1357	-	-
Mov Cap-2 Maneuver	242	226	-	246	230	-	-	-	-	-	-	-
Stage 1	398	369	-	774	727	-	-	-	-	-	-	-
Stage 2	889	716	-	390	369	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.8	24.5	0.2	4
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1325	-	-	231	246	-	1357	-	-
HCM Lane V/C Ratio	0.004	-	-	0.015	0.251	-	0.167	-	-
HCM Control Delay (s)	7.7	-	-	20.8	24.5	0	8.2	-	-
HCM Lane LOS	A	-	-	C	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	1	-	0.6	-	-

Intersection	
Int Delay, s/veh	14.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	30	305	18	123	448	37	13	11	183	98	31	72
Future Vol, veh/h	30	305	18	123	448	37	13	11	183	98	31	72
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	347	20	140	509	42	15	13	208	111	35	82

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	551	0	0	367	0	0	967	1246	174	1037	1224	255
Stage 1	-	-	-	-	-	-	415	415	-	789	789	-
Stage 2	-	-	-	-	-	-	552	831	-	248	435	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1015	-	-	1188	-	-	209	172	839	185	178	744
Stage 1	-	-	-	-	-	-	585	591	-	350	400	-
Stage 2	-	-	-	-	-	-	486	383	-	734	579	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1015	-	-	1188	-	-	136	147	839	116	152	744
Mov Cap-2 Maneuver	-	-	-	-	-	-	136	147	-	116	152	-
Stage 1	-	-	-	-	-	-	566	571	-	338	353	-
Stage 2	-	-	-	-	-	-	344	338	-	522	560	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.7	13.3	79.1
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	136	147	839	1015	-	-	1188	-	-	116	152	744
HCM Lane V/C Ratio	0.109	0.085	0.248	0.034	-	-	0.118	-	-	0.96	0.232	0.11
HCM Control Delay (s)	34.7	31.8	10.7	8.7	-	-	8.4	-	-	143.2	35.7	10.4
HCM Lane LOS	D	D	B	A	-	-	A	-	-	F	E	B
HCM 95th %tile Q(veh)	0.4	0.3	1	0.1	-	-	0.4	-	-	6.2	0.9	0.4

HCM 6th AWSC AM EXISTING PLUS APPROVED PROJECTS

3: N CHESTNUT AVE & E COPPER AVE 04/18/2019

Intersection	
Intersection Delay, s/veh	127.7
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✥	
Traffic Vol, veh/h	19	381	205	60	323	6	170	7	73	14	13	32
Future Vol, veh/h	19	381	205	60	323	6	170	7	73	14	13	32
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	508	273	80	431	8	227	9	97	19	17	43
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	241.2	38	19	15.2
HCM LOS	F	E	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	100%	0%	24%
Vol Thru, %	0%	9%	0%	65%	0%	98%	22%
Vol Right, %	0%	91%	0%	35%	0%	2%	54%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	170	80	19	586	60	329	59
LT Vol	170	0	19	0	60	0	14
Through Vol	0	7	0	381	0	323	13
RT Vol	0	73	0	205	0	6	32
Lane Flow Rate	227	107	25	781	80	439	79
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.525	0.214	0.054	1.488	0.169	0.862	0.189
Departure Headway (Hd)	9.267	8.081	7.62	6.855	8.319	7.788	9.926
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	392	447	467	531	434	469	364
Service Time	6.967	5.781	5.412	4.646	6.019	5.488	7.926
HCM Lane V/C Ratio	0.579	0.239	0.054	1.471	0.184	0.936	0.217
HCM Control Delay	21.8	13	10.9	248.7	12.7	42.6	15.2
HCM Lane LOS	C	B	B	F	B	E	C
HCM 95th-tile Q	2.9	0.8	0.2	39	0.6	8.9	0.7

Intersection	
Intersection Delay, s/veh	129.7
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	29	226	214	124	239	49	98	59	30	52	209	51
Future Vol, veh/h	29	226	214	124	239	49	98	59	30	52	209	51
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	286	271	157	303	62	124	75	38	66	265	65
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	196.1	148.2	30.7	65
HCM LOS	F	F	D	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	52%	6%	30%	17%
Vol Thru, %	32%	48%	58%	67%
Vol Right, %	16%	46%	12%	16%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	187	469	412	312
LT Vol	98	29	124	52
Through Vol	59	226	239	209
RT Vol	30	214	49	51
Lane Flow Rate	237	594	522	395
Geometry Grp	1	1	1	1
Degree of Util (X)	0.62	1.345	1.218	0.937
Departure Headway (Hd)	11.133	8.832	9.356	9.941
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	327	416	391	367
Service Time	9.133	6.832	7.356	7.941
HCM Lane V/C Ratio	0.725	1.428	1.335	1.076
HCM Control Delay	30.7	196.1	148.2	65
HCM Lane LOS	D	F	F	F
HCM 95th-tile Q	3.9	25.6	19.5	9.9

5: E INTERNATIONAL AVE & N CHESTNUT AVE

06/05/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	330	705	46	343	575	139	7	392	266	74	170	111
v/c Ratio	0.81	0.80	0.10	0.82	0.64	0.29	0.06	0.81	0.55	0.46	0.14	0.18
Control Delay	57.9	47.1	0.4	58.4	41.1	10.2	57.8	53.2	24.7	62.3	26.1	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.9	47.1	0.4	58.4	41.1	10.2	57.8	53.2	24.7	62.3	26.1	6.5
Queue Length 50th (ft)	234	265	0	243	204	8	5	275	90	54	42	0
Queue Length 95th (ft)	235	222	0	245	180	14	15	261	88	74	56	7
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	532	1042	518	532	1048	537	135	613	579	207	1456	705
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.68	0.09	0.64	0.55	0.26	0.05	0.64	0.46	0.36	0.12	0.16

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	201	430	28	209	351	85	4	239	162	45	104	68
Future Volume (veh/h)	201	430	28	209	351	85	4	239	162	45	104	68
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	330	705	46	343	575	139	7	392	266	74	170	111
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	370	927	399	383	952	410	16	512	418	96	1131	502
Arrive On Green	0.21	0.26	0.26	0.21	0.27	0.27	0.01	0.27	0.27	0.05	0.32	0.32
Sat Flow, veh/h	1781	3554	1530	1781	3554	1532	1781	1870	1528	1781	3554	1578
Grp Volume(v), veh/h	330	705	46	343	575	139	7	392	266	74	170	111
Grp Sat Flow(s),veh/h/ln	1781	1777	1530	1781	1777	1532	1781	1870	1528	1781	1777	1578
Q Serve(g_s), s	17.7	18.0	2.3	18.4	13.9	7.2	0.4	18.9	15.1	4.0	3.4	5.1
Cycle Q Clear(g_c), s	17.7	18.0	2.3	18.4	13.9	7.2	0.4	18.9	15.1	4.0	3.4	5.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	370	927	399	383	952	410	16	512	418	96	1131	502
V/C Ratio(X)	0.89	0.76	0.12	0.90	0.60	0.34	0.44	0.77	0.64	0.77	0.15	0.22
Avail Cap(c_a), veh/h	534	1005	433	534	1005	433	136	605	494	208	1294	574
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	33.5	27.7	37.5	31.4	29.0	48.5	32.8	31.4	45.9	24.0	24.6
Incr Delay (d2), s/veh	12.8	3.2	0.1	13.8	0.9	0.5	18.4	4.9	2.1	12.4	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	7.8	0.8	9.2	5.8	2.6	0.2	9.0	5.6	2.1	1.4	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.7	36.7	27.8	51.3	32.4	29.5	66.9	37.8	33.5	58.3	24.1	24.8
LnGrp LOS	D	D	C	D	C	C	E	D	C	E	C	C
Approach Vol, veh/h		1081			1057			665			355	
Approach Delay, s/veh		40.6			38.2			36.4			31.4	
Approach LOS		D			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.8	32.1	25.6	30.8	5.4	36.5	24.9	31.5
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	6.0	20.9	20.4	20.0	2.4	7.1	19.7	15.9
Green Ext Time (p_c), s	0.1	2.5	0.7	2.8	0.0	1.4	0.7	3.2

Intersection Summary	
HCM 6th Ctrl Delay	37.9
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	325	51	109	217	86	67	259	178	68	261	182
v/c Ratio	0.44	0.39	0.11	0.36	0.30	0.19	0.26	0.50	0.31	0.26	0.50	0.32
Control Delay	33.9	25.5	0.5	37.1	28.5	0.9	38.2	27.8	6.3	37.2	27.2	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	25.5	0.5	37.1	28.5	0.9	38.2	27.8	6.3	37.2	27.2	6.0
Queue Length 50th (ft)	55	57	0	37	39	0	23	87	0	24	87	0
Queue Length 95th (ft)	151	116	0	116	89	0	80	196	27	80	192	26
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	806	1646	797	519	1073	594	411	1109	1014	483	1154	1050
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.20	0.06	0.21	0.20	0.14	0.16	0.23	0.18	0.14	0.23	0.17

Intersection Summary

6: N CHESTNUT AVE & E BEHYMER AVE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	124	247	39	83	165	65	51	197	135	52	198	138
Future Volume (veh/h)	124	247	39	83	165	65	51	197	135	52	198	138
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	163	325	51	109	217	86	67	259	178	68	261	182
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	219	624	278	153	493	220	115	419	355	116	420	356
Arrive On Green	0.12	0.18	0.18	0.09	0.14	0.14	0.06	0.22	0.22	0.07	0.22	0.22
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	163	325	51	109	217	86	67	259	178	68	261	182
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	3.7	3.5	1.1	2.5	2.3	2.1	1.5	5.2	4.1	1.5	5.2	4.2
Cycle Q Clear(g_c), s	3.7	3.5	1.1	2.5	2.3	2.1	1.5	5.2	4.1	1.5	5.2	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	219	624	278	153	493	220	115	419	355	116	420	356
V/C Ratio(X)	0.74	0.52	0.18	0.71	0.44	0.39	0.58	0.62	0.50	0.58	0.62	0.51
Avail Cap(c_a), veh/h	963	1860	830	620	1178	525	492	1415	1199	578	1505	1275
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.6	15.6	14.6	18.5	16.5	16.3	18.9	14.6	14.1	18.9	14.6	14.1
Incr Delay (d2), s/veh	4.9	0.7	0.3	6.0	0.6	1.1	4.6	1.5	1.1	4.6	1.5	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.2	0.3	1.1	0.8	0.7	0.7	1.9	1.2	0.7	2.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.6	16.2	14.9	24.5	17.1	17.5	23.5	16.1	15.2	23.5	16.1	15.3
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		539			412			504			511	
Approach Delay, s/veh		18.0			19.1			16.8			16.8	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.2	13.8	8.1	12.5	7.2	13.8	9.6	11.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	3.5	7.2	4.5	5.5	3.5	7.2	5.7	4.3
Green Ext Time (p_c), s	0.1	2.1	0.2	1.9	0.1	2.1	0.4	1.0

Intersection Summary	
HCM 6th Ctrl Delay	17.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
2: MILLBROOK AVE & E COPPER AVE

EPAP AM
W IMPROVEMENTS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	34	347	20	140	509	42	15	13	208	111	35	82
v/c Ratio	0.17	0.43	0.04	0.59	0.38	0.06	0.08	0.04	0.48	0.46	0.05	0.13
Control Delay	33.0	21.7	0.2	42.0	17.3	0.2	33.2	21.6	7.8	38.0	16.5	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	21.7	0.2	42.0	17.3	0.2	33.2	21.6	7.8	38.0	16.5	2.1
Queue Length 50th (ft)	9	47	0	38	46	0	4	3	0	30	6	0
Queue Length 95th (ft)	51	121	0	#212	177	0	29	18	45	#163	36	12
Internal Link Dist (ft)		1334			1174			566			314	
Turn Bay Length (ft)	240		210	265		260	330		150	175		100
Base Capacity (vph)	239	2038	960	239	2038	960	239	1150	1057	239	1150	1024
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.17	0.02	0.59	0.25	0.04	0.06	0.01	0.20	0.46	0.03	0.08

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	30	305	18	123	448	37	13	11	183	98	31	72
Future Volume (veh/h)	30	305	18	123	448	37	13	11	183	98	31	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	34	347	20	140	509	42	15	12	208	111	35	82
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	69	659	294	180	880	393	34	345	292	154	470	399
Arrive On Green	0.04	0.19	0.19	0.10	0.25	0.25	0.02	0.18	0.18	0.09	0.25	0.25
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	34	347	20	140	509	42	15	12	208	111	35	82
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.8	3.7	0.4	3.2	5.3	0.9	0.4	0.2	5.2	2.6	0.6	1.7
Cycle Q Clear(g_c), s	0.8	3.7	0.4	3.2	5.3	0.9	0.4	0.2	5.2	2.6	0.6	1.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	69	659	294	180	880	393	34	345	292	154	470	399
V/C Ratio(X)	0.49	0.53	0.07	0.78	0.58	0.11	0.44	0.03	0.71	0.72	0.07	0.21
Avail Cap(c_a), veh/h	316	2693	1201	316	2693	1201	316	1519	1287	316	1519	1287
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.9	15.5	14.2	18.5	14.0	12.3	20.5	14.1	16.2	18.8	12.1	12.5
Incr Delay (d2), s/veh	5.3	0.7	0.1	7.0	0.6	0.1	8.7	0.0	3.2	6.3	0.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.2	0.1	1.4	1.6	0.2	0.2	0.1	1.6	1.1	0.2	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.2	16.2	14.3	25.5	14.6	12.4	29.2	14.2	19.4	25.1	12.1	12.7
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		401			691			235			228	
Approach Delay, s/veh		16.9			16.6			19.7			18.7	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	12.3	8.8	13.0	5.3	15.1	6.1	15.7
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	34.3	7.5	32.0	7.5	34.3	7.5	32.0
Max Q Clear Time (g_c+I1), s	4.6	7.2	5.2	5.7	2.4	3.7	2.8	7.3
Green Ext Time (p_c), s	0.1	0.7	0.1	2.0	0.0	0.4	0.0	3.1

Intersection Summary	
HCM 6th Ctrl Delay	17.5
HCM 6th LOS	B

Queues
3: N CHESTNUT AVE & E COPPER AVE

	↗	→	↘	↙	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	25	508	273	80	431	8	227	106	19	17	43
v/c Ratio	0.14	0.71	0.35	0.36	0.49	0.01	0.58	0.20	0.11	0.07	0.13
Control Delay	47.8	29.2	4.2	47.5	19.9	0.0	41.8	8.8	48.1	38.6	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.8	29.2	4.2	47.5	19.9	0.0	41.8	8.8	48.1	38.6	0.8
Queue Length 50th (ft)	12	216	0	37	120	0	103	3	9	8	0
Queue Length 95th (ft)	42	362	20	101	290	0	#230	29	35	27	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	218	1454	1295	277	1477	1284	568	755	218	431	476
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.35	0.21	0.29	0.29	0.01	0.40	0.14	0.09	0.04	0.09

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑	↱
Traffic Volume (veh/h)	19	381	205	60	323	6	170	7	73	14	13	32
Future Volume (veh/h)	19	381	205	60	323	6	170	7	73	14	13	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	25	508	273	80	431	8	227	9	97	19	17	43
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	51	657	557	114	723	613	288	31	329	41	159	135
Arrive On Green	0.03	0.35	0.35	0.06	0.39	0.39	0.16	0.22	0.22	0.02	0.09	0.09
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	136	1470	1781	1870	1585
Grp Volume(v), veh/h	25	508	273	80	431	8	227	0	106	19	17	43
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1606	1781	1870	1585
Q Serve(g_s), s	0.8	13.4	7.5	2.4	10.2	0.2	6.8	0.0	3.0	0.6	0.5	1.4
Cycle Q Clear(g_c), s	0.8	13.4	7.5	2.4	10.2	0.2	6.8	0.0	3.0	0.6	0.5	1.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.92	1.00		1.00
Lane Grp Cap(c), veh/h	51	657	557	114	723	613	288	0	360	41	159	135
V/C Ratio(X)	0.49	0.77	0.49	0.70	0.60	0.01	0.79	0.00	0.29	0.47	0.11	0.32
Avail Cap(c_a), veh/h	241	2021	1712	306	2088	1770	628	0	711	241	422	358
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.5	16.0	14.1	25.4	13.5	10.5	22.3	0.0	17.8	26.7	23.4	23.8
Incr Delay (d2), s/veh	7.0	2.0	0.7	7.6	0.8	0.0	4.8	0.0	0.5	8.1	0.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	4.7	2.1	1.1	3.3	0.0	2.9	0.0	1.0	0.3	0.2	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.5	18.0	14.7	33.0	14.3	10.5	27.1	0.0	18.3	34.8	23.7	25.2
LnGrp LOS	C	B	B	C	B	B	C	A	B	C	C	C
Approach Vol, veh/h		806			519			333			79	
Approach Delay, s/veh		17.3			17.1			24.3			27.1	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.8	16.9	8.0	24.7	13.5	9.2	6.1	26.6
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.6	5.0	4.4	15.4	8.8	3.4	2.8	12.2
Green Ext Time (p_c), s	0.0	0.5	0.1	4.1	0.5	0.1	0.0	2.5

Intersection Summary	
HCM 6th Ctrl Delay	19.1
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

4: N WILLOW AVE & COPPER AVE

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	37	557	157	365	124	113	66	330
v/c Ratio	0.27	0.93	0.69	0.46	0.60	0.22	0.41	0.78
Control Delay	52.1	57.2	60.4	26.4	57.0	25.8	53.2	49.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.1	57.2	60.4	26.4	57.0	25.8	53.2	49.0
Queue Length 50th (ft)	23	336	98	175	78	48	42	198
Queue Length 95th (ft)	52	#518	160	271	130	83	78	254
Internal Link Dist (ft)		1168		2435		1529		9418
Turn Bay Length (ft)	300		300		300		300	
Base Capacity (vph)	222	596	258	786	258	513	525	712
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.93	0.61	0.46	0.48	0.22	0.13	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	29	226	214	124	239	49	98	59	30	52	209	51
Future Volume (veh/h)	29	226	214	124	239	49	98	59	30	52	209	51
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	37	286	271	157	303	62	124	75	38	66	265	65
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	61	311	294	194	642	131	158	303	153	87	317	78
Arrive On Green	0.03	0.35	0.35	0.11	0.43	0.43	0.09	0.26	0.26	0.05	0.22	0.22
Sat Flow, veh/h	1781	883	837	1781	1507	308	1781	1171	593	1781	1451	356
Grp Volume(v), veh/h	37	0	557	157	0	365	124	0	113	66	0	330
Grp Sat Flow(s),veh/h/ln	1781	0	1720	1781	0	1815	1781	0	1764	1781	0	1806
Q Serve(g_s), s	1.7	0.0	26.0	7.2	0.0	12.1	5.7	0.0	4.2	3.1	0.0	14.6
Cycle Q Clear(g_c), s	1.7	0.0	26.0	7.2	0.0	12.1	5.7	0.0	4.2	3.1	0.0	14.6
Prop In Lane	1.00		0.49	1.00		0.17	1.00		0.34	1.00		0.20
Lane Grp Cap(c), veh/h	61	0	605	194	0	774	158	0	456	87	0	395
V/C Ratio(X)	0.60	0.00	0.92	0.81	0.00	0.47	0.79	0.00	0.25	0.76	0.00	0.84
Avail Cap(c_a), veh/h	266	0	675	309	0	774	309	0	502	628	0	838
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.8	0.0	26.0	36.4	0.0	17.2	37.3	0.0	24.6	39.3	0.0	31.2
Incr Delay (d2), s/veh	9.1	0.0	17.0	8.2	0.0	0.4	8.4	0.0	0.3	12.8	0.0	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	12.1	3.3	0.0	4.4	2.7	0.0	1.7	1.6	0.0	6.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.9	0.0	43.0	44.6	0.0	17.7	45.7	0.0	24.8	52.1	0.0	35.9
LnGrp LOS	D	A	D	D	A	B	D	A	C	D	A	D
Approach Vol, veh/h		594			522			237			396	
Approach Delay, s/veh		43.4			25.8			35.7			38.6	
Approach LOS		D			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.6	26.8	13.6	34.6	11.9	23.5	7.4	40.8
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	5.1	6.2	9.2	28.0	7.7	16.6	3.7	14.1
Green Ext Time (p_c), s	0.1	0.4	0.2	1.4	0.1	1.7	0.0	1.9

Intersection Summary	
HCM 6th Ctrl Delay	36.0
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Vol, veh/h	1	1	2	21	0	193	3	294	57	154	214	0
Future Vol, veh/h	1	1	2	21	0	193	3	294	57	154	214	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	300	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1	2	23	0	208	3	316	61	166	230	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	726	945	115	801	915	-	230	0	0	377	0	0
Stage 1	562	562	-	353	353	-	-	-	-	-	-	-
Stage 2	164	383	-	448	562	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	312	260	916	276	271	0	1335	-	-	1178	-	-
Stage 1	479	508	-	637	629	0	-	-	-	-	-	-
Stage 2	822	610	-	560	508	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	278	223	916	244	232	-	1335	-	-	1178	-	-
Mov Cap-2 Maneuver	278	223	-	244	232	-	-	-	-	-	-	-
Stage 1	478	436	-	636	628	-	-	-	-	-	-	-
Stage 2	820	609	-	479	436	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.3	21.3	0.1	3.6
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1335	-	-	390	244	-	1178	-	-
HCM Lane V/C Ratio	0.002	-	-	0.011	0.093	-	0.141	-	-
HCM Control Delay (s)	7.7	-	-	14.3	21.3	0	8.6	-	-
HCM Lane LOS	A	-	-	B	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	-	0.5	-	-

Intersection	
Int Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	80	578	20	84	285	95	21	41	181	60	15	38
Future Vol, veh/h	80	578	20	84	285	95	21	41	181	60	15	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	86	622	22	90	306	102	23	44	195	65	16	41

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	408	0	0	644	0	0	1135	1382	311	991	1302	153
Stage 1	-	-	-	-	-	-	794	794	-	486	486	-
Stage 2	-	-	-	-	-	-	341	588	-	505	816	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1147	-	-	937	-	-	157	143	685	200	160	866
Stage 1	-	-	-	-	-	-	348	398	-	531	549	-
Stage 2	-	-	-	-	-	-	647	494	-	518	389	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1147	-	-	937	-	-	119	120	685	90	134	866
Mov Cap-2 Maneuver	-	-	-	-	-	-	119	120	-	90	134	-
Stage 1	-	-	-	-	-	-	322	368	-	491	496	-
Stage 2	-	-	-	-	-	-	539	447	-	302	360	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	1.7	21.5	67.1
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	119	120	685	1147	-	-	937	-	-	90	134	866
HCM Lane V/C Ratio	0.19	0.367	0.284	0.075	-	-	0.096	-	-	0.717	0.12	0.047
HCM Control Delay (s)	42.2	51.5	12.3	8.4	-	-	9.3	-	-	111.5	35.5	9.4
HCM Lane LOS	E	F	B	A	-	-	A	-	-	F	E	A
HCM 95th %tile Q(veh)	0.7	1.5	1.2	0.2	-	-	0.3	-	-	3.6	0.4	0.1

3: N CHESTNUT AVE & E COPPER AVE

Intersection	
Intersection Delay, s/veh	27.7
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✥	
Traffic Vol, veh/h	42	375	122	13	370	14	107	9	50	9	5	15
Future Vol, veh/h	42	375	122	13	370	14	107	9	50	9	5	15
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	421	137	15	416	16	120	10	56	10	6	17
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	36.5	23.3	12.4	11.4
HCM LOS	E	C	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	100%	0%	31%
Vol Thru, %	0%	15%	0%	75%	0%	96%	17%
Vol Right, %	0%	85%	0%	25%	0%	4%	52%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	107	59	42	497	13	384	29
LT Vol	107	0	42	0	13	0	9
Through Vol	0	9	0	375	0	370	5
RT Vol	0	50	0	122	0	14	15
Lane Flow Rate	120	66	47	558	15	431	33
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.263	0.124	0.085	0.895	0.027	0.731	0.071
Departure Headway (Hd)	7.872	6.753	6.454	5.772	6.634	6.1	7.814
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	454	528	553	625	537	591	461
Service Time	5.657	4.537	4.216	3.534	4.402	3.868	5.814
HCM Lane V/C Ratio	0.264	0.125	0.085	0.893	0.028	0.729	0.072
HCM Control Delay	13.5	10.5	9.8	38.8	9.6	23.8	11.4
HCM Lane LOS	B	B	A	E	A	C	B
HCM 95th-tile Q	1	0.4	0.3	10.9	0.1	6.2	0.2

Intersection	
Intersection Delay, s/veh	73.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	52	240	151	75	202	65	170	175	68	69	141	29
Future Vol, veh/h	52	240	151	75	202	65	170	175	68	69	141	29
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	56	258	162	81	217	70	183	188	73	74	152	31
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	101.4	51.9	86.5	30.3
HCM LOS	F	F	F	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	41%	12%	22%	29%
Vol Thru, %	42%	54%	59%	59%
Vol Right, %	16%	34%	19%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	413	443	342	239
LT Vol	170	52	75	69
Through Vol	175	240	202	141
RT Vol	68	151	65	29
Lane Flow Rate	444	476	368	257
Geometry Grp	1	1	1	1
Degree of Util (X)	1.042	1.095	0.884	0.663
Departure Headway (Hd)	8.867	8.59	9.177	9.862
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	413	424	397	370
Service Time	6.867	6.59	7.177	7.862
HCM Lane V/C Ratio	1.075	1.123	0.927	0.695
HCM Control Delay	86.5	101.4	51.9	30.3
HCM Lane LOS	F	F	F	D
HCM 95th-tile Q	13.7	15.8	8.9	4.6

Queues

EPAP PM

5: E INTERNATIONAL AVE & N CHESTNUT AVE

06/05/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	84	189	26	113	214	49	25	145	69	84	158	143
v/c Ratio	0.29	0.26	0.07	0.35	0.27	0.12	0.11	0.35	0.17	0.30	0.14	0.23
Control Delay	34.6	25.5	0.3	33.8	24.2	0.6	38.3	27.6	3.2	36.2	19.2	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	25.5	0.3	33.8	24.2	0.6	38.3	27.6	3.2	36.2	19.2	5.9
Queue Length 50th (ft)	25	30	0	34	33	0	8	43	0	25	16	0
Queue Length 95th (ft)	109	84	0	135	91	0	47	137	14	113	68	42
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	1004	1976	891	1004	1991	898	279	1120	950	428	2305	1063
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.10	0.03	0.11	0.11	0.05	0.09	0.13	0.07	0.20	0.07	0.13

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	74	166	23	99	188	43	22	128	61	74	139	126
Future Volume (veh/h)	74	166	23	99	188	43	22	128	61	74	139	126
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.96	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	189	26	112	214	49	25	145	69	84	158	143
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	118	898	386	150	961	414	52	445	361	118	978	434
Arrive On Green	0.07	0.25	0.25	0.08	0.27	0.27	0.03	0.24	0.24	0.07	0.28	0.28
Sat Flow, veh/h	1781	3554	1529	1781	3554	1532	1781	1870	1519	1781	3554	1576
Grp Volume(v), veh/h	84	189	26	112	214	49	25	145	69	84	158	143
Grp Sat Flow(s),veh/h/ln	1781	1777	1529	1781	1777	1532	1781	1870	1519	1781	1777	1576
Q Serve(g_s), s	2.5	2.3	0.7	3.3	2.5	1.3	0.7	3.5	2.0	2.5	1.8	3.9
Cycle Q Clear(g_c), s	2.5	2.3	0.7	3.3	2.5	1.3	0.7	3.5	2.0	2.5	1.8	3.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	118	898	386	150	961	414	52	445	361	118	978	434
V/C Ratio(X)	0.71	0.21	0.07	0.75	0.22	0.12	0.48	0.33	0.19	0.71	0.16	0.33
Avail Cap(c_a), veh/h	973	1830	787	973	1830	789	247	1102	895	379	2356	1045
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.7	15.9	15.3	24.2	15.3	14.8	25.8	17.0	16.4	24.7	14.8	15.6
Incr Delay (d2), s/veh	7.6	0.1	0.1	7.2	0.1	0.1	6.9	0.4	0.3	7.6	0.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.8	0.2	1.5	0.9	0.4	0.4	1.4	0.6	1.2	0.7	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.3	16.0	15.4	31.4	15.4	15.0	32.7	17.4	16.7	32.3	14.9	16.0
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		299			375			239			385	
Approach Delay, s/veh		20.6			20.1			18.8			19.1	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	18.0	9.0	18.8	6.1	20.1	8.1	19.8
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	4.5	5.5	5.3	4.3	2.7	5.9	4.5	4.5
Green Ext Time (p_c), s	0.1	1.0	0.3	1.1	0.0	1.4	0.2	1.4

Intersection Summary	
HCM 6th Ctrl Delay	19.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

6: N CHESTNUT AVE & E BEHYMER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	77	188	16	41	262	61	34	146	88	77	144	95
v/c Ratio	0.20	0.16	0.03	0.12	0.27	0.11	0.10	0.26	0.15	0.20	0.22	0.14
Control Delay	30.8	19.4	0.1	33.2	22.7	0.4	33.9	22.8	0.5	31.1	19.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.8	19.4	0.1	33.2	22.7	0.4	33.9	22.8	0.5	31.1	19.0	0.4
Queue Length 50th (ft)	22	18	0	12	39	0	10	42	0	22	28	0
Queue Length 95th (ft)	97	82	0	62	116	0	55	127	0	98	119	0
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	1007	2037	960	775	1600	805	640	1280	1141	746	1318	1170
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.09	0.02	0.05	0.16	0.08	0.05	0.11	0.08	0.10	0.11	0.08

Intersection Summary

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	72	175	15	38	244	57	32	136	82	72	134	88
Future Volume (veh/h)	72	175	15	38	244	57	32	136	82	72	134	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	77	188	16	41	262	61	34	146	88	77	144	95
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	657	293	84	556	248	72	295	250	134	360	305
Arrive On Green	0.08	0.18	0.18	0.05	0.16	0.16	0.04	0.16	0.16	0.08	0.19	0.19
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	77	188	16	41	262	61	34	146	88	77	144	95
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	1.5	1.6	0.3	0.8	2.3	1.2	0.7	2.5	1.7	1.5	2.4	1.8
Cycle Q Clear(g_c), s	1.5	1.6	0.3	0.8	2.3	1.2	0.7	2.5	1.7	1.5	2.4	1.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	134	657	293	84	556	248	72	295	250	134	360	305
V/C Ratio(X)	0.57	0.29	0.05	0.49	0.47	0.25	0.47	0.50	0.35	0.57	0.40	0.31
Avail Cap(c_a), veh/h	1147	2218	989	739	1404	626	586	1687	1429	688	1794	1520
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.6	12.3	11.7	16.2	13.4	12.9	16.4	13.4	13.1	15.6	12.3	12.1
Incr Delay (d2), s/veh	3.8	0.2	0.1	4.4	0.6	0.5	4.8	1.3	0.8	3.8	0.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.5	0.1	0.3	0.7	0.3	0.3	0.9	0.5	0.6	0.8	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.4	12.5	11.8	20.6	14.0	13.4	21.2	14.7	14.0	19.4	13.1	12.7
LnGrp LOS	B	B	B	C	B	B	C	B	B	B	B	B
Approach Vol, veh/h		281			364			268			316	
Approach Delay, s/veh		14.4			14.7			15.3			14.5	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	10.0	6.1	11.7	5.9	11.2	7.1	10.7
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	3.5	4.5	2.8	3.6	2.7	4.4	3.5	4.3
Green Ext Time (p_c), s	0.1	1.0	0.0	1.0	0.0	1.1	0.1	1.1

Intersection Summary			
HCM 6th Ctrl Delay			14.7
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

2: MILLBROOK AVE & E COPPER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	91	657	23	95	324	108	24	47	206	68	17	43
v/c Ratio	0.34	0.56	0.04	0.35	0.28	0.18	0.10	0.13	0.44	0.27	0.03	0.08
Control Delay	35.9	20.6	0.1	36.2	18.0	5.2	34.4	23.5	7.2	34.6	17.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	20.6	0.1	36.2	18.0	5.2	34.4	23.5	7.2	34.6	17.9	0.3
Queue Length 50th (ft)	29	102	0	30	45	0	8	15	0	21	4	0
Queue Length 95th (ft)	#128	233	0	#135	114	32	39	44	44	85	22	0
Internal Link Dist (ft)		1334			1174			566			314	
Turn Bay Length (ft)	240		210	265		260	330		150	175		100
Base Capacity (vph)	285	2237	1043	285	2237	1043	285	1236	1119	285	1236	1091
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.29	0.02	0.33	0.14	0.10	0.08	0.04	0.18	0.24	0.01	0.04

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
2: MILLBROOK AVE & E COPPER AVE

EPAP PM
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	80	578	20	84	285	95	21	41	181	60	15	38
Future Volume (veh/h)	80	578	20	84	285	95	21	41	181	60	15	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	91	657	23	95	324	108	24	47	206	68	17	43
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	131	1024	457	134	1030	459	51	338	287	111	401	340
Arrive On Green	0.07	0.29	0.29	0.08	0.29	0.29	0.03	0.18	0.18	0.06	0.21	0.21
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	91	657	23	95	324	108	24	47	206	68	17	43
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	2.4	7.7	0.5	2.5	3.4	2.5	0.6	1.0	5.8	1.8	0.3	1.0
Cycle Q Clear(g_c), s	2.4	7.7	0.5	2.5	3.4	2.5	0.6	1.0	5.8	1.8	0.3	1.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	131	1024	457	134	1030	459	51	338	287	111	401	340
V/C Ratio(X)	0.69	0.64	0.05	0.71	0.31	0.24	0.47	0.14	0.72	0.61	0.04	0.13
Avail Cap(c_a), veh/h	281	2392	1067	281	2392	1067	281	1349	1144	281	1349	1144
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.5	14.8	12.2	21.5	13.2	12.9	22.7	16.4	18.3	21.7	14.8	15.1
Incr Delay (d2), s/veh	6.4	0.7	0.0	6.7	0.2	0.3	6.6	0.2	3.4	5.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	2.4	0.1	1.1	1.0	0.7	0.3	0.4	1.9	0.8	0.1	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.9	15.4	12.3	28.2	13.4	13.1	29.4	16.5	21.7	27.1	14.8	15.2
LnGrp LOS	C	B	B	C	B	B	C	B	C	C	B	B
Approach Vol, veh/h		771			527			277			128	
Approach Delay, s/veh		16.8			16.0			21.5			21.5	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.5	13.1	8.1	18.9	5.9	14.7	8.0	19.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	34.3	7.5	32.0	7.5	34.3	7.5	32.0
Max Q Clear Time (g_c+I1), s	3.8	7.8	4.5	9.7	2.6	3.0	4.4	5.4
Green Ext Time (p_c), s	0.0	0.9	0.0	4.0	0.0	0.2	0.0	2.2

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	56	500	163	17	493	19	143	79	12	7	20
v/c Ratio	0.19	0.44	0.16	0.06	0.49	0.02	0.34	0.15	0.04	0.02	0.05
Control Delay	40.4	15.8	3.7	41.9	19.9	0.1	34.2	9.4	42.7	33.4	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	15.8	3.7	41.9	19.9	0.1	34.2	9.4	42.7	33.4	0.2
Queue Length 50th (ft)	17	69	0	5	124	0	42	3	4	2	0
Queue Length 95th (ft)	76	352	21	32	341	0	145	29	25	15	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	353	1596	1379	447	1612	1388	825	941	353	669	660
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.31	0.12	0.04	0.31	0.01	0.17	0.08	0.03	0.01	0.03

Intersection Summary

HCM 6th Signalized Intersection Summary
3: N CHESTNUT AVE & E COPPER AVE

EPAP PM
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↑	↱
Traffic Volume (veh/h)	42	375	122	13	370	14	107	9	50	9	5	15
Future Volume (veh/h)	42	375	122	13	370	14	107	9	50	9	5	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	56	500	163	17	493	19	143	12	67	12	7	20
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	99	708	600	38	644	546	191	44	243	28	159	134
Arrive On Green	0.06	0.38	0.38	0.02	0.34	0.34	0.11	0.18	0.18	0.02	0.08	0.08
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	246	1376	1781	1870	1585
Grp Volume(v), veh/h	56	500	163	17	493	19	143	0	79	12	7	20
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1623	1781	1870	1585
Q Serve(g_s), s	1.4	10.4	3.3	0.4	10.8	0.4	3.6	0.0	1.9	0.3	0.2	0.5
Cycle Q Clear(g_c), s	1.4	10.4	3.3	0.4	10.8	0.4	3.6	0.0	1.9	0.3	0.2	0.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.85	1.00		1.00
Lane Grp Cap(c), veh/h	99	708	600	38	644	546	191	0	286	28	159	134
V/C Ratio(X)	0.57	0.71	0.27	0.45	0.77	0.03	0.75	0.00	0.28	0.44	0.04	0.15
Avail Cap(c_a), veh/h	292	2442	2069	369	2523	2138	758	0	868	292	510	433
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.1	12.1	9.9	22.2	13.4	10.0	19.9	0.0	16.3	22.4	19.3	19.4
Incr Delay (d2), s/veh	5.0	1.3	0.2	8.1	1.9	0.0	5.8	0.0	0.5	10.5	0.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	3.1	0.8	0.2	3.4	0.1	1.6	0.0	0.7	0.2	0.1	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.1	13.4	10.1	30.3	15.3	10.0	25.7	0.0	16.8	32.8	19.4	19.9
LnGrp LOS	C	B	B	C	B	A	C	A	B	C	B	B
Approach Vol, veh/h		719			529			222			39	
Approach Delay, s/veh		13.6			15.6			22.5			23.8	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.2	12.6	5.5	22.5	9.4	8.4	7.0	21.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.3	3.9	2.4	12.4	5.6	2.5	3.4	12.8
Green Ext Time (p_c), s	0.0	0.3	0.0	3.6	0.3	0.0	0.0	3.0

Intersection Summary	
HCM 6th Ctrl Delay	15.9
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues

4: N WILLOW AVE & COPPER AVE

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	56	420	81	287	183	261	74	183
v/c Ratio	0.30	0.75	0.38	0.49	0.60	0.51	0.36	0.55
Control Delay	43.3	34.8	43.2	25.7	45.2	32.7	43.2	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.3	34.8	43.2	25.7	45.2	32.7	43.2	38.1
Queue Length 50th (ft)	28	184	40	113	89	115	36	84
Queue Length 95th (ft)	74	347	96	220	#219	231	90	167
Internal Link Dist (ft)		1168		2435		1529		9418
Turn Bay Length (ft)	300		300		300		300	
Base Capacity (vph)	299	794	347	853	347	588	708	959
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.53	0.23	0.34	0.53	0.44	0.10	0.19

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

4: N WILLOW AVE & COPPER AVE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	52	240	151	75	202	65	170	175	68	69	141	29
Future Volume (veh/h)	52	240	151	75	202	65	170	175	68	69	141	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	56	258	162	81	217	70	183	188	73	74	152	31
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	93	321	202	115	421	136	235	281	109	110	224	46
Arrive On Green	0.05	0.30	0.30	0.06	0.31	0.31	0.13	0.22	0.22	0.06	0.15	0.15
Sat Flow, veh/h	1781	1074	675	1781	1355	437	1781	1283	498	1781	1508	307
Grp Volume(v), veh/h	56	0	420	81	0	287	183	0	261	74	0	183
Grp Sat Flow(s),veh/h/ln	1781	0	1749	1781	0	1792	1781	0	1781	1781	0	1815
Q Serve(g_s), s	1.7	0.0	12.1	2.4	0.0	7.2	5.4	0.0	7.3	2.2	0.0	5.2
Cycle Q Clear(g_c), s	1.7	0.0	12.1	2.4	0.0	7.2	5.4	0.0	7.3	2.2	0.0	5.2
Prop In Lane	1.00		0.39	1.00		0.24	1.00		0.28	1.00		0.17
Lane Grp Cap(c), veh/h	93	0	522	115	0	557	235	0	390	110	0	270
V/C Ratio(X)	0.60	0.00	0.80	0.70	0.00	0.51	0.78	0.00	0.67	0.67	0.00	0.68
Avail Cap(c_a), veh/h	408	0	1052	474	0	1144	474	0	777	964	0	1292
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.3	0.0	17.6	25.0	0.0	15.4	22.9	0.0	19.5	25.0	0.0	22.0
Incr Delay (d2), s/veh	6.0	0.0	3.0	7.5	0.0	0.7	5.5	0.0	2.0	6.9	0.0	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	4.2	1.1	0.0	2.4	2.3	0.0	2.7	1.0	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.3	0.0	20.6	32.5	0.0	16.1	28.4	0.0	21.5	32.0	0.0	24.9
LnGrp LOS	C	A	C	C	A	B	C	A	C	C	A	C
Approach Vol, veh/h		476			368			444			257	
Approach Delay, s/veh		21.9			19.7			24.3			27.0	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	17.1	8.0	21.5	11.7	13.3	7.4	22.2
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	4.2	9.3	4.4	14.1	7.4	7.2	3.7	9.2
Green Ext Time (p_c), s	0.2	1.1	0.1	2.2	0.3	0.9	0.1	1.5

Intersection Summary	
HCM 6th Ctrl Delay	22.9
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Vol, veh/h	1	2	0	52	1	90	4	156	26	196	205	1
Future Vol, veh/h	1	2	0	52	1	90	4	156	26	196	205	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	600	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	2	0	60	1	105	5	181	30	228	238	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	796	916	120	782	901	-	239	0	0	211	0	0
Stage 1	695	695	-	206	206	-	-	-	-	-	-	-
Stage 2	101	221	-	576	695	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	278	271	909	284	276	0	1325	-	-	1357	-	-
Stage 1	399	442	-	777	730	0	-	-	-	-	-	-
Stage 2	894	719	-	470	442	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	240	225	909	245	229	-	1325	-	-	1357	-	-
Mov Cap-2 Maneuver	240	225	-	245	229	-	-	-	-	-	-	-
Stage 1	397	368	-	774	727	-	-	-	-	-	-	-
Stage 2	889	716	-	389	368	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.9	24.6	0.2	4
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1325	-	-	230	245	-	1357	-	-
HCM Lane V/C Ratio	0.004	-	-	0.015	0.252	-	0.168	-	-
HCM Control Delay (s)	7.7	-	-	20.9	24.6	0	8.2	-	-
HCM Lane LOS	A	-	-	C	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	1	-	0.6	-	-

Intersection	
Int Delay, s/veh	16.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	30	318	18	125	474	37	13	11	184	98	31	72
Future Vol, veh/h	30	318	18	125	474	37	13	11	184	98	31	72
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	361	20	142	539	42	15	13	209	111	35	82

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	581	0	0	381	0	0	1000	1294	181	1078	1272	270
Stage 1	-	-	-	-	-	-	429	429	-	823	823	-
Stage 2	-	-	-	-	-	-	571	865	-	255	449	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	989	-	-	1174	-	-	197	161	831	173	166	728
Stage 1	-	-	-	-	-	-	574	582	-	334	386	-
Stage 2	-	-	-	-	-	-	473	369	-	727	571	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	989	-	-	1174	-	-	125	137	831	~ 107	141	728
Mov Cap-2 Maneuver	-	-	-	-	-	-	125	137	-	~ 107	141	-
Stage 1	-	-	-	-	-	-	554	562	-	323	339	-
Stage 2	-	-	-	-	-	-	331	324	-	514	552	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.7	13.7	94.5
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	125	137	831	989	-	-	1174	-	-	107	141	728
HCM Lane V/C Ratio	0.118	0.091	0.252	0.034	-	-	0.121	-	-	1.041	0.25	0.112
HCM Control Delay (s)	37.6	33.9	10.8	8.8	-	-	8.5	-	-	173.7	38.8	10.6
HCM Lane LOS	E	D	B	A	-	-	A	-	-	F	E	B
HCM 95th %tile Q(veh)	0.4	0.3	1	0.1	-	-	0.4	-	-	6.7	0.9	0.4

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Intersection Delay, s/veh	193.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↑	↱
Traffic Vol, veh/h	19	401	205	89	362	6	170	7	91	14	13	32
Future Vol, veh/h	19	401	205	89	362	6	170	7	91	14	13	32
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	535	273	119	483	8	227	9	121	19	17	43
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	3	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	3	2	2
HCM Control Delay	363.3	84.3	23.1	15.2
HCM LOS	F	F	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	7%	0%	66%	0%	98%	0%	100%	0%
Vol Right, %	0%	93%	0%	34%	0%	2%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	170	98	19	606	89	368	14	13	32
LT Vol	170	0	19	0	89	0	14	0	0
Through Vol	0	7	0	401	0	362	0	13	0
RT Vol	0	91	0	205	0	6	0	0	32
Lane Flow Rate	227	131	25	808	119	491	19	17	43
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.579	0.292	0.061	1.768	0.279	1.083	0.054	0.047	0.108
Departure Headway (Hd)	10.74	9.528	8.916	8.161	9.863	9.333	12.303	11.77	11.024
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	338	380	404	452	367	393	293	306	327
Service Time	8.44	7.228	6.616	5.861	7.563	7.033	10.003	9.47	8.724
HCM Lane V/C Ratio	0.672	0.345	0.062	1.788	0.324	1.249	0.065	0.056	0.131
HCM Control Delay	27.2	16.1	12.2	374.3	16.3	100.7	15.7	15	15.1
HCM Lane LOS	D	C	B	F	C	F	C	B	C
HCM 95th-tile Q	3.5	1.2	0.2	48.4	1.1	14.7	0.2	0.1	0.4

Intersection	
Intersection Delay, s/veh	178.2
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	31	236	270	126	242	49	116	59	32	52	209	52
Future Vol, veh/h	31	236	270	126	242	49	116	59	32	52	209	52
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	299	342	159	306	62	147	75	41	66	265	66
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	297.9	171.8	38.1	74.1
HCM LOS	F	F	E	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	56%	6%	30%	17%
Vol Thru, %	29%	44%	58%	67%
Vol Right, %	15%	50%	12%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	207	537	417	313
LT Vol	116	31	126	52
Through Vol	59	236	242	209
RT Vol	32	270	49	52
Lane Flow Rate	262	680	528	396
Geometry Grp	1	1	1	1
Degree of Util (X)	0.692	1.584	1.271	0.961
Departure Headway (Hd)	12.009	9.197	10.175	10.842
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	304	401	364	337
Service Time	10.009	7.197	8.175	8.842
HCM Lane V/C Ratio	0.862	1.696	1.451	1.175
HCM Control Delay	38.1	297.9	171.8	74.1
HCM Lane LOS	E	F	F	F
HCM 95th-tile Q	4.8	35.2	20.3	10.2

5: E INTERNATIONAL AVE & N CHESTNUT AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	330	705	46	346	582	166	7	395	266	115	175	111
v/c Ratio	0.84	0.83	0.10	0.85	0.67	0.34	0.07	0.84	0.56	0.68	0.13	0.17
Control Delay	62.2	50.4	0.5	63.0	43.1	10.1	58.0	57.1	25.2	72.7	25.8	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.2	50.4	0.5	63.0	43.1	10.1	58.0	57.1	25.2	72.7	25.8	6.3
Queue Length 50th (ft)	241	274	0	252	214	11	5	284	94	87	44	0
Queue Length 95th (ft)	235	222	0	247	182	13	15	264	88	107	57	7
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	484	952	482	484	959	518	123	559	538	188	1374	672
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.74	0.10	0.71	0.61	0.32	0.06	0.71	0.49	0.61	0.13	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	201	430	28	211	355	101	4	241	162	70	107	68
Future Volume (veh/h)	201	430	28	211	355	101	4	241	162	70	107	68
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	330	705	46	346	582	166	7	395	266	115	175	111
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	367	893	384	383	924	398	16	500	408	143	1203	534
Arrive On Green	0.21	0.25	0.25	0.21	0.26	0.26	0.01	0.27	0.27	0.08	0.34	0.34
Sat Flow, veh/h	1781	3554	1528	1781	3554	1530	1781	1870	1526	1781	3554	1578
Grp Volume(v), veh/h	330	705	46	346	582	166	7	395	266	115	175	111
Grp Sat Flow(s),veh/h/ln	1781	1777	1528	1781	1777	1530	1781	1870	1526	1781	1777	1578
Q Serve(g_s), s	18.8	19.3	2.4	19.7	15.1	9.4	0.4	20.4	16.1	6.6	3.6	5.2
Cycle Q Clear(g_c), s	18.8	19.3	2.4	19.7	15.1	9.4	0.4	20.4	16.1	6.6	3.6	5.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	367	893	384	383	924	398	16	500	408	143	1203	534
V/C Ratio(X)	0.90	0.79	0.12	0.90	0.63	0.42	0.45	0.79	0.65	0.80	0.15	0.21
Avail Cap(c_a), veh/h	505	950	408	505	950	409	128	572	467	197	1223	543
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.2	36.4	30.1	39.8	34.1	31.9	51.3	35.4	33.8	47.0	23.9	24.5
Incr Delay (d2), s/veh	15.0	4.3	0.1	16.3	1.3	0.7	18.6	6.6	2.7	15.3	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.5	8.6	0.9	10.0	6.4	3.4	0.3	10.0	6.0	3.5	1.5	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.2	40.7	30.2	56.1	35.3	32.6	69.9	42.0	36.5	62.3	24.0	24.7
LnGrp LOS	E	D	C	E	D	C	E	D	D	E	C	C
Approach Vol, veh/h		1081			1094			668			401	
Approach Delay, s/veh		44.7			41.5			40.1			35.2	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.9	33.0	26.8	31.3	5.4	40.4	25.9	32.2
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	8.6	22.4	21.7	21.3	2.4	7.2	20.8	17.1
Green Ext Time (p_c), s	0.1	2.4	0.7	2.5	0.0	1.4	0.7	3.2

Intersection Summary	
HCM 6th Ctrl Delay	41.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

6: N CHESTNUT AVE & E BEHYMER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	325	51	111	220	86	67	262	178	68	268	182
v/c Ratio	0.44	0.39	0.11	0.37	0.30	0.19	0.26	0.50	0.31	0.26	0.51	0.31
Control Delay	34.1	25.7	0.5	37.2	28.6	0.9	38.4	27.8	6.3	37.4	27.3	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.1	25.7	0.5	37.2	28.6	0.9	38.4	27.8	6.3	37.4	27.3	6.0
Queue Length 50th (ft)	56	58	0	38	40	0	23	88	0	24	90	0
Queue Length 95th (ft)	151	116	0	117	90	0	80	199	27	80	197	26
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	801	1636	793	516	1067	592	409	1103	1010	480	1149	1046
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.20	0.06	0.22	0.21	0.15	0.16	0.24	0.18	0.14	0.23	0.17

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	124	247	39	84	167	65	51	199	135	52	204	138
Future Volume (veh/h)	124	247	39	84	167	65	51	199	135	52	204	138
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	163	325	51	111	220	86	67	262	178	68	268	182
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	219	622	277	154	492	220	115	425	361	116	427	362
Arrive On Green	0.12	0.18	0.18	0.09	0.14	0.14	0.06	0.23	0.23	0.07	0.23	0.23
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	163	325	51	111	220	86	67	262	178	68	268	182
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	3.7	3.5	1.2	2.5	2.4	2.1	1.5	5.3	4.1	1.6	5.4	4.2
Cycle Q Clear(g_c), s	3.7	3.5	1.2	2.5	2.4	2.1	1.5	5.3	4.1	1.6	5.4	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	219	622	277	154	492	220	115	425	361	116	427	362
V/C Ratio(X)	0.74	0.52	0.18	0.72	0.45	0.39	0.58	0.62	0.49	0.59	0.63	0.50
Avail Cap(c_a), veh/h	955	1847	824	616	1169	521	488	1405	1190	573	1494	1266
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.8	15.7	14.7	18.7	16.6	16.5	19.1	14.6	14.1	19.1	14.6	14.1
Incr Delay (d2), s/veh	4.9	0.7	0.3	6.2	0.6	1.1	4.6	1.5	1.0	4.6	1.5	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.2	0.4	1.1	0.8	0.7	0.7	2.0	1.2	0.7	2.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.7	16.4	15.1	24.9	17.2	17.6	23.7	16.0	15.1	23.7	16.1	15.2
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		539			417			507			518	
Approach Delay, s/veh		18.2			19.3			16.7			16.8	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.2	14.0	8.1	12.5	7.2	14.1	9.7	11.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	3.6	7.3	4.5	5.5	3.5	7.4	5.7	4.4
Green Ext Time (p_c), s	0.1	2.1	0.2	1.9	0.1	2.2	0.4	1.0

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	↖↗	
Traffic Vol, veh/h	502	5	5	437	17	16
Future Vol, veh/h	502	5	5	437	17	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	92	92	79	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	669	5	5	553	18	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	674	0	1235	672
Stage 1	-	-	-	-	672	-
Stage 2	-	-	-	-	563	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	917	-	195	456
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	570	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	917	-	193	456
Mov Cap-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	508	-
Stage 2	-	-	-	-	565	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	20.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	268	-	-	917	-
HCM Lane V/C Ratio	0.134	-	-	0.006	-
HCM Control Delay (s)	20.5	-	-	8.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

8: PROJECT ACCESS EAST & E COPPER AVE

Intersection	
Int Delay, s/veh	2.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Traffic Vol, veh/h	501	17	17	392	50	50
Future Vol, veh/h	501	17	17	392	50	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	545	18	18	426	54	54

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	563	0	1016	554
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	462	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1008	-	264	532
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	634	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1008	-	258	532
Mov Cap-2 Maneuver	-	-	-	-	258	-
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	619	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	20
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	347	-	-	1008	-
HCM Lane V/C Ratio	0.313	-	-	0.018	-
HCM Control Delay (s)	20	-	-	8.6	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.3	-	-	0.1	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	34	356	20	142	539	42	15	13	209	111	35	82
v/c Ratio	0.17	0.43	0.04	0.60	0.40	0.06	0.08	0.04	0.48	0.47	0.05	0.13
Control Delay	33.1	21.6	0.2	42.6	17.4	0.2	33.3	21.8	7.8	38.2	16.6	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	21.6	0.2	42.6	17.4	0.2	33.3	21.8	7.8	38.2	16.6	2.1
Queue Length 50th (ft)	9	48	0	39	50	0	4	3	0	30	6	0
Queue Length 95th (ft)	51	124	0	#216	188	0	29	18	45	#163	36	12
Internal Link Dist (ft)		1334			1174			566			314	
Turn Bay Length (ft)	240		210	265		260	330		150	175		100
Base Capacity (vph)	238	2030	957	238	2030	957	238	1145	1053	238	1145	1020
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.18	0.02	0.60	0.27	0.04	0.06	0.01	0.20	0.47	0.03	0.08

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
2: MILLBROOK AVE & E COPPER AVE

AM EPAP PLUS PROJECT
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	30	313	18	125	474	37	13	11	184	98	31	72
Future Volume (veh/h)	30	313	18	125	474	37	13	11	184	98	31	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	34	356	20	142	539	42	15	12	209	111	35	82
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	69	686	306	183	913	407	34	345	292	152	469	397
Arrive On Green	0.04	0.19	0.19	0.10	0.26	0.26	0.02	0.18	0.18	0.09	0.25	0.25
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	34	356	20	142	539	42	15	12	209	111	35	82
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.8	3.9	0.4	3.3	5.7	0.9	0.4	0.2	5.3	2.6	0.6	1.8
Cycle Q Clear(g_c), s	0.8	3.9	0.4	3.3	5.7	0.9	0.4	0.2	5.3	2.6	0.6	1.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	69	686	306	183	913	407	34	345	292	152	469	397
V/C Ratio(X)	0.49	0.52	0.07	0.78	0.59	0.10	0.44	0.03	0.72	0.73	0.07	0.21
Avail Cap(c_a), veh/h	310	2643	1179	310	2643	1179	310	1491	1264	310	1491	1264
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.3	15.6	14.2	18.8	14.0	12.2	20.9	14.4	16.5	19.2	12.3	12.7
Incr Delay (d2), s/veh	5.3	0.6	0.1	6.9	0.6	0.1	8.7	0.0	3.3	6.6	0.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	1.2	0.1	1.4	1.7	0.2	0.2	0.1	1.7	1.2	0.2	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.6	16.2	14.3	25.7	14.6	12.3	29.6	14.4	19.8	25.8	12.4	13.0
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		410			723			236			228	
Approach Delay, s/veh		16.9			16.7			20.1			19.1	
Approach LOS		B			B			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	12.4	8.9	13.5	5.3	15.3	6.2	16.3
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	34.3	7.5	32.0	7.5	34.3	7.5	32.0
Max Q Clear Time (g_c+I1), s	4.6	7.3	5.3	5.9	2.4	3.8	2.8	7.7
Green Ext Time (p_c), s	0.1	0.7	0.1	2.1	0.0	0.4	0.0	3.3

Intersection Summary			
HCM 6th Ctrl Delay			17.6
HCM 6th LOS			B

Queues
3: N CHESTNUT AVE & E COPPER AVE

	↗	→	↘	↙	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	25	535	273	119	483	8	227	130	19	17	43
v/c Ratio	0.16	0.75	0.35	0.54	0.50	0.01	0.64	0.26	0.13	0.08	0.14
Control Delay	49.6	31.3	4.1	52.8	19.6	0.0	45.5	8.6	49.7	39.9	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.6	31.3	4.1	52.8	19.6	0.0	45.5	8.6	49.7	39.9	0.9
Queue Length 50th (ft)	12	235	0	58	140	0	106	3	9	8	0
Queue Length 95th (ft)	43	383	19	#172	329	0	#244	31	36	27	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	180	1422	1273	228	1457	1267	469	661	180	363	423
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.38	0.21	0.52	0.33	0.01	0.48	0.20	0.11	0.05	0.10

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↑	↱
Traffic Volume (veh/h)	19	401	205	89	362	6	170	7	91	14	13	32
Future Volume (veh/h)	19	401	205	89	362	6	170	7	91	14	13	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	25	535	273	119	483	8	227	9	121	19	17	43
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	51	675	572	154	783	664	285	24	325	40	151	128
Arrive On Green	0.03	0.36	0.36	0.09	0.42	0.42	0.16	0.22	0.22	0.02	0.08	0.08
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	111	1491	1781	1870	1585
Grp Volume(v), veh/h	25	535	273	119	483	8	227	0	130	19	17	43
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1602	1781	1870	1585
Q Serve(g_s), s	0.8	15.3	8.0	3.9	12.1	0.2	7.4	0.0	4.1	0.6	0.5	1.5
Cycle Q Clear(g_c), s	0.8	15.3	8.0	3.9	12.1	0.2	7.4	0.0	4.1	0.6	0.5	1.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.93	1.00		1.00
Lane Grp Cap(c), veh/h	51	675	572	154	783	664	285	0	349	40	151	128
V/C Ratio(X)	0.49	0.79	0.48	0.77	0.62	0.01	0.80	0.00	0.37	0.47	0.11	0.34
Avail Cap(c_a), veh/h	223	1867	1582	282	1929	1635	580	0	655	223	390	331
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.7	17.1	14.8	26.8	13.6	10.2	24.2	0.0	19.9	28.9	25.5	26.0
Incr Delay (d2), s/veh	7.3	2.2	0.6	8.0	0.8	0.0	5.1	0.0	0.7	8.3	0.3	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.5	2.4	1.8	4.0	0.0	3.2	0.0	1.5	0.3	0.2	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.0	19.3	15.4	34.8	14.4	10.2	29.3	0.0	20.6	37.2	25.9	27.5
LnGrp LOS	D	B	B	C	B	B	C	A	C	D	C	C
Approach Vol, veh/h		833			610			357			79	
Approach Delay, s/veh		18.5			18.4			26.2			29.5	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.9	17.6	9.7	26.8	14.1	9.3	6.2	30.3
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.6	6.1	5.9	17.3	9.4	3.5	2.8	14.1
Green Ext Time (p_c), s	0.0	0.6	0.1	4.3	0.4	0.1	0.0	2.9

Intersection Summary	
HCM 6th Ctrl Delay	20.4
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

4: N WILLOW AVE & COPPER AVE

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	641	159	368	147	116	66	331
v/c Ratio	0.29	1.09	0.70	0.47	0.67	0.22	0.41	0.79
Control Delay	52.8	95.6	61.6	27.0	60.0	25.5	53.7	49.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	95.6	61.6	27.0	60.0	25.5	53.7	49.7
Queue Length 50th (ft)	25	~476	102	184	94	49	42	203
Queue Length 95th (ft)	55	#636	162	276	151	84	78	255
Internal Link Dist (ft)		1168		2435		1529		9418
Turn Bay Length (ft)	300		300		300		300	
Base Capacity (vph)	219	590	255	776	255	519	519	703
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	1.09	0.62	0.47	0.58	0.22	0.13	0.47

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

	↰	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	31	236	270	126	242	49	116	59	32	52	209	52
Future Volume (veh/h)	31	236	270	126	242	49	116	59	32	52	209	52
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	39	299	342	159	306	62	147	75	41	66	265	66
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	61	287	328	194	656	133	181	306	167	87	312	78
Arrive On Green	0.03	0.36	0.36	0.11	0.43	0.43	0.10	0.27	0.27	0.05	0.22	0.22
Sat Flow, veh/h	1781	796	910	1781	1509	306	1781	1137	622	1781	1446	360
Grp Volume(v), veh/h	39	0	641	159	0	368	147	0	116	66	0	331
Grp Sat Flow(s),veh/h/ln	1781	0	1706	1781	0	1815	1781	0	1758	1781	0	1806
Q Serve(g_s), s	2.0	0.0	32.8	8.0	0.0	13.1	7.4	0.0	4.7	3.3	0.0	16.0
Cycle Q Clear(g_c), s	2.0	0.0	32.8	8.0	0.0	13.1	7.4	0.0	4.7	3.3	0.0	16.0
Prop In Lane	1.00		0.53	1.00		0.17	1.00		0.35	1.00		0.20
Lane Grp Cap(c), veh/h	61	0	615	194	0	789	181	0	473	87	0	390
V/C Ratio(X)	0.64	0.00	1.04	0.82	0.00	0.47	0.81	0.00	0.25	0.76	0.00	0.85
Avail Cap(c_a), veh/h	244	0	615	284	0	789	284	0	473	577	0	769
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.4	0.0	29.1	39.7	0.0	18.3	40.0	0.0	26.0	42.8	0.0	34.3
Incr Delay (d2), s/veh	10.4	0.0	48.0	11.5	0.0	0.4	9.4	0.0	0.3	12.8	0.0	5.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	20.1	3.9	0.0	4.9	3.5	0.0	1.9	1.7	0.0	7.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.8	0.0	77.1	51.2	0.0	18.7	49.4	0.0	26.3	55.6	0.0	39.4
LnGrp LOS	D	A	F	D	A	B	D	A	C	E	A	D
Approach Vol, veh/h		680			527			263			397	
Approach Delay, s/veh		75.8			28.5			39.2			42.1	
Approach LOS		E			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	29.7	14.4	38.0	13.8	24.9	7.6	44.8
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	5.3	6.7	10.0	34.8	9.4	18.0	4.0	15.1
Green Ext Time (p_c), s	0.1	0.4	0.1	0.0	0.1	1.7	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	50.1
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			↰	↱	↰	↑↱		↰	↑↱	
Traffic Vol, veh/h	1	1	2	21	0	196	3	294	57	158	214	0
Future Vol, veh/h	1	1	2	21	0	196	3	294	57	158	214	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	600	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1	2	23	0	211	3	316	61	170	230	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	734	953	115	809	923	-	230	0	0	377	0	0
Stage 1	570	570	-	353	353	-	-	-	-	-	-	-
Stage 2	164	383	-	456	570	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	308	258	916	272	268	0	1335	-	-	1178	-	-
Stage 1	474	504	-	637	629	0	-	-	-	-	-	-
Stage 2	822	610	-	554	504	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	274	220	916	240	229	-	1335	-	-	1178	-	-
Mov Cap-2 Maneuver	274	220	-	240	229	-	-	-	-	-	-	-
Stage 1	473	431	-	636	628	-	-	-	-	-	-	-
Stage 2	820	609	-	472	431	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.5	21.6	0.1	3.6
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1335	-	-	385	240	-	1178	-	-
HCM Lane V/C Ratio	0.002	-	-	0.011	0.094	-	0.144	-	-
HCM Control Delay (s)	7.7	-	-	14.5	21.6	0	8.6	-	-
HCM Lane LOS	A	-	-	B	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	-	0.5	-	-

Intersection	
Int Delay, s/veh	12.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	80	641	20	87	312	95	21	41	185	60	15	38
Future Vol, veh/h	80	641	20	87	312	95	21	41	185	60	15	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	86	689	22	94	335	102	23	44	199	65	16	41

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	437	0	0	711	0	0	1225	1486	345	1062	1406	168
Stage 1	-	-	-	-	-	-	861	861	-	523	523	-
Stage 2	-	-	-	-	-	-	364	625	-	539	883	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1119	-	-	884	-	-	135	123	651	178	138	847
Stage 1	-	-	-	-	-	-	317	371	-	505	529	-
Stage 2	-	-	-	-	-	-	627	475	-	494	362	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1119	-	-	884	-	-	99	101	651	71	114	847
Mov Cap-2 Maneuver	-	-	-	-	-	-	99	101	-	71	114	-
Stage 1	-	-	-	-	-	-	293	342	-	466	473	-
Stage 2	-	-	-	-	-	-	515	425	-	276	334	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	1.7	25	104.6
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	99	101	651	1119	-	-	884	-	-	71	114	847
HCM Lane V/C Ratio	0.228	0.436	0.306	0.077	-	-	0.106	-	-	0.909	0.141	0.048
HCM Control Delay (s)	51.8	65.8	12.9	8.5	-	-	9.6	-	-	180.6	41.7	9.5
HCM Lane LOS	F	F	B	A	-	-	A	-	-	F	E	A
HCM 95th %tile Q(veh)	0.8	1.8	1.3	0.2	-	-	0.4	-	-	4.5	0.5	0.2

Intersection	
Intersection Delay, s/veh	95.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↑	↱
Traffic Vol, veh/h	42	471	122	17	411	14	107	9	79	9	5	15
Future Vol, veh/h	42	471	122	17	411	14	107	9	79	9	5	15
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	529	137	19	462	16	120	10	89	10	6	17
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	3	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	3	2	2
HCM Control Delay	152.5	54.9	14.5	12.5
HCM LOS	F	F	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	10%	0%	79%	0%	97%	0%	100%	0%
Vol Right, %	0%	90%	0%	21%	0%	3%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	107	88	42	593	17	425	9	5	15
LT Vol	107	0	42	0	17	0	9	0	0
Through Vol	0	9	0	471	0	411	0	5	0
RT Vol	0	79	0	122	0	14	0	0	15
Lane Flow Rate	120	99	47	666	19	478	10	6	17
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.29	0.208	0.099	1.281	0.041	0.946	0.027	0.014	0.039
Departure Headway (Hd)	9.361	8.188	7.573	6.92	8.19	7.656	10.233	9.709	8.977
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	386	441	471	526	440	478	352	371	401
Service Time	7.061	5.888	5.346	4.692	5.89	5.356	7.933	7.409	6.677
HCM Lane V/C Ratio	0.311	0.224	0.1	1.266	0.043	1	0.028	0.016	0.042
HCM Control Delay	15.8	13	11.2	162.5	11.2	56.6	13.2	12.5	12
HCM Lane LOS	C	B	B	F	B	F	B	B	B
HCM 95th-tile Q	1.2	0.8	0.3	27.2	0.1	11.4	0.1	0	0.1

Intersection	
Intersection Delay, s/veh	114.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	55	254	184	81	217	65	225	175	68	69	142	32
Future Vol, veh/h	55	254	184	81	217	65	225	175	68	69	142	32
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	59	273	198	87	233	70	242	188	73	74	153	34
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	159.3	66.7	147.3	34.4
HCM LOS	F	F	F	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	48%	11%	22%	28%
Vol Thru, %	37%	52%	60%	58%
Vol Right, %	15%	37%	18%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	468	493	363	243
LT Vol	225	55	81	69
Through Vol	175	254	217	142
RT Vol	68	184	65	32
Lane Flow Rate	503	530	390	261
Geometry Grp	1	1	1	1
Degree of Util (X)	1.215	1.249	0.942	0.682
Departure Headway (Hd)	9.414	9.182	10.08	10.935
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	387	398	363	332
Service Time	7.414	7.182	8.08	8.935
HCM Lane V/C Ratio	1.3	1.332	1.074	0.786
HCM Control Delay	147.3	159.3	66.7	34.4
HCM Lane LOS	F	F	F	D
HCM 95th-tile Q	19.3	21	10	4.7

5: E INTERNATIONAL AVE & N CHESTNUT AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	84	189	26	113	215	73	25	150	69	84	163	143
v/c Ratio	0.29	0.26	0.07	0.35	0.28	0.18	0.11	0.36	0.16	0.30	0.14	0.23
Control Delay	34.7	25.5	0.3	33.9	24.3	3.8	38.3	27.6	3.2	36.3	19.1	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	25.5	0.3	33.9	24.3	3.8	38.3	27.6	3.2	36.3	19.1	5.9
Queue Length 50th (ft)	25	30	0	34	33	0	8	45	0	26	16	0
Queue Length 95th (ft)	109	84	0	135	91	16	47	141	14	113	71	42
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	1002	1971	889	1002	1987	896	278	1117	948	427	2299	1061
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.10	0.03	0.11	0.11	0.08	0.09	0.13	0.07	0.20	0.07	0.13

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	74	166	23	99	189	64	22	132	61	74	143	126
Future Volume (veh/h)	74	166	23	99	189	64	22	132	61	74	143	126
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	1.00		0.96	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	189	26	112	215	73	25	150	69	84	162	143
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	118	896	385	150	960	414	52	448	364	118	984	436
Arrive On Green	0.07	0.25	0.25	0.08	0.27	0.27	0.03	0.24	0.24	0.07	0.28	0.28
Sat Flow, veh/h	1781	3554	1528	1781	3554	1532	1781	1870	1520	1781	3554	1576
Grp Volume(v), veh/h	84	189	26	112	215	73	25	150	69	84	162	143
Grp Sat Flow(s),veh/h/ln	1781	1777	1528	1781	1777	1532	1781	1870	1520	1781	1777	1576
Q Serve(g_s), s	2.5	2.3	0.7	3.3	2.5	2.0	0.7	3.6	2.0	2.5	1.9	3.9
Cycle Q Clear(g_c), s	2.5	2.3	0.7	3.3	2.5	2.0	0.7	3.6	2.0	2.5	1.9	3.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	118	896	385	150	960	414	52	448	364	118	984	436
V/C Ratio(X)	0.71	0.21	0.07	0.75	0.22	0.18	0.49	0.33	0.19	0.71	0.16	0.33
Avail Cap(c_a), veh/h	970	1823	784	970	1823	786	247	1098	892	378	2348	1041
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.8	16.0	15.4	24.3	15.4	15.2	25.9	17.0	16.4	24.8	14.8	15.6
Incr Delay (d2), s/veh	7.7	0.1	0.1	7.2	0.1	0.2	6.9	0.4	0.2	7.7	0.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.8	0.2	1.6	0.9	0.6	0.4	1.4	0.6	1.2	0.7	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.5	16.1	15.5	31.5	15.5	15.4	32.8	17.5	16.7	32.5	14.9	16.0
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		299			400			244			389	
Approach Delay, s/veh		20.7			19.9			18.8			19.1	
Approach LOS		C			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.1	18.2	9.1	18.9	6.1	20.2	8.1	19.8
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	4.5	5.6	5.3	4.3	2.7	5.9	4.5	4.5
Green Ext Time (p_c), s	0.1	1.0	0.3	1.1	0.0	1.5	0.2	1.5

Intersection Summary			
HCM 6th Ctrl Delay			19.7
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
6: N CHESTNUT AVE & E BEHYMER AVE

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	77	188	16	43	270	61	34	155	88	77	148	95
v/c Ratio	0.20	0.16	0.03	0.12	0.27	0.11	0.10	0.28	0.15	0.20	0.22	0.14
Control Delay	31.0	19.5	0.1	33.2	22.7	0.4	34.0	22.9	0.5	31.2	19.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	19.5	0.1	33.2	22.7	0.4	34.0	22.9	0.5	31.2	19.0	0.4
Queue Length 50th (ft)	23	19	0	13	41	0	10	45	0	23	29	0
Queue Length 95th (ft)	97	83	0	65	119	0	55	134	0	98	122	0
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	1000	2025	955	770	1591	802	638	1276	1138	741	1314	1166
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.09	0.02	0.06	0.17	0.08	0.05	0.12	0.08	0.10	0.11	0.08

Intersection Summary

6: N CHESTNUT AVE & E BEHYMER AVE

06/03/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	72	175	15	40	251	57	32	144	82	72	138	88
Future Volume (veh/h)	72	175	15	40	251	57	32	144	82	72	138	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	77	188	16	43	270	61	34	155	88	77	148	95
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	657	293	87	563	251	72	304	257	134	369	313
Arrive On Green	0.08	0.18	0.18	0.05	0.16	0.16	0.04	0.16	0.16	0.08	0.20	0.20
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	77	188	16	43	270	61	34	155	88	77	148	95
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	1.5	1.6	0.3	0.8	2.4	1.2	0.7	2.7	1.7	1.5	2.4	1.8
Cycle Q Clear(g_c), s	1.5	1.6	0.3	0.8	2.4	1.2	0.7	2.7	1.7	1.5	2.4	1.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	134	657	293	87	563	251	72	304	257	134	369	313
V/C Ratio(X)	0.58	0.29	0.05	0.50	0.48	0.24	0.48	0.51	0.34	0.58	0.40	0.30
Avail Cap(c_a), veh/h	1134	2192	978	731	1387	619	580	1667	1412	680	1773	1502
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.8	12.4	11.9	16.4	13.5	13.0	16.6	13.5	13.1	15.8	12.4	12.1
Incr Delay (d2), s/veh	3.9	0.2	0.1	4.3	0.6	0.5	4.8	1.3	0.8	3.9	0.7	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.5	0.1	0.4	0.8	0.3	0.3	1.0	0.5	0.6	0.8	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.7	12.6	11.9	20.7	14.2	13.5	21.4	14.8	13.9	19.7	13.1	12.7
LnGrp LOS	B	B	B	C	B	B	C	B	B	B	B	B
Approach Vol, veh/h		281			374			277			320	
Approach Delay, s/veh		14.5			14.8			15.4			14.5	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.2	10.2	6.2	11.7	5.9	11.5	7.2	10.8
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	3.5	4.7	2.8	3.6	2.7	4.4	3.5	4.4
Green Ext Time (p_c), s	0.1	1.1	0.0	1.0	0.0	1.1	0.1	1.2

Intersection Summary			
HCM 6th Ctrl Delay			14.8
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	↰↱	
Traffic Vol, veh/h	505	19	18	435	11	11
Future Vol, veh/h	505	19	18	435	11	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	549	21	20	473	12	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	570	0	1073	560
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	513	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1002	-	244	528
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	601	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1002	-	237	528
Mov Cap-2 Maneuver	-	-	-	-	237	-
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	585	-

Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		16.9	
HCM LOS					C	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	327	-	-	1002	-
HCM Lane V/C Ratio	0.073	-	-	0.02	-
HCM Control Delay (s)	16.9	-	-	8.7	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

8: PROJECT ACCESS EAST & E COPPER AVE

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Traffic Vol, veh/h	459	57	55	419	34	32
Future Vol, veh/h	459	57	55	419	34	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	499	62	60	455	37	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	561	0	1105	530
Stage 1	-	-	-	-	530	-
Stage 2	-	-	-	-	575	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1010	-	233	549
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	563	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1010	-	214	549
Mov Cap-2 Maneuver	-	-	-	-	214	-
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	518	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	20.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	304	-	-	1010	-
HCM Lane V/C Ratio	0.236	-	-	0.059	-
HCM Control Delay (s)	20.5	-	-	8.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.2	-

Queues
2: MILLBROOK AVE & E COPPER AVE

PM EPAP PLUS PROJECT
W IMPROVEMENTS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	91	657	23	95	324	108	24	47	206	68	17	43
v/c Ratio	0.34	0.56	0.04	0.35	0.28	0.18	0.10	0.13	0.44	0.27	0.03	0.08
Control Delay	35.9	20.6	0.1	36.2	18.0	5.2	34.4	23.5	7.2	34.6	17.9	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	20.6	0.1	36.2	18.0	5.2	34.4	23.5	7.2	34.6	17.9	0.3
Queue Length 50th (ft)	29	102	0	30	45	0	8	15	0	21	4	0
Queue Length 95th (ft)	#128	233	0	#135	114	32	39	44	44	85	22	0
Internal Link Dist (ft)		1334			1174			566			314	
Turn Bay Length (ft)	240		210	265		260	330		150	175		100
Base Capacity (vph)	285	2237	1043	285	2237	1043	285	1236	1119	285	1236	1091
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.29	0.02	0.33	0.14	0.10	0.08	0.04	0.18	0.24	0.01	0.04

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	80	578	20	84	285	95	21	41	181	60	15	38
Future Volume (veh/h)	80	578	20	84	285	95	21	41	181	60	15	38
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	91	657	23	95	324	108	24	47	206	68	17	43
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	131	1024	457	134	1030	459	51	338	287	111	401	340
Arrive On Green	0.07	0.29	0.29	0.08	0.29	0.29	0.03	0.18	0.18	0.06	0.21	0.21
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	91	657	23	95	324	108	24	47	206	68	17	43
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	2.4	7.7	0.5	2.5	3.4	2.5	0.6	1.0	5.8	1.8	0.3	1.0
Cycle Q Clear(g_c), s	2.4	7.7	0.5	2.5	3.4	2.5	0.6	1.0	5.8	1.8	0.3	1.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	131	1024	457	134	1030	459	51	338	287	111	401	340
V/C Ratio(X)	0.69	0.64	0.05	0.71	0.31	0.24	0.47	0.14	0.72	0.61	0.04	0.13
Avail Cap(c_a), veh/h	281	2392	1067	281	2392	1067	281	1349	1144	281	1349	1144
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.5	14.8	12.2	21.5	13.2	12.9	22.7	16.4	18.3	21.7	14.8	15.1
Incr Delay (d2), s/veh	6.4	0.7	0.0	6.7	0.2	0.3	6.6	0.2	3.4	5.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	2.4	0.1	1.1	1.0	0.7	0.3	0.4	1.9	0.8	0.1	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.9	15.4	12.3	28.2	13.4	13.1	29.4	16.5	21.7	27.1	14.8	15.2
LnGrp LOS	C	B	B	C	B	B	C	B	C	C	B	B
Approach Vol, veh/h		771			527			277			128	
Approach Delay, s/veh		16.8			16.0			21.5			21.5	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.5	13.1	8.1	18.9	5.9	14.7	8.0	19.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	34.3	7.5	32.0	7.5	34.3	7.5	32.0
Max Q Clear Time (g_c+I1), s	3.8	7.8	4.5	9.7	2.6	3.0	4.4	5.4
Green Ext Time (p_c), s	0.0	0.9	0.0	4.0	0.0	0.2	0.0	2.2

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

3: N CHESTNUT AVE & E COPPER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	38	529	137	19	462	16	120	99	10	6	17
v/c Ratio	0.12	0.49	0.14	0.06	0.45	0.02	0.28	0.18	0.03	0.02	0.04
Control Delay	39.0	16.2	3.9	40.0	17.5	0.0	32.2	8.2	41.3	32.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.0	16.2	3.9	40.0	17.5	0.0	32.2	8.2	41.3	32.2	0.2
Queue Length 50th (ft)	8	69	0	4	58	0	22	2	2	1	0
Queue Length 95th (ft)	68	477	38	41	394	0	155	46	28	16	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	379	1613	1389	480	1630	1402	898	1018	379	713	694
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.33	0.10	0.04	0.28	0.01	0.13	0.10	0.03	0.01	0.02

Intersection Summary

HCM 6th Signalized Intersection Summary
3: N CHESTNUT AVE & E COPPER AVE

PM EPAP PLUS PROJECT
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↑	↱
Traffic Volume (veh/h)	34	471	122	17	411	14	107	9	79	9	5	15
Future Volume (veh/h)	34	471	122	17	411	14	107	9	79	9	5	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	529	137	19	462	16	120	10	89	10	6	17
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	75	701	594	42	666	565	160	27	242	23	169	143
Arrive On Green	0.04	0.37	0.37	0.02	0.36	0.36	0.09	0.17	0.17	0.01	0.09	0.09
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	163	1447	1781	1870	1585
Grp Volume(v), veh/h	38	529	137	19	462	16	120	0	99	10	6	17
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1610	1781	1870	1585
Q Serve(g_s), s	0.9	10.9	2.6	0.5	9.4	0.3	2.9	0.0	2.4	0.2	0.1	0.4
Cycle Q Clear(g_c), s	0.9	10.9	2.6	0.5	9.4	0.3	2.9	0.0	2.4	0.2	0.1	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.90	1.00		1.00
Lane Grp Cap(c), veh/h	75	701	594	42	666	565	160	0	269	23	169	143
V/C Ratio(X)	0.51	0.75	0.23	0.45	0.69	0.03	0.75	0.00	0.37	0.43	0.04	0.12
Avail Cap(c_a), veh/h	301	2520	2136	381	2605	2207	783	0	889	301	527	446
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.8	12.1	9.5	21.4	12.2	9.3	19.7	0.0	16.4	21.7	18.4	18.6
Incr Delay (d2), s/veh	5.2	1.7	0.2	7.5	1.3	0.0	6.9	0.0	0.8	12.0	0.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	3.2	0.6	0.2	2.8	0.1	1.4	0.0	0.8	0.2	0.1	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.0	13.8	9.7	28.9	13.5	9.3	26.7	0.0	17.2	33.8	18.5	18.9
LnGrp LOS	C	B	A	C	B	A	C	A	B	C	B	B
Approach Vol, veh/h		704			497			219			33	
Approach Delay, s/veh		13.6			14.0			22.4			23.3	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.1	11.9	5.5	21.8	8.5	8.5	6.4	21.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.2	4.4	2.5	12.9	4.9	2.4	2.9	11.4
Green Ext Time (p_c), s	0.0	0.4	0.0	3.7	0.2	0.0	0.0	2.8

Intersection Summary	
HCM 6th Ctrl Delay	15.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
4: N WILLOW AVE & COPPER AVE

	↗	→	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	59	471	87	303	242	261	74	187
v/c Ratio	0.34	0.77	0.43	0.47	0.78	0.52	0.39	0.59
Control Delay	45.8	35.5	46.0	25.1	56.9	34.3	45.8	41.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.8	35.5	46.0	25.1	56.9	34.3	45.8	41.1
Queue Length 50th (ft)	32	216	47	122	137	130	40	96
Queue Length 95th (ft)	77	#440	102	235	#320	232	90	170
Internal Link Dist (ft)		1168		2435		1529		9418
Turn Bay Length (ft)	300		300		300		300	
Base Capacity (vph)	269	714	312	768	312	551	635	860
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.66	0.28	0.39	0.78	0.47	0.12	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	55	254	184	81	217	65	225	175	68	69	142	32
Future Volume (veh/h)	55	254	184	81	217	65	225	175	68	69	142	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	59	273	198	87	233	70	242	188	73	74	153	34
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	91	323	235	114	461	138	293	323	125	102	214	48
Arrive On Green	0.05	0.32	0.32	0.06	0.33	0.33	0.16	0.25	0.25	0.06	0.14	0.14
Sat Flow, veh/h	1781	1008	731	1781	1381	415	1781	1283	498	1781	1482	329
Grp Volume(v), veh/h	59	0	471	87	0	303	242	0	261	74	0	187
Grp Sat Flow(s),veh/h/ln	1781	0	1739	1781	0	1796	1781	0	1781	1781	0	1811
Q Serve(g_s), s	2.1	0.0	16.0	3.0	0.0	8.6	8.3	0.0	8.1	2.6	0.0	6.2
Cycle Q Clear(g_c), s	2.1	0.0	16.0	3.0	0.0	8.6	8.3	0.0	8.1	2.6	0.0	6.2
Prop In Lane	1.00		0.42	1.00		0.23	1.00		0.28	1.00		0.18
Lane Grp Cap(c), veh/h	91	0	558	114	0	599	293	0	448	102	0	262
V/C Ratio(X)	0.65	0.00	0.84	0.77	0.00	0.51	0.83	0.00	0.58	0.72	0.00	0.71
Avail Cap(c_a), veh/h	351	0	900	408	0	986	408	0	669	830	0	1109
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.5	0.0	20.0	29.2	0.0	16.9	25.6	0.0	20.8	29.4	0.0	25.8
Incr Delay (d2), s/veh	7.6	0.0	4.2	10.2	0.0	0.7	9.4	0.0	1.2	9.2	0.0	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	5.9	1.5	0.0	3.0	3.8	0.0	3.0	1.3	0.0	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.1	0.0	24.2	39.4	0.0	17.6	35.0	0.0	22.0	38.6	0.0	29.4
LnGrp LOS	D	A	C	D	A	B	D	A	C	D	A	C
Approach Vol, veh/h		530			390			503			261	
Approach Delay, s/veh		25.6			22.5			28.2			32.0	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.1	21.1	8.5	25.5	14.9	14.4	7.7	26.3				
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2				
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8				
Max Q Clear Time (g_c+I1), s	4.6	10.1	5.0	18.0	10.3	8.2	4.1	10.6				
Green Ext Time (p_c), s	0.2	1.1	0.1	2.3	0.3	0.9	0.1	1.6				
Intersection Summary												
HCM 6th Ctrl Delay			26.7									
HCM 6th LOS			C									

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	191.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Vol, veh/h	10	10	10	70	10	580	10	340	20	540	380	10
Future Vol, veh/h	10	10	10	70	10	580	10	340	20	540	380	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	300	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	12	12	81	12	674	12	395	23	628	442	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1932	2146	227	1914	2141	-	454	0	0	418	0	0
Stage 1	1704	1704	-	431	431	-	-	-	-	-	-	-
Stage 2	228	442	-	1483	1710	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	40	48	776	~ 41	48	0	1103	-	-	1138	-	-
Stage 1	95	145	-	573	581	0	-	-	-	-	-	-
Stage 2	754	575	-	131	144	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	13	21	776	~ 13	21	-	1103	-	-	1138	-	-
Mov Cap-2 Maneuver	13	21	-	~ 13	21	-	-	-	-	-	-	-
Stage 1	94	65	-	567	575	-	-	-	-	-	-	-
Stage 2	731	569	-	~ 47	65	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 586.5	$ 3075.5	0.2	7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1103	-	-	24	14	-	1138	-	-
HCM Lane V/C Ratio	0.011	-	-	1.453	6.645	-	0.552	-	-
HCM Control Delay (s)	8.3	-	-	$ 586.5	$ 3075.5	0	12	-	-
HCM Lane LOS	A	-	-	F	F	A	B	-	-
HCM 95th %tile Q(veh)	0	-	-	4.4	12.6	-	3.5	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

2: MILLBROOK AVE & E COPPER AVE

Intersection	
Int Delay, s/veh	77.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	40	500	50	150	670	40	30	20	210	100	30	80
Future Vol, veh/h	40	500	50	150	670	40	30	20	210	100	30	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	568	57	170	761	45	34	23	239	114	34	91

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	806	0	0	625	0	0	1396	1804	284	1487	1816	381
Stage 1	-	-	-	-	-	-	658	658	-	1101	1101	-
Stage 2	-	-	-	-	-	-	738	1146	-	386	715	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	814	-	-	952	-	-	101	79	713	~ 86	77	617
Stage 1	-	-	-	-	-	-	420	459	-	226	286	-
Stage 2	-	-	-	-	-	-	376	272	-	609	433	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	814	-	-	952	-	-	40	61	713	~ 34	60	617
Mov Cap-2 Maneuver	-	-	-	-	-	-	40	61	-	~ 34	60	-
Stage 1	-	-	-	-	-	-	397	434	-	214	235	-
Stage 2	-	-	-	-	-	-	225	223	-	363	409	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.7	46.4	$ 640.9
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	40	61	713	814	-	-	952	-	-	34	60	617
HCM Lane V/C Ratio	0.852	0.373	0.335	0.056	-	-	0.179	-	-	3.342	0.568	0.147
HCM Control Delay (s)	250.5	95.5	12.6	9.7	-	-	9.6	-	-	$ 1298.9	125.3	11.8
HCM Lane LOS	F	F	B	A	-	-	A	-	-	F	F	B
HCM 95th %tile Q(veh)	3.2	1.4	1.5	0.2	-	-	0.7	-	-	13.2	2.3	0.5

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	390.2
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✥	
Traffic Vol, veh/h	20	640	280	60	470	10	190	10	90	10	10	30
Future Vol, veh/h	20	640	280	60	470	10	190	10	90	10	10	30
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	853	373	80	627	13	253	13	120	13	13	40
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	656	158.6	23.8	18.6
HCM LOS	F	F	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	100%	0%	20%
Vol Thru, %	0%	10%	0%	70%	0%	98%	20%
Vol Right, %	0%	90%	0%	30%	0%	2%	60%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	190	100	20	920	60	480	50
LT Vol	190	0	20	0	60	0	10
Through Vol	0	10	0	640	0	470	10
RT Vol	0	90	0	280	0	10	30
Lane Flow Rate	253	133	27	1227	80	640	67
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.595	0.271	0.058	2.438	0.173	1.296	0.169
Departure Headway (Hd)	10.746	9.533	8.329	7.591	9.546	9.004	13.004
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	339	380	433	491	378	410	278
Service Time	8.446	7.233	6.029	5.291	7.246	6.704	11.004
HCM Lane V/C Ratio	0.746	0.35	0.062	2.499	0.212	1.561	0.241
HCM Control Delay	28.1	15.7	11.5	670	14.2	176.7	18.6
HCM Lane LOS	D	C	B	F	B	F	C
HCM 95th-tile Q	3.6	1.1	0.2	90.1	0.6	23.2	0.6

4: N WILLOW AVE & COPPER AVE

Intersection	
Intersection Delay, s/veh	661.7
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	110	520	110	130	370	310	70	230	90	290	280	100
Future Vol, veh/h	110	520	110	130	370	310	70	230	90	290	280	100
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	139	658	139	165	468	392	89	291	114	367	354	127
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	733.1	817	254.3	632.2
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	18%	15%	16%	43%
Vol Thru, %	59%	70%	46%	42%
Vol Right, %	23%	15%	38%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	390	740	810	670
LT Vol	70	110	130	290
Through Vol	230	520	370	280
RT Vol	90	110	310	100
Lane Flow Rate	494	937	1025	848
Geometry Grp	1	1	1	1
Degree of Util (X)	1.307	2.491	2.687	2.268
Departure Headway (Hd)	30.858	22.869	21.697	21.854
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	123	169	185	178
Service Time	28.858	20.869	19.697	19.854
HCM Lane V/C Ratio	4.016	5.544	5.541	4.764
HCM Control Delay	254.3	733.1	817	632.2
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	10.1	33.7	39.2	30.7

5: E INTERNATIONAL AVE & N CHESTNUT AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	361	721	49	361	607	180	16	393	262	123	164	115
v/c Ratio	0.88	0.84	0.11	0.88	0.70	0.37	0.16	0.84	0.56	0.72	0.13	0.19
Control Delay	66.1	51.4	0.5	66.1	45.1	11.0	59.4	58.1	25.2	75.9	28.1	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.1	51.4	0.5	66.1	45.1	11.0	59.4	58.1	25.2	75.9	28.1	6.7
Queue Length 50th (ft)	265	284	0	265	230	16	12	284	92	94	41	0
Queue Length 95th (ft)	257	227	0	257	190	17	26	262	87	114	55	7
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	475	934	475	475	934	513	120	548	529	185	1283	637
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.77	0.10	0.76	0.65	0.35	0.13	0.72	0.50	0.66	0.13	0.18

Intersection Summary

HCM 6th Signalized Intersection Summary
5: E INTERNATIONAL AVE & N CHESTNUT AVE

CUM AM
06/05/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	220	440	30	220	370	110	10	240	160	75	100	70
Future Volume (veh/h)	220	440	30	220	370	110	10	240	160	75	100	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	361	721	49	361	607	180	16	393	262	123	164	115
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	396	883	379	396	883	379	32	492	401	151	1173	521
Arrive On Green	0.22	0.25	0.25	0.22	0.25	0.25	0.02	0.26	0.26	0.08	0.33	0.33
Sat Flow, veh/h	1781	3554	1528	1781	3554	1528	1781	1870	1525	1781	3554	1578
Grp Volume(v), veh/h	361	721	49	361	607	180	16	393	262	123	164	115
Grp Sat Flow(s),veh/h/ln	1781	1777	1528	1781	1777	1528	1781	1870	1525	1781	1777	1578
Q Serve(g_s), s	21.1	20.4	2.7	21.1	16.5	10.7	1.0	20.9	16.3	7.2	3.5	5.6
Cycle Q Clear(g_c), s	21.1	20.4	2.7	21.1	16.5	10.7	1.0	20.9	16.3	7.2	3.5	5.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	396	883	379	396	883	379	32	492	401	151	1173	521
V/C Ratio(X)	0.91	0.82	0.13	0.91	0.69	0.47	0.51	0.80	0.65	0.81	0.14	0.22
Avail Cap(c_a), veh/h	492	925	398	492	925	398	125	557	454	192	1191	529
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.5	37.8	31.2	40.5	36.4	34.2	52.0	36.7	35.0	48.0	25.1	25.8
Incr Delay (d2), s/veh	18.7	5.6	0.2	18.7	2.0	0.9	12.1	7.3	2.8	18.6	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	9.3	1.0	11.0	7.2	4.0	0.5	10.3	6.2	4.0	1.5	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.2	43.4	31.3	59.2	38.4	35.1	64.1	44.0	37.8	66.6	25.2	26.1
LnGrp LOS	E	D	C	E	D	D	E	D	D	E	C	C
Approach Vol, veh/h		1131			1148			671			402	
Approach Delay, s/veh		47.9			44.4			42.1			38.1	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.6	33.3	28.2	31.7	6.4	40.5	28.2	31.7
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	9.2	22.9	23.1	22.4	3.0	7.6	23.1	18.5
Green Ext Time (p_c), s	0.1	2.3	0.6	2.2	0.0	1.4	0.6	3.1

Intersection Summary	
HCM 6th Ctrl Delay	44.4
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	184	355	53	118	237	92	79	276	184	92	276	224
v/c Ratio	0.54	0.36	0.10	0.45	0.38	0.22	0.35	0.59	0.35	0.38	0.58	0.39
Control Delay	38.0	26.9	0.4	41.0	31.3	1.3	41.4	32.1	6.5	40.7	30.7	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.0	26.9	0.4	41.0	31.3	1.3	41.4	32.1	6.5	40.7	30.7	6.2
Queue Length 50th (ft)	67	67	0	44	46	0	29	100	0	34	98	0
Queue Length 95th (ft)	168	126	0	123	96	0	92	210	27	102	204	27
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	646	1337	670	416	878	516	330	967	910	387	1027	973
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.27	0.08	0.28	0.27	0.18	0.24	0.29	0.20	0.24	0.27	0.23

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	140	270	40	90	180	70	60	210	140	70	210	170
Future Volume (veh/h)	140	270	40	90	180	70	60	210	140	70	210	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	184	355	53	118	237	92	79	276	184	92	276	224
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	246	650	290	155	470	210	125	427	362	137	439	372
Arrive On Green	0.14	0.18	0.18	0.09	0.13	0.13	0.07	0.23	0.23	0.08	0.23	0.23
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	184	355	53	118	237	92	79	276	184	92	276	224
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	4.4	4.0	1.2	2.9	2.7	2.4	1.9	5.9	4.5	2.2	5.8	5.5
Cycle Q Clear(g_c), s	4.4	4.0	1.2	2.9	2.7	2.4	1.9	5.9	4.5	2.2	5.8	5.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	246	650	290	155	470	210	125	427	362	137	439	372
V/C Ratio(X)	0.75	0.55	0.18	0.76	0.50	0.44	0.63	0.65	0.51	0.67	0.63	0.60
Avail Cap(c_a), veh/h	910	1760	785	587	1114	497	465	1338	1134	546	1423	1206
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.2	16.3	15.2	19.6	17.8	17.6	19.9	15.4	14.8	19.8	15.1	15.0
Incr Delay (d2), s/veh	4.5	0.7	0.3	7.4	0.8	1.4	5.1	1.6	1.1	5.6	1.5	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	1.4	0.4	1.3	1.0	0.8	0.9	2.2	1.4	1.0	2.2	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.8	17.0	15.5	27.1	18.6	19.0	25.0	17.0	15.9	25.4	16.6	16.6
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		592			447			539			592	
Approach Delay, s/veh		18.7			20.9			17.8			18.0	
Approach LOS		B			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	14.6	8.3	13.3	7.6	14.8	10.6	11.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	4.2	7.9	4.9	6.0	3.9	7.8	6.4	4.7
Green Ext Time (p_c), s	0.1	2.2	0.2	2.0	0.1	2.4	0.4	1.1

Intersection Summary			
HCM 6th Ctrl Delay			18.7
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

1: N FRIANT RD & N WILLOW AVE

	→	←	↖	↰	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	93	674	12	418	628	454
v/c Ratio	0.13	0.40	0.43	0.09	0.60	0.77	0.18
Control Delay	20.6	33.1	0.8	39.5	31.7	27.5	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	33.1	0.8	39.5	31.7	27.5	6.1
Queue Length 50th (ft)	10	39	0	5	90	217	26
Queue Length 95th (ft)	31	79	0	24	160	#543	100
Internal Link Dist (ft)	1803	10507			9484		648
Turn Bay Length (ft)			220	205		600	
Base Capacity (vph)	671	569	1583	137	1004	950	2590
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.16	0.43	0.09	0.42	0.66	0.18

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰↑	↱	↰	↑↱		↰	↑↱	
Traffic Volume (veh/h)	10	10	10	70	10	580	10	340	20	540	380	10
Future Volume (veh/h)	10	10	10	70	10	580	10	340	20	540	380	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	12	12	12	81	12	0	12	395	23	628	442	12
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	144	66	52	267	17		28	635	37	728	2047	55
Arrive On Green	0.09	0.09	0.09	0.09	0.09	0.00	0.02	0.19	0.19	0.41	0.58	0.58
Sat Flow, veh/h	419	737	578	1316	195	1585	1781	3413	198	1781	3534	96
Grp Volume(v), veh/h	36	0	0	93	0	0	12	205	213	628	222	232
Grp Sat Flow(s),veh/h/ln	1735	0	0	1511	0	1585	1781	1777	1835	1781	1777	1853
Q Serve(g_s), s	0.0	0.0	0.0	1.8	0.0	0.0	0.3	4.8	4.8	14.5	2.7	2.7
Cycle Q Clear(g_c), s	0.9	0.0	0.0	2.6	0.0	0.0	0.3	4.8	4.8	14.5	2.7	2.7
Prop In Lane	0.33		0.33	0.87		1.00	1.00		0.11	1.00		0.05
Lane Grp Cap(c), veh/h	261	0	0	285	0		28	330	341	728	1029	1073
V/C Ratio(X)	0.14	0.00	0.00	0.33	0.00		0.44	0.62	0.62	0.86	0.22	0.22
Avail Cap(c_a), veh/h	1080	0	0	1020	0		198	724	748	1369	1892	1973
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.0	0.0	0.0	19.7	0.0	0.0	21.9	16.8	16.8	12.1	4.5	4.5
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.7	0.0	0.0	10.4	1.9	1.9	3.2	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.0	0.8	0.0	0.0	0.2	1.6	1.7	3.9	0.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.2	0.0	0.0	20.4	0.0	0.0	32.3	18.7	18.7	15.3	4.6	4.6
LnGrp LOS	B	A	A	C	A		C	B	B	B	A	A
Approach Vol, veh/h		36			93	A		430			1082	
Approach Delay, s/veh		19.2			20.4			19.1			10.8	
Approach LOS		B			C			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	22.8	13.5		8.5	5.2	31.2		8.5
Change Period (Y+Rc), s	4.5	5.2		4.5	4.5	5.2		4.5
Max Green Setting (Gmax), s	34.5	18.3		27.0	5.0	47.8		27.0
Max Q Clear Time (g_c+I1), s	16.5	6.8		2.9	2.3	4.7		4.6
Green Ext Time (p_c), s	1.9	1.5		0.1	0.0	2.3		0.3

Intersection Summary	
HCM 6th Ctrl Delay	13.7
HCM 6th LOS	B

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	45	568	57	170	761	45	34	23	239	114	34	91
v/c Ratio	0.23	0.56	0.11	0.78	0.56	0.07	0.18	0.08	0.53	0.52	0.06	0.16
Control Delay	35.8	22.4	0.4	58.0	20.4	0.2	35.4	23.8	8.2	42.6	21.4	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.8	22.4	0.4	58.0	20.4	0.2	35.4	23.8	8.2	42.6	21.4	3.2
Queue Length 50th (ft)	15	84	0	59	118	0	11	8	0	38	8	0
Queue Length 95th (ft)	62	199	0	#261	276	0	51	27	47	#170	35	17
Internal Link Dist (ft)		1334			1174			566			314	
Turn Bay Length (ft)	240		210	265		260	330		150	175		100
Base Capacity (vph)	219	1867	889	219	1867	889	219	1053	999	219	1053	948
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.30	0.06	0.78	0.41	0.05	0.16	0.02	0.24	0.52	0.03	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
2: MILLBROOK AVE & E COPPER AVE

CUM AM
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	40	500	50	150	670	40	30	20	210	100	30	80
Future Volume (veh/h)	40	500	50	150	670	40	30	20	210	100	30	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	45	568	57	170	761	45	34	23	239	114	34	91
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	81	880	392	214	1145	511	66	367	311	147	452	383
Arrive On Green	0.05	0.25	0.25	0.12	0.32	0.32	0.04	0.20	0.20	0.08	0.24	0.24
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	45	568	57	170	761	45	34	23	239	114	34	91
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	1.3	7.6	1.5	4.9	9.8	1.0	1.0	0.5	7.6	3.3	0.7	2.4
Cycle Q Clear(g_c), s	1.3	7.6	1.5	4.9	9.8	1.0	1.0	0.5	7.6	3.3	0.7	2.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	81	880	392	214	1145	511	66	367	311	147	452	383
V/C Ratio(X)	0.55	0.65	0.15	0.79	0.66	0.09	0.51	0.06	0.77	0.78	0.08	0.24
Avail Cap(c_a), veh/h	252	2148	958	252	2148	958	252	1212	1027	252	1212	1027
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.7	17.8	15.5	22.6	15.5	12.5	25.0	17.3	20.1	23.8	15.5	16.1
Incr Delay (d2), s/veh	5.7	0.8	0.2	13.7	0.7	0.1	6.0	0.1	4.0	8.5	0.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	2.6	0.4	2.5	3.1	0.3	0.5	0.2	2.6	1.6	0.3	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.5	18.6	15.7	36.4	16.1	12.6	31.1	17.4	24.1	32.3	15.6	16.5
LnGrp LOS	C	B	B	D	B	B	C	B	C	C	B	B
Approach Vol, veh/h		670			976			296			239	
Approach Delay, s/veh		19.2			19.5			24.4			23.9	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	14.9	10.9	18.3	6.5	17.3	6.9	22.3
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	34.3	7.5	32.0	7.5	34.3	7.5	32.0
Max Q Clear Time (g_c+I1), s	5.3	9.6	6.9	9.6	3.0	4.4	3.3	11.8
Green Ext Time (p_c), s	0.0	0.9	0.0	3.5	0.0	0.4	0.0	4.7

Intersection Summary	
HCM 6th Ctrl Delay	20.5
HCM 6th LOS	C

3: N CHESTNUT AVE & E COPPER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	27	853	373	80	627	13	253	133	13	13	40
v/c Ratio	0.22	0.90	0.41	0.51	0.62	0.01	0.77	0.25	0.11	0.07	0.14
Control Delay	59.9	40.2	8.7	65.8	22.9	0.0	63.1	9.3	58.3	47.9	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.9	40.2	8.7	65.8	22.9	0.0	63.1	9.3	58.3	47.9	1.0
Queue Length 50th (ft)	19	524	50	57	299	0	181	7	9	9	0
Queue Length 95th (ft)	47	#742	97	105	453	0	#301	34	28	23	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	144	1138	1058	183	1180	1052	375	599	144	298	373
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.75	0.35	0.44	0.53	0.01	0.67	0.22	0.09	0.04	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑	↱
Traffic Volume (veh/h)	20	640	280	60	470	10	190	10	90	10	10	30
Future Volume (veh/h)	20	640	280	60	470	10	190	10	90	10	10	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	27	853	373	80	627	13	253	13	120	13	13	40
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	49	958	812	103	1015	860	293	32	297	28	104	88
Arrive On Green	0.03	0.51	0.51	0.06	0.54	0.54	0.16	0.20	0.20	0.02	0.06	0.06
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	157	1452	1781	1870	1585
Grp Volume(v), veh/h	27	853	373	80	627	13	253	0	133	13	13	40
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1609	1781	1870	1585
Q Serve(g_s), s	1.3	36.4	13.4	3.9	20.5	0.3	12.3	0.0	6.4	0.6	0.6	2.2
Cycle Q Clear(g_c), s	1.3	36.4	13.4	3.9	20.5	0.3	12.3	0.0	6.4	0.6	0.6	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.90	1.00		1.00
Lane Grp Cap(c), veh/h	49	958	812	103	1015	860	293	0	329	28	104	88
V/C Ratio(X)	0.55	0.89	0.46	0.78	0.62	0.02	0.86	0.00	0.40	0.47	0.12	0.45
Avail Cap(c_a), veh/h	150	1256	1065	190	1298	1100	390	0	443	150	263	223
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.8	19.5	13.9	41.4	14.0	9.4	36.2	0.0	30.7	43.5	40.0	40.7
Incr Delay (d2), s/veh	9.5	6.7	0.4	11.7	0.6	0.0	14.3	0.0	0.8	12.1	0.5	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	14.8	4.1	2.0	7.3	0.1	6.3	0.0	2.5	0.4	0.3	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.2	26.2	14.3	53.0	14.6	9.4	50.5	0.0	31.5	55.5	40.5	44.3
LnGrp LOS	D	C	B	D	B	A	D	A	C	E	D	D
Approach Vol, veh/h		1253			720			386			66	
Approach Delay, s/veh		23.2			18.8			44.0			45.8	
Approach LOS		C			B			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.9	22.7	9.7	50.8	19.1	9.5	6.9	53.5
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.6	8.4	5.9	38.4	14.3	4.2	3.3	22.5
Green Ext Time (p_c), s	0.0	0.6	0.0	7.2	0.3	0.1	0.0	4.1

Intersection Summary	
HCM 6th Ctrl Delay	25.8
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Queues
4: N WILLOW AVE & COPPER AVE

	⤴	→	↙	←	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	139	797	165	860	89	291	114	367	354	127
v/c Ratio	0.73	0.85	0.76	0.81	0.51	0.82	0.27	0.87	0.53	0.20
Control Delay	73.1	47.9	72.1	36.4	60.7	63.4	5.1	63.0	34.0	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.1	47.9	72.1	36.4	60.7	63.4	5.1	63.0	34.0	5.8
Queue Length 50th (ft)	106	299	126	262	67	216	0	272	218	0
Queue Length 95th (ft)	#164	315	#186	275	103	272	15	330	278	29
Internal Link Dist (ft)		1168		2435		1529			9418	
Turn Bay Length (ft)	300		300		300		200	300		200
Base Capacity (vph)	205	1063	237	1186	237	411	461	485	685	662
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.75	0.70	0.73	0.38	0.71	0.25	0.76	0.52	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	110	520	110	130	370	310	70	230	90	290	280	100
Future Volume (veh/h)	110	520	110	130	370	310	70	230	90	290	280	100
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	139	658	139	165	468	392	89	291	114	367	354	127
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	170	820	173	198	544	455	115	340	288	406	646	548
Arrive On Green	0.10	0.28	0.28	0.11	0.30	0.30	0.06	0.18	0.18	0.23	0.35	0.35
Sat Flow, veh/h	1781	2920	616	1781	1836	1535	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	139	400	397	165	453	407	89	291	114	367	354	127
Grp Sat Flow(s),veh/h/ln	1781	1777	1759	1781	1777	1594	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	7.5	20.5	20.5	8.9	23.6	23.6	4.8	14.7	6.2	19.6	15.0	5.6
Cycle Q Clear(g_c), s	7.5	20.5	20.5	8.9	23.6	23.6	4.8	14.7	6.2	19.6	15.0	5.6
Prop In Lane	1.00		0.35	1.00		0.96	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	170	499	494	198	527	472	115	340	288	406	646	548
V/C Ratio(X)	0.82	0.80	0.80	0.83	0.86	0.86	0.78	0.86	0.40	0.90	0.55	0.23
Avail Cap(c_a), veh/h	228	596	590	264	632	567	264	455	386	537	742	628
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.4	32.7	32.7	42.6	32.5	32.5	45.1	38.8	35.3	36.7	25.9	22.8
Incr Delay (d2), s/veh	15.4	6.6	6.8	15.5	10.1	11.2	10.7	11.5	0.9	15.5	0.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	9.1	9.0	4.6	10.8	9.9	2.4	7.4	2.3	9.7	6.2	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.8	39.3	39.4	58.1	42.6	43.8	55.8	50.3	36.2	52.2	26.6	23.0
LnGrp LOS	E	D	D	E	D	D	E	D	D	D	C	C
Approach Vol, veh/h		936			1025			494			848	
Approach Delay, s/veh		42.2			45.6			48.0			37.2	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.8	23.0	15.4	32.7	10.8	39.0	13.9	34.2
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	21.6	16.7	10.9	22.5	6.8	17.0	9.5	25.6
Green Ext Time (p_c), s	0.7	1.1	0.1	3.2	0.1	2.2	0.1	3.4

Intersection Summary			
HCM 6th Ctrl Delay			42.8
HCM 6th LOS			D

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Vol, veh/h	10	10	10	30	10	590	10	470	70	630	470	10
Future Vol, veh/h	10	10	10	30	10	590	10	470	70	630	470	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	300	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	11	11	32	11	634	11	505	75	677	505	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2145	2467	258	2177	2435	-	516	0	0	580	0	0
Stage 1	1865	1865	-	565	565	-	-	-	-	-	-	-
Stage 2	280	602	-	1612	1870	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	27	30	741	~ 26	31	0	1046	-	-	990	-	-
Stage 1	75	121	-	477	506	0	-	-	-	-	-	-
Stage 2	703	487	-	109	120	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 9	741	-	~ 10	-	1046	-	-	990	-	-
Mov Cap-2 Maneuver	-	~ 9	-	-	~ 10	-	-	-	-	-	-	-
Stage 1	74	38	-	472	500	-	-	-	-	-	-	-
Stage 2	681	482	-	~ 24	38	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0.2	9.2
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1046	-	-	-	-	-	990	-	-
HCM Lane V/C Ratio	0.01	-	-	-	-	-	0.684	-	-
HCM Control Delay (s)	8.5	-	-	-	-	0	16.1	-	-
HCM Lane LOS	A	-	-	-	-	A	C	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-	5.7	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	52.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	70	720	50	110	460	100	50	50	170	60	20	40
Future Vol, veh/h	70	720	50	110	460	100	50	50	170	60	20	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	75	774	54	118	495	108	54	54	183	65	22	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	603	0	0	828	0	0	1419	1763	387	1295	1709	248
Stage 1	-	-	-	-	-	-	924	924	-	731	731	-
Stage 2	-	-	-	-	-	-	495	839	-	564	978	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	971	-	-	799	-	-	97	83	611	120	90	752
Stage 1	-	-	-	-	-	-	290	346	-	379	425	-
Stage 2	-	-	-	-	-	-	525	379	-	478	327	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	971	-	-	799	-	-	59	65	611	~ 22	71	752
Mov Cap-2 Maneuver	-	-	-	-	-	-	59	65	-	~ 22	71	-
Stage 1	-	-	-	-	-	-	268	319	-	350	362	-
Stage 2	-	-	-	-	-	-	397	323	-	257	302	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	1.7	78	$ 636.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	59	65	611	971	-	-	799	-	-	22	71	752
HCM Lane V/C Ratio	0.911	0.827	0.299	0.078	-	-	0.148	-	-	2.933	0.303	0.057
HCM Control Delay (s)	205.5	170.2	13.4	9	-	-	10.3	-	$	1239.9	76.4	10.1
HCM Lane LOS	F	F	B	A	-	-	B	-	-	F	F	B
HCM 95th %tile Q(veh)	4.2	3.8	1.3	0.3	-	-	0.5	-	-	8.2	1.1	0.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Intersection Delay, s/veh	150.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✥	
Traffic Vol, veh/h	40	520	150	20	630	10	150	10	60	10	10	20
Future Vol, veh/h	40	520	150	20	630	10	150	10	60	10	10	20
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	584	169	22	708	11	169	11	67	11	11	22
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	178	173.4	16.2	14.2
HCM LOS	F	F	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	100%	0%	25%
Vol Thru, %	0%	14%	0%	78%	0%	98%	25%
Vol Right, %	0%	86%	0%	22%	0%	2%	50%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	150	70	40	670	20	640	40
LT Vol	150	0	40	0	20	0	10
Through Vol	0	10	0	520	0	630	10
RT Vol	0	60	0	150	0	10	20
Lane Flow Rate	169	79	45	753	22	719	45
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.39	0.158	0.088	1.345	0.044	1.32	0.108
Departure Headway (Hd)	9.359	8.206	7.511	6.836	7.561	7.037	10.029
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	388	440	480	534	476	525	360
Service Time	7.059	5.906	5.211	4.536	5.261	4.737	8.029
HCM Lane V/C Ratio	0.436	0.18	0.094	1.41	0.046	1.37	0.125
HCM Control Delay	17.9	12.4	10.9	188	10.6	178.5	14.2
HCM Lane LOS	C	B	B	F	B	F	B
HCM 95th-tile Q	1.8	0.6	0.3	31.2	0.1	29.2	0.4

4: N WILLOW AVE & COPPER AVE

Intersection	
Intersection Delay, s/veh	506.7
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	90	450	50	90	440	320	100	300	130	410	200	120
Future Vol, veh/h	90	450	50	90	440	320	100	300	130	410	200	120
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	97	484	54	97	473	344	108	323	140	441	215	129
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	383.5	676.9	308.2	552.1
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	19%	15%	11%	56%
Vol Thru, %	57%	76%	52%	27%
Vol Right, %	25%	8%	38%	16%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	530	590	850	730
LT Vol	100	90	90	410
Through Vol	300	450	440	200
RT Vol	130	50	320	120
Lane Flow Rate	570	634	914	785
Geometry Grp	1	1	1	1
Degree of Util (X)	1.507	1.694	2.393	2.103
Departure Headway (Hd)	22.673	21.807	17.812	18.939
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	165	178	219	204
Service Time	20.673	19.807	15.812	16.939
HCM Lane V/C Ratio	3.455	3.562	4.174	3.848
HCM Control Delay	308.2	383.5	676.9	552.1
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	15.8	19.7	39.8	31

5: E INTERNATIONAL AVE & N CHESTNUT AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	102	193	34	136	239	57	11	148	68	91	182	159
v/c Ratio	0.33	0.26	0.08	0.39	0.30	0.13	0.05	0.36	0.16	0.32	0.14	0.24
Control Delay	35.1	26.3	0.4	34.3	24.9	1.5	40.0	28.6	3.1	37.4	17.3	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	26.3	0.4	34.3	24.9	1.5	40.0	28.6	3.1	37.4	17.3	5.2
Queue Length 50th (ft)	32	32	0	42	38	0	4	46	0	29	19	0
Queue Length 95th (ft)	128	88	0	159	103	4	27	143	13	123	80	45
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	985	1940	899	985	1958	906	268	1099	960	411	2259	1051
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.10	0.04	0.14	0.12	0.06	0.04	0.13	0.07	0.22	0.08	0.15

Intersection Summary

HCM 6th Signalized Intersection Summary
5: E INTERNATIONAL AVE & N CHESTNUT AVE

CUM PM
06/05/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	90	170	30	120	210	50	10	130	60	80	160	140
Future Volume (veh/h)	90	170	30	120	210	50	10	130	60	80	160	140
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	102	193	34	136	239	57	11	148	68	91	182	159
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	150	562	248	184	629	278	26	337	283	141	870	386
Arrive On Green	0.08	0.16	0.16	0.10	0.18	0.18	0.01	0.18	0.18	0.08	0.24	0.24
Sat Flow, veh/h	1781	3554	1570	1781	3554	1572	1781	1870	1572	1781	3554	1575
Grp Volume(v), veh/h	102	193	34	136	239	57	11	148	68	91	182	159
Grp Sat Flow(s),veh/h/ln	1781	1777	1570	1781	1777	1572	1781	1870	1572	1781	1777	1575
Q Serve(g_s), s	2.2	2.0	0.8	3.0	2.4	1.3	0.2	2.9	1.5	2.0	1.6	3.4
Cycle Q Clear(g_c), s	2.2	2.0	0.8	3.0	2.4	1.3	0.2	2.9	1.5	2.0	1.6	3.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	150	562	248	184	629	278	26	337	283	141	870	386
V/C Ratio(X)	0.68	0.34	0.14	0.74	0.38	0.20	0.43	0.44	0.24	0.65	0.21	0.41
Avail Cap(c_a), veh/h	1299	2442	1079	1299	2442	1080	330	1470	1236	506	3145	1394
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.0	15.2	14.7	17.6	14.7	14.2	19.8	14.8	14.2	18.1	12.2	12.8
Incr Delay (d2), s/veh	5.3	0.4	0.2	5.7	0.4	0.4	11.0	0.9	0.4	4.9	0.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.7	0.2	1.3	0.8	0.4	0.2	1.1	0.4	0.9	0.5	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.3	15.5	14.9	23.3	15.1	14.6	30.7	15.7	14.7	22.9	12.3	13.5
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		329			432			227			432	
Approach Delay, s/veh		17.9			17.6			16.1			15.0	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.7	12.5	8.7	11.6	5.1	15.1	7.9	12.4
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	4.0	4.9	5.0	4.0	2.2	5.4	4.2	4.4
Green Ext Time (p_c), s	0.1	1.0	0.3	1.2	0.0	1.7	0.2	1.5

Intersection Summary			
HCM 6th Ctrl Delay			16.6
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	101	213	17	45	292	101	45	169	101	112	169	124
v/c Ratio	0.33	0.21	0.03	0.18	0.38	0.21	0.18	0.39	0.20	0.37	0.30	0.21
Control Delay	34.2	22.1	0.1	35.9	26.7	1.7	35.9	27.1	1.1	35.8	22.8	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	22.1	0.1	35.9	26.7	1.7	35.9	27.1	1.1	35.8	22.8	2.3
Queue Length 50th (ft)	32	33	0	15	48	0	15	54	0	36	50	0
Queue Length 95th (ft)	120	91	0	66	130	5	66	147	1	135	143	16
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	820	1660	804	528	1095	603	419	1095	1001	492	1140	1035
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.13	0.02	0.09	0.27	0.17	0.11	0.15	0.10	0.23	0.15	0.12

Intersection Summary

HCM 6th Signalized Intersection Summary
6: N CHESTNUT AVE & E BEHYMER AVE

CUM PM
06/05/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	90	190	15	40	260	90	40	150	90	100	150	110
Future Volume (veh/h)	90	190	15	40	260	90	40	150	90	100	150	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	101	213	17	45	292	101	45	169	101	112	169	124
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	154	709	316	89	579	258	89	313	265	163	391	331
Arrive On Green	0.09	0.20	0.20	0.05	0.16	0.16	0.05	0.17	0.17	0.09	0.21	0.21
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	101	213	17	45	292	101	45	169	101	112	169	124
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	2.1	1.9	0.3	0.9	2.8	2.2	0.9	3.1	2.2	2.3	3.0	2.6
Cycle Q Clear(g_c), s	2.1	1.9	0.3	0.9	2.8	2.2	0.9	3.1	2.2	2.3	3.0	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	154	709	316	89	579	258	89	313	265	163	391	331
V/C Ratio(X)	0.66	0.30	0.05	0.51	0.50	0.39	0.51	0.54	0.38	0.69	0.43	0.37
Avail Cap(c_a), veh/h	1055	2039	909	680	1290	576	539	1550	1314	633	1649	1397
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.8	13.0	12.3	17.6	14.5	14.2	17.6	14.5	14.1	16.7	13.1	12.9
Incr Delay (d2), s/veh	4.7	0.2	0.1	4.4	0.7	1.0	4.4	1.4	0.9	5.1	0.8	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.6	0.1	0.4	0.9	0.7	0.4	1.2	0.7	1.0	1.1	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.5	13.2	12.4	22.0	15.2	15.2	22.0	15.9	15.0	21.9	13.8	13.6
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		331			438			315			405	
Approach Delay, s/veh		15.7			15.9			16.5			16.0	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	10.9	6.4	12.8	6.4	12.4	7.8	11.4
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	4.3	5.1	2.9	3.9	2.9	5.0	4.1	4.8
Green Ext Time (p_c), s	0.2	1.2	0.0	1.1	0.0	1.3	0.2	1.4

Intersection Summary	
HCM 6th Ctrl Delay	16.0
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

1: N FRIANT RD & N WILLOW AVE

	→	←	↖	↰	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	33	43	634	11	580	677	516
v/c Ratio	0.15	0.21	0.40	0.09	0.73	0.76	0.18
Control Delay	22.4	30.6	0.8	39.5	33.2	26.2	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.4	30.6	0.8	39.5	33.2	26.2	5.1
Queue Length 50th (ft)	9	19	0	5	123	253	24
Queue Length 95th (ft)	32	45	0	24	#258	#654	121
Internal Link Dist (ft)	1803	10507			9484		648
Turn Bay Length (ft)			220	205		600	
Base Capacity (vph)	621	555	1583	128	934	886	2849
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.08	0.40	0.09	0.62	0.76	0.18

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
1: N FRIANT RD & N WILLOW AVE

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			↰	↱	↰	↑↱		↰	↑↱	
Traffic Volume (veh/h)	10	10	10	30	10	590	10	470	70	630	470	10
Future Volume (veh/h)	10	10	10	30	10	590	10	470	70	630	470	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	11	11	32	11	0	11	505	75	677	505	11
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	124	42	36	199	26		25	709	105	763	2285	50
Arrive On Green	0.06	0.06	0.06	0.06	0.06	0.00	0.01	0.23	0.23	0.43	0.64	0.64
Sat Flow, veh/h	465	652	558	1171	402	1585	1781	3105	459	1781	3556	77
Grp Volume(v), veh/h	33	0	0	43	0	0	11	288	292	677	252	264
Grp Sat Flow(s),veh/h/ln	1675	0	0	1573	0	1585	1781	1777	1788	1781	1777	1856
Q Serve(g_s), s	0.0	0.0	0.0	0.3	0.0	0.0	0.3	7.6	7.7	17.9	3.0	3.0
Cycle Q Clear(g_c), s	0.9	0.0	0.0	1.2	0.0	0.0	0.3	7.6	7.7	17.9	3.0	3.0
Prop In Lane	0.33		0.33	0.74		1.00	1.00		0.26	1.00		0.04
Lane Grp Cap(c), veh/h	202	0	0	225	0		25	406	408	763	1142	1193
V/C Ratio(X)	0.16	0.00	0.00	0.19	0.00		0.44	0.71	0.72	0.89	0.22	0.22
Avail Cap(c_a), veh/h	945	0	0	917	0		175	638	642	1206	1666	1741
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	0.0	22.9	0.0	0.0	24.9	18.1	18.1	13.4	3.8	3.8
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.4	0.0	0.0	11.4	2.3	2.4	5.2	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0	0.4	0.0	0.0	0.2	2.6	2.7	5.6	0.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.1	0.0	0.0	23.3	0.0	0.0	36.4	20.4	20.5	18.7	3.9	3.9
LnGrp LOS	C	A	A	C	A		D	C	C	B	A	A
Approach Vol, veh/h		33			43	A		591			1193	
Approach Delay, s/veh		23.1			23.3			20.8			12.3	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	26.3	16.8		7.8	5.2	38.0		7.8
Change Period (Y+Rc), s	4.5	5.2		4.5	4.5	5.2		4.5
Max Green Setting (Gmax), s	34.5	18.3		27.0	5.0	47.8		27.0
Max Q Clear Time (g_c+I1), s	19.9	9.7		2.9	2.3	5.0		3.2
Green Ext Time (p_c), s	2.0	2.0		0.1	0.0	2.7		0.1

Intersection Summary	
HCM 6th Ctrl Delay	15.4
HCM 6th LOS	B

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	75	774	54	118	495	108	54	54	183	65	22	43
v/c Ratio	0.34	0.66	0.09	0.49	0.36	0.16	0.25	0.16	0.43	0.30	0.07	0.11
Control Delay	37.2	22.7	0.3	41.1	18.1	4.9	35.9	24.5	7.5	36.4	23.8	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.2	22.7	0.3	41.1	18.1	4.9	35.9	24.5	7.5	36.4	23.8	0.6
Queue Length 50th (ft)	26	126	0	41	73	0	18	18	0	22	7	0
Queue Length 95th (ft)	#104	290	0	#181	177	34	73	50	45	85	26	0
Internal Link Dist (ft)		1334			1174			566			314	
Turn Bay Length (ft)	240		210	265		260	330		150	175		100
Base Capacity (vph)	240	2052	966	240	2052	966	240	1158	1053	240	1158	1030
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.38	0.06	0.49	0.24	0.11	0.23	0.05	0.17	0.27	0.02	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
2: MILLBROOK AVE & E COPPER AVE

CUM PM
W IMPROVEMENTS

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	70	720	50	110	460	100	50	50	170	60	20	40
Future Volume (veh/h)	70	720	50	110	460	100	50	50	170	60	20	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	75	774	54	118	495	108	54	54	183	65	22	43
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	115	1149	513	152	1224	546	94	307	260	105	319	270
Arrive On Green	0.06	0.32	0.32	0.09	0.34	0.34	0.05	0.16	0.16	0.06	0.17	0.17
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	75	774	54	118	495	108	54	54	183	65	22	43
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	2.1	9.6	1.2	3.3	5.4	2.4	1.5	1.3	5.5	1.8	0.5	1.2
Cycle Q Clear(g_c), s	2.1	9.6	1.2	3.3	5.4	2.4	1.5	1.3	5.5	1.8	0.5	1.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	115	1149	513	152	1224	546	94	307	260	105	319	270
V/C Ratio(X)	0.66	0.67	0.11	0.78	0.40	0.20	0.58	0.18	0.70	0.62	0.07	0.16
Avail Cap(c_a), veh/h	263	2240	999	263	2240	999	263	1263	1071	263	1263	1071
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.2	14.9	12.0	22.7	12.7	11.7	23.5	18.3	20.1	23.3	17.7	18.0
Incr Delay (d2), s/veh	6.2	0.7	0.1	8.2	0.2	0.2	5.5	0.3	3.5	5.8	0.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.9	0.3	1.5	1.6	0.7	0.7	0.5	1.9	0.8	0.2	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.4	15.6	12.1	31.0	12.9	11.9	29.0	18.5	23.5	29.1	17.8	18.2
LnGrp LOS	C	B	B	C	B	B	C	B	C	C	B	B
Approach Vol, veh/h		903			721			291			130	
Approach Delay, s/veh		16.5			15.7			23.6			23.6	
Approach LOS		B			B			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.5	12.8	8.8	21.6	7.2	13.2	7.8	22.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2				
Max Green Setting (Gmax), s	7.5	34.3	7.5	32.0	7.5	34.3	7.5	32.0				
Max Q Clear Time (g_c+I1), s	3.8	7.5	5.3	11.6	3.5	3.2	4.1	7.4				
Green Ext Time (p_c), s	0.0	0.8	0.0	4.9	0.0	0.2	0.0	3.3				
Intersection Summary												
HCM 6th Ctrl Delay			17.7									
HCM 6th LOS			B									

	↗	→	↘	↙	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	45	611	169	27	724	11	169	85	11	11	22
v/c Ratio	0.24	0.64	0.19	0.14	0.80	0.01	0.51	0.18	0.06	0.05	0.07
Control Delay	51.9	21.9	5.0	50.9	28.9	0.0	45.5	10.5	52.3	42.5	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.9	21.9	5.0	50.9	28.9	0.0	45.5	10.5	52.3	42.5	0.4
Queue Length 50th (ft)	23	178	4	14	330	0	85	4	6	6	0
Queue Length 95th (ft)	82	590	52	55	#744	0	222	46	31	25	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	218	1397	1224	276	1419	1238	568	746	218	428	473
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.44	0.14	0.10	0.51	0.01	0.30	0.11	0.05	0.03	0.05

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
3: N CHESTNUT AVE & E COPPER AVE

CUM PM
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑	↱
Traffic Volume (veh/h)	40	544	150	24	644	10	150	10	66	10	10	20
Future Volume (veh/h)	40	544	150	24	644	10	150	10	66	10	10	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	45	611	169	27	724	11	169	11	74	11	11	22
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	881	746	54	855	725	218	38	255	25	135	115
Arrive On Green	0.04	0.47	0.47	0.03	0.46	0.46	0.12	0.18	0.18	0.01	0.07	0.07
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	209	1408	1781	1870	1585
Grp Volume(v), veh/h	45	611	169	27	724	11	169	0	85	11	11	22
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1617	1781	1870	1585
Q Serve(g_s), s	1.5	15.8	3.9	0.9	21.1	0.2	5.7	0.0	2.8	0.4	0.3	0.8
Cycle Q Clear(g_c), s	1.5	15.8	3.9	0.9	21.1	0.2	5.7	0.0	2.8	0.4	0.3	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.87	1.00		1.00
Lane Grp Cap(c), veh/h	78	881	746	54	855	725	218	0	293	25	135	115
V/C Ratio(X)	0.58	0.69	0.23	0.50	0.85	0.02	0.77	0.00	0.29	0.44	0.08	0.19
Avail Cap(c_a), veh/h	217	1819	1542	275	1880	1593	565	0	644	217	380	322
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.8	12.8	9.6	29.4	14.8	9.1	26.1	0.0	21.8	30.1	26.6	26.8
Incr Delay (d2), s/veh	6.7	1.0	0.2	7.2	2.4	0.0	5.8	0.0	0.5	11.9	0.3	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	5.0	1.0	0.5	7.1	0.1	2.6	0.0	1.0	0.2	0.2	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.5	13.8	9.8	36.5	17.2	9.1	31.9	0.0	22.3	42.0	26.9	27.6
LnGrp LOS	D	B	A	D	B	A	C	A	C	D	C	C
Approach Vol, veh/h		825			762			254			44	
Approach Delay, s/veh		14.1			17.8			28.7			31.0	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.4	15.6	6.3	34.1	12.0	8.9	7.2	33.3
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.4	4.8	2.9	17.8	7.7	2.8	3.5	23.1
Green Ext Time (p_c), s	0.0	0.4	0.0	4.5	0.3	0.0	0.0	5.0

Intersection Summary	
HCM 6th Ctrl Delay	18.0
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
4: N WILLOW AVE & COPPER AVE

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	97	538	97	817	108	323	140	441	215	129
v/c Ratio	0.58	0.60	0.55	0.84	0.59	0.87	0.33	0.93	0.32	0.20
Control Delay	64.2	39.1	61.1	40.0	62.1	67.6	8.5	68.5	29.3	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.2	39.1	61.1	40.0	62.1	67.6	8.5	68.5	29.3	5.8
Queue Length 50th (ft)	69	178	69	247	77	231	0	324	114	0
Queue Length 95th (ft)	130	243	127	327	140	#407	52	#563	196	43
Internal Link Dist (ft)		1168		2435		1529			9418	
Turn Bay Length (ft)	300		300		300		200	300		200
Base Capacity (vph)	201	1052	233	1158	233	404	455	476	678	658
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.51	0.42	0.71	0.46	0.80	0.31	0.93	0.32	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
4: N WILLOW AVE & COPPER AVE

CUM PM
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	90	450	50	90	440	320	100	300	130	410	200	120
Future Volume (veh/h)	90	450	50	90	440	320	100	300	130	410	200	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	97	484	54	97	473	344	108	323	140	441	215	129
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	902	100	124	550	399	136	367	311	473	720	610
Arrive On Green	0.07	0.28	0.28	0.07	0.28	0.28	0.08	0.20	0.20	0.27	0.39	0.39
Sat Flow, veh/h	1781	3224	358	1781	1966	1425	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	97	266	272	97	427	390	108	323	140	441	215	129
Grp Sat Flow(s),veh/h/ln	1781	1777	1806	1781	1777	1614	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	5.5	13.0	13.1	5.5	23.4	23.5	6.1	17.2	8.0	24.8	8.2	5.6
Cycle Q Clear(g_c), s	5.5	13.0	13.1	5.5	23.4	23.5	6.1	17.2	8.0	24.8	8.2	5.6
Prop In Lane	1.00		0.20	1.00		0.88	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	497	505	124	498	452	136	367	311	473	720	610
V/C Ratio(X)	0.79	0.53	0.54	0.78	0.86	0.86	0.79	0.88	0.45	0.93	0.30	0.21
Avail Cap(c_a), veh/h	217	569	578	252	603	548	252	434	368	513	720	610
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.9	31.3	31.3	46.9	35.0	35.0	46.5	40.0	36.3	36.8	21.9	21.1
Incr Delay (d2), s/veh	10.5	0.9	0.9	10.4	10.3	11.5	9.9	16.5	1.0	23.4	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	5.4	5.5	2.7	10.8	10.0	3.0	9.1	3.0	13.1	3.4	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.5	32.1	32.2	57.3	45.3	46.5	56.4	56.5	37.3	60.1	22.1	21.3
LnGrp LOS	E	C	C	E	D	D	E	E	D	E	C	C
Approach Vol, veh/h		635			914			571			785	
Approach Delay, s/veh		36.0			47.1			51.8			43.3	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	31.7	25.3	11.6	33.9	12.3	44.7	11.6	33.9
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	26.8	19.2	7.5	15.1	8.1	10.2	7.5	25.5
Green Ext Time (p_c), s	0.4	0.9	0.1	2.6	0.1	1.5	0.1	3.2

Intersection Summary	
HCM 6th Ctrl Delay	44.6
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: N FRIANT RD & N WILLOW AVE

AM CUM PLUS PROJECT
no improvements

Intersection	
Int Delay, s/veh	191.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Vol, veh/h	10	10	10	70	10	582	10	340	20	539	380	10
Future Vol, veh/h	10	10	10	70	10	582	10	340	20	539	380	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	300	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	12	12	81	12	677	12	395	23	627	442	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1930	2144	227	1912	2139	-	454	0	0	418	0	0
Stage 1	1702	1702	-	431	431	-	-	-	-	-	-	-
Stage 2	228	442	-	1481	1708	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	40	48	776	~ 41	48	0	1103	-	-	1138	-	-
Stage 1	95	146	-	573	581	0	-	-	-	-	-	-
Stage 2	754	575	-	131	145	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	13	21	776	~ 13	21	-	1103	-	-	1138	-	-
Mov Cap-2 Maneuver	13	21	-	~ 13	21	-	-	-	-	-	-	-
Stage 1	94	66	-	567	575	-	-	-	-	-	-	-
Stage 2	731	569	-	~ 48	65	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 586.5	$ 3075.5	0.2	6.9
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1103	-	-	24	14	-	1138	-	-
HCM Lane V/C Ratio	0.011	-	-	1.453	6.645	-	0.551	-	-
HCM Control Delay (s)	8.3	-	-	$ 586.5	$ 3075.5	0	12	-	-
HCM Lane LOS	A	-	-	F	F	A	B	-	-
HCM 95th %tile Q(veh)	0	-	-	4.4	12.6	-	3.5	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	80

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Vol, veh/h	40	480	50	152	696	40	30	20	209	100	30	80
Future Vol, veh/h	40	480	50	152	696	40	30	20	209	100	30	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	545	57	173	791	45	34	23	238	114	34	91

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	836	0	0	602	0	0	1394	1817	273	1511	1829	396
Stage 1	-	-	-	-	-	-	635	635	-	1137	1137	-
Stage 2	-	-	-	-	-	-	759	1182	-	374	692	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	794	-	-	971	-	-	101	77	725	~ 83	76	603
Stage 1	-	-	-	-	-	-	433	471	-	215	275	-
Stage 2	-	-	-	-	-	-	365	262	-	619	443	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	794	-	-	971	-	-	39	60	725	~ 33	59	603
Mov Cap-2 Maneuver	-	-	-	-	-	-	39	60	-	~ 33	59	-
Stage 1	-	-	-	-	-	-	408	444	-	203	226	-
Stage 2	-	-	-	-	-	-	216	215	-	373	418	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.6	47.9	$ 666
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	39	60	725	794	-	-	971	-	-	33	59	603
HCM Lane V/C Ratio	0.874	0.379	0.328	0.057	-	-	0.178	-	-	3.444	0.578	0.151
HCM Control Delay (s)	261.6	97.7	12.4	9.8	-	-	9.5	-	-	$ 1350.4	128.8	12
HCM Lane LOS	F	F	B	A	-	-	A	-	-	F	F	B
HCM 95th %tile Q(veh)	3.3	1.4	1.4	0.2	-	-	0.6	-	-	13.3	2.3	0.5

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	370.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✥	
Traffic Vol, veh/h	20	610	280	89	509	10	190	10	65	10	10	30
Future Vol, veh/h	20	610	280	89	509	10	190	10	65	10	10	30
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	813	373	119	679	13	253	13	87	13	13	40
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	615	184	24	18.3
HCM LOS	F	F	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	100%	0%	20%
Vol Thru, %	0%	13%	0%	69%	0%	98%	20%
Vol Right, %	0%	87%	0%	31%	0%	2%	60%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	190	75	20	890	89	519	50
LT Vol	190	0	20	0	89	0	10
Through Vol	0	10	0	610	0	509	10
RT Vol	0	65	0	280	0	10	30
Lane Flow Rate	253	100	27	1187	119	692	67
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.596	0.204	0.058	2.345	0.255	1.387	0.168
Departure Headway (Hd)	10.613	9.426	8.368	7.623	9.361	8.822	12.766
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	342	383	431	487	387	415	283
Service Time	8.313	7.126	6.068	5.323	7.061	6.522	10.766
HCM Lane V/C Ratio	0.74	0.261	0.063	2.437	0.307	1.667	0.237
HCM Control Delay	27.8	14.5	11.6	628.6	15.2	213	18.3
HCM Lane LOS	D	B	B	F	C	F	C
HCM 95th-tile Q	3.6	0.8	0.2	84.3	1	27.5	0.6

4: N WILLOW AVE & COPPER AVE

Intersection	
Intersection Delay, s/veh	691.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	112	528	166	121	373	310	88	230	92	290	278	101
Future Vol, veh/h	112	528	166	121	373	310	88	230	92	290	278	101
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	142	668	210	153	472	392	111	291	116	367	352	128
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	827.3	811.6	283.9	634.6
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	21%	14%	15%	43%
Vol Thru, %	56%	66%	46%	42%
Vol Right, %	22%	21%	39%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	410	806	804	669
LT Vol	88	112	121	290
Through Vol	230	528	373	278
RT Vol	92	166	310	101
Lane Flow Rate	519	1020	1018	847
Geometry Grp	1	1	1	1
Degree of Util (X)	1.375	2.702	2.666	2.265
Departure Headway (Hd)	32.151	23.201	23.282	23.301
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	119	173	173	169
Service Time	30.151	21.201	21.282	21.301
HCM Lane V/C Ratio	4.361	5.896	5.884	5.012
HCM Control Delay	283.9	827.3	811.6	634.6
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	10.7	37.2	36.4	29

7: PROJECT ACCESS WEST & E COPPER AVE

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	↰↱	
Traffic Vol, veh/h	679	5	5	590	17	16
Future Vol, veh/h	679	5	5	590	17	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	92	92	79	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	905	5	5	747	18	17

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	910	0	1665	908
Stage 1	-	-	-	-	908	-
Stage 2	-	-	-	-	757	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	748	-	106	334
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	463	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	748	-	105	334
Mov Cap-2 Maneuver	-	-	-	-	105	-
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	458	-

Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		34.6	
HCM LOS					D	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	157	-	-	748	-
HCM Lane V/C Ratio	0.228	-	-	0.007	-
HCM Control Delay (s)	34.6	-	-	9.8	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0	-

8: PROJECT ACCESS EAST & E COPPER AVE

Intersection	
Int Delay, s/veh	2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Traffic Vol, veh/h	678	17	17	545	50	50
Future Vol, veh/h	678	17	17	545	50	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	737	18	18	592	54	54

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	755	0	1374	746
Stage 1	-	-	-	-	746	-
Stage 2	-	-	-	-	628	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	855	-	160	413
Stage 1	-	-	-	-	469	-
Stage 2	-	-	-	-	532	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	855	-	155	413
Mov Cap-2 Maneuver	-	-	-	-	155	-
Stage 1	-	-	-	-	469	-
Stage 2	-	-	-	-	516	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	35.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	225	-	-	855	-
HCM Lane V/C Ratio	0.483	-	-	0.022	-
HCM Control Delay (s)	35.1	-	-	9.3	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	2.4	-	-	0.1	-

5: E INTERNATIONAL AVE & N CHESTNUT AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	361	721	49	364	613	143	16	389	262	123	169	115
v/c Ratio	0.88	0.84	0.11	0.88	0.71	0.31	0.16	0.84	0.56	0.72	0.14	0.19
Control Delay	66.0	51.3	0.5	66.4	45.1	11.4	59.4	58.0	25.1	75.9	28.2	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.0	51.3	0.5	66.4	45.1	11.4	59.4	58.0	25.1	75.9	28.2	6.7
Queue Length 50th (ft)	264	283	0	267	231	13	12	281	91	93	43	0
Queue Length 95th (ft)	257	227	0	261	192	18	26	259	86	114	56	7
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	475	934	475	475	934	489	120	548	530	185	1280	636
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.77	0.10	0.77	0.66	0.29	0.13	0.71	0.49	0.66	0.13	0.18

Intersection Summary

HCM 6th Signalized Intersection Summary
5: E INTERNATIONAL AVE & N CHESTNUT AVE

AM CUM PLUS PROJECT
06/05/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	220	440	30	222	374	87	10	237	160	75	103	70
Future Volume (veh/h)	220	440	30	222	374	87	10	237	160	75	103	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.96	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	361	721	49	364	613	143	16	389	262	123	169	115
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	396	882	379	399	888	382	32	489	399	151	1169	519
Arrive On Green	0.22	0.25	0.25	0.22	0.25	0.25	0.02	0.26	0.26	0.08	0.33	0.33
Sat Flow, veh/h	1781	3554	1528	1781	3554	1528	1781	1870	1525	1781	3554	1578
Grp Volume(v), veh/h	361	721	49	364	613	143	16	389	262	123	169	115
Grp Sat Flow(s),veh/h/ln	1781	1777	1528	1781	1777	1528	1781	1870	1525	1781	1777	1578
Q Serve(g_s), s	21.1	20.5	2.7	21.3	16.7	8.3	1.0	20.7	16.4	7.3	3.6	5.6
Cycle Q Clear(g_c), s	21.1	20.5	2.7	21.3	16.7	8.3	1.0	20.7	16.4	7.3	3.6	5.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	396	882	379	399	888	382	32	489	399	151	1169	519
V/C Ratio(X)	0.91	0.82	0.13	0.91	0.69	0.37	0.51	0.79	0.66	0.81	0.14	0.22
Avail Cap(c_a), veh/h	492	924	397	492	924	397	125	556	454	192	1190	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.6	37.9	31.2	40.5	36.3	33.2	52.0	36.8	35.2	48.1	25.3	26.0
Incr Delay (d2), s/veh	18.7	5.6	0.2	19.0	2.1	0.6	12.1	7.0	2.9	18.7	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	9.3	1.0	11.1	7.3	3.1	0.5	10.2	6.2	4.0	1.5	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.3	43.5	31.4	59.4	38.4	33.8	64.1	43.8	38.0	66.7	25.3	26.2
LnGrp LOS	E	D	C	E	D	C	E	D	D	E	C	C
Approach Vol, veh/h		1131			1120			667			407	
Approach Delay, s/veh		48.0			44.7			42.0			38.1	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.6	33.2	28.4	31.7	6.4	40.3	28.2	31.9
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	9.3	22.7	23.3	22.5	3.0	7.6	23.1	18.7
Green Ext Time (p_c), s	0.1	2.3	0.6	2.2	0.0	1.4	0.6	3.0

Intersection Summary			
HCM 6th Ctrl Delay			44.5
HCM 6th LOS			D

Notes

User approved pedestrian interval to be less than phase max green.

6: N CHESTNUT AVE & E BEHYMER AVE

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	184	355	53	118	237	92	79	272	184	92	284	224
v/c Ratio	0.55	0.36	0.10	0.45	0.38	0.22	0.35	0.58	0.34	0.38	0.59	0.39
Control Delay	38.2	26.9	0.4	41.1	31.4	1.3	41.5	31.7	6.5	40.7	31.0	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	26.9	0.4	41.1	31.4	1.3	41.5	31.7	6.5	40.7	31.0	6.1
Queue Length 50th (ft)	69	69	0	45	46	0	30	99	0	35	102	0
Queue Length 95th (ft)	168	126	0	123	96	0	92	206	27	102	210	27
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	645	1335	669	416	876	515	329	965	908	387	1025	972
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.27	0.08	0.28	0.27	0.18	0.24	0.28	0.20	0.24	0.28	0.23

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	140	270	40	90	180	70	60	207	140	70	216	170
Future Volume (veh/h)	140	270	40	90	180	70	60	207	140	70	216	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	184	355	53	118	237	92	79	272	184	92	284	224
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	246	649	290	155	469	209	125	431	365	136	442	375
Arrive On Green	0.14	0.18	0.18	0.09	0.13	0.13	0.07	0.23	0.23	0.08	0.24	0.24
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	184	355	53	118	237	92	79	272	184	92	284	224
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	4.4	4.0	1.2	2.9	2.7	2.4	1.9	5.8	4.5	2.2	6.0	5.6
Cycle Q Clear(g_c), s	4.4	4.0	1.2	2.9	2.7	2.4	1.9	5.8	4.5	2.2	6.0	5.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	246	649	290	155	469	209	125	431	365	136	442	375
V/C Ratio(X)	0.75	0.55	0.18	0.76	0.51	0.44	0.63	0.63	0.50	0.67	0.64	0.60
Avail Cap(c_a), veh/h	907	1754	782	585	1110	495	464	1334	1130	544	1418	1202
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.3	16.4	15.3	19.7	17.8	17.7	20.0	15.3	14.8	19.9	15.2	15.0
Incr Delay (d2), s/veh	4.5	0.7	0.3	7.4	0.8	1.5	5.2	1.5	1.1	5.7	1.6	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	1.4	0.4	1.3	1.0	0.8	0.9	2.2	1.4	1.0	2.3	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.8	17.1	15.6	27.1	18.7	19.1	25.1	16.8	15.9	25.5	16.7	16.5
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		592			447			535			600	
Approach Delay, s/veh		18.8			21.0			17.7			18.0	
Approach LOS		B			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	14.7	8.3	13.3	7.6	14.9	10.6	11.0
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	4.2	7.8	4.9	6.0	3.9	8.0	6.4	4.7
Green Ext Time (p_c), s	0.1	2.1	0.2	2.0	0.1	2.4	0.4	1.1

Intersection Summary			
HCM 6th Ctrl Delay			18.8
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

1: N FRIANT RD & N WILLOW AVE

	→	←	↖	↰	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	93	677	12	418	627	454
v/c Ratio	0.13	0.40	0.43	0.09	0.59	0.77	0.18
Control Delay	20.6	33.1	0.8	39.5	31.7	27.6	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	33.1	0.8	39.5	31.7	27.6	6.1
Queue Length 50th (ft)	10	39	0	5	90	217	26
Queue Length 95th (ft)	31	79	0	24	160	#543	100
Internal Link Dist (ft)	1803	10507			9484		648
Turn Bay Length (ft)			220	205		600	
Base Capacity (vph)	673	571	1583	138	1007	953	2590
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.16	0.43	0.09	0.42	0.66	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
1: N FRIANT RD & N WILLOW AVE

AM CUM PLUS PROJECT
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰	↱	↰	↑↱		↰	↑↱	
Traffic Volume (veh/h)	10	10	10	70	10	582	10	340	20	539	380	10
Future Volume (veh/h)	10	10	10	70	10	582	10	340	20	539	380	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	12	12	12	81	12	0	12	395	23	627	442	12
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	144	66	52	268	17		28	635	37	727	2045	55
Arrive On Green	0.09	0.09	0.09	0.09	0.09	0.00	0.02	0.19	0.19	0.41	0.58	0.58
Sat Flow, veh/h	419	737	578	1316	195	1585	1781	3413	198	1781	3534	96
Grp Volume(v), veh/h	36	0	0	93	0	0	12	205	213	627	222	232
Grp Sat Flow(s),veh/h/ln	1735	0	0	1511	0	1585	1781	1777	1835	1781	1777	1853
Q Serve(g_s), s	0.0	0.0	0.0	1.8	0.0	0.0	0.3	4.8	4.8	14.4	2.7	2.7
Cycle Q Clear(g_c), s	0.9	0.0	0.0	2.6	0.0	0.0	0.3	4.8	4.8	14.4	2.7	2.7
Prop In Lane	0.33		0.33	0.87		1.00	1.00		0.11	1.00		0.05
Lane Grp Cap(c), veh/h	262	0	0	285	0		28	331	341	727	1028	1072
V/C Ratio(X)	0.14	0.00	0.00	0.33	0.00		0.44	0.62	0.62	0.86	0.22	0.22
Avail Cap(c_a), veh/h	1081	0	0	1021	0		199	725	749	1371	1894	1976
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.0	0.0	0.0	19.7	0.0	0.0	21.9	16.8	16.8	12.1	4.5	4.5
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.7	0.0	0.0	10.4	1.9	1.9	3.2	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.0	0.8	0.0	0.0	0.2	1.6	1.7	3.9	0.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.2	0.0	0.0	20.4	0.0	0.0	32.3	18.7	18.7	15.3	4.7	4.6
LnGrp LOS	B	A	A	C	A		C	B	B	B	A	A
Approach Vol, veh/h		36			93	A		430			1081	
Approach Delay, s/veh		19.2			20.4			19.1			10.8	
Approach LOS		B			C			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	22.8	13.5		8.5	5.2	31.1		8.5
Change Period (Y+Rc), s	4.5	5.2		4.5	4.5	5.2		4.5
Max Green Setting (Gmax), s	34.5	18.3		27.0	5.0	47.8		27.0
Max Q Clear Time (g_c+I1), s	16.4	6.8		2.9	2.3	4.7		4.6
Green Ext Time (p_c), s	1.9	1.5		0.1	0.0	2.3		0.3

Intersection Summary	
HCM 6th Ctrl Delay	13.7
HCM 6th LOS	B

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

2: MILLBROOK AVE & E COPPER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	45	545	57	173	791	45	34	23	238	114	34	91
v/c Ratio	0.23	0.53	0.11	0.80	0.58	0.07	0.18	0.08	0.53	0.53	0.06	0.16
Control Delay	36.2	21.9	0.4	60.6	20.6	0.2	35.7	24.1	8.3	43.1	21.7	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.2	21.9	0.4	60.6	20.6	0.2	35.7	24.1	8.3	43.1	21.7	3.1
Queue Length 50th (ft)	15	80	0	61	124	0	11	8	0	39	8	0
Queue Length 95th (ft)	62	191	0	#267	289	0	51	27	47	#170	35	17
Internal Link Dist (ft)		1334			1174			566			314	
Turn Bay Length (ft)	240		210	265		260	330		150	175		100
Base Capacity (vph)	217	1859	886	217	1859	886	217	1049	995	217	1049	944
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.29	0.06	0.80	0.43	0.05	0.16	0.02	0.24	0.53	0.03	0.10

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
2: MILLBROOK AVE & E COPPER AVE

AM CUM PLUS PROJECT
W IMPROVEMENTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	40	480	50	152	696	40	30	20	209	100	30	80
Future Volume (veh/h)	40	480	50	152	696	40	30	20	209	100	30	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	45	545	57	173	791	45	34	23	238	114	34	91
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	81	878	392	218	1150	513	66	366	310	147	451	382
Arrive On Green	0.05	0.25	0.25	0.12	0.32	0.32	0.04	0.20	0.20	0.08	0.24	0.24
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	45	545	57	173	791	45	34	23	238	114	34	91
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	1.3	7.2	1.5	5.0	10.3	1.0	1.0	0.5	7.5	3.3	0.7	2.5
Cycle Q Clear(g_c), s	1.3	7.2	1.5	5.0	10.3	1.0	1.0	0.5	7.5	3.3	0.7	2.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	81	878	392	218	1150	513	66	366	310	147	451	382
V/C Ratio(X)	0.55	0.62	0.15	0.79	0.69	0.09	0.51	0.06	0.77	0.78	0.08	0.24
Avail Cap(c_a), veh/h	252	2144	956	252	2144	956	252	1210	1025	252	1210	1025
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.8	17.8	15.6	22.6	15.6	12.5	25.1	17.4	20.2	23.9	15.6	16.2
Incr Delay (d2), s/veh	5.7	0.7	0.2	14.1	0.7	0.1	6.0	0.1	4.0	8.5	0.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	2.4	0.4	2.6	3.2	0.3	0.5	0.2	2.6	1.6	0.3	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.5	18.5	15.8	36.8	16.4	12.6	31.1	17.4	24.2	32.3	15.6	16.5
LnGrp LOS	C	B	B	D	B	B	C	B	C	C	B	B
Approach Vol, veh/h		647			1009			295			239	
Approach Delay, s/veh		19.1			19.7			24.4			23.9	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	14.9	11.0	18.3	6.5	17.3	6.9	22.4
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	34.3	7.5	32.0	7.5	34.3	7.5	32.0
Max Q Clear Time (g_c+I1), s	5.3	9.5	7.0	9.2	3.0	4.5	3.3	12.3
Green Ext Time (p_c), s	0.0	0.9	0.0	3.4	0.0	0.4	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	20.6
HCM 6th LOS	C

3: N CHESTNUT AVE & E COPPER AVE

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	27	813	373	119	679	13	253	100	13	13	40
v/c Ratio	0.23	0.91	0.42	0.72	0.65	0.01	0.81	0.20	0.12	0.08	0.14
Control Delay	59.9	42.4	8.3	76.8	24.1	0.0	65.8	10.4	58.2	47.6	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.9	42.4	8.3	76.8	24.1	0.0	65.8	10.4	58.2	47.6	1.1
Queue Length 50th (ft)	18	480	46	83	338	0	172	7	9	9	0
Queue Length 95th (ft)	47	675	88	#177	504	0	#301	33	28	23	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	133	1118	1048	168	1155	1033	346	548	133	278	358
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.73	0.36	0.71	0.59	0.01	0.73	0.18	0.10	0.05	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

3: N CHESTNUT AVE & E COPPER AVE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↑	↱
Traffic Volume (veh/h)	20	610	280	89	509	10	190	10	65	10	10	30
Future Volume (veh/h)	20	610	280	89	509	10	190	10	65	10	10	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	27	813	373	119	679	13	253	13	87	13	13	40
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	49	917	777	149	1023	867	292	43	286	27	102	87
Arrive On Green	0.03	0.49	0.49	0.08	0.55	0.55	0.16	0.20	0.20	0.02	0.05	0.05
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	210	1407	1781	1870	1585
Grp Volume(v), veh/h	27	813	373	119	679	13	253	0	100	13	13	40
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1617	1781	1870	1585
Q Serve(g_s), s	1.3	35.3	14.1	5.9	23.3	0.3	12.5	0.0	4.7	0.7	0.6	2.2
Cycle Q Clear(g_c), s	1.3	35.3	14.1	5.9	23.3	0.3	12.5	0.0	4.7	0.7	0.6	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.87	1.00		1.00
Lane Grp Cap(c), veh/h	49	917	777	149	1023	867	292	0	328	27	102	87
V/C Ratio(X)	0.56	0.89	0.48	0.80	0.66	0.02	0.87	0.00	0.30	0.47	0.13	0.46
Avail Cap(c_a), veh/h	148	1241	1052	188	1283	1087	385	0	440	148	259	220
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	20.7	15.3	40.5	14.5	9.3	36.7	0.0	30.5	44.0	40.6	41.3
Incr Delay (d2), s/veh	9.6	6.3	0.5	17.1	0.9	0.0	14.8	0.0	0.5	12.1	0.6	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	14.5	4.5	3.1	8.3	0.1	6.5	0.0	1.8	0.4	0.3	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.9	27.0	15.8	57.6	15.4	9.3	51.5	0.0	31.0	56.1	41.1	45.1
LnGrp LOS	D	C	B	E	B	A	D	A	C	E	D	D
Approach Vol, veh/h		1213			811			353			66	
Approach Delay, s/veh		24.1			21.5			45.7			46.5	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.9	22.8	12.0	49.4	19.3	9.4	7.0	54.5
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.7	6.7	7.9	37.3	14.5	4.2	3.3	25.3
Green Ext Time (p_c), s	0.0	0.4	0.0	6.9	0.3	0.1	0.0	4.6

Intersection Summary	
HCM 6th Ctrl Delay	27.0
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

4: N WILLOW AVE & COPPER AVE

	↗	→	↙	←	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	142	878	153	864	111	291	116	367	352	128
v/c Ratio	0.76	0.90	0.74	0.80	0.60	0.83	0.28	0.88	0.59	0.22
Control Delay	76.0	51.2	70.9	35.9	63.3	64.8	5.4	64.3	37.3	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.0	51.2	70.9	35.9	63.3	64.8	5.4	64.3	37.3	6.0
Queue Length 50th (ft)	109	336	116	264	83	216	0	272	222	0
Queue Length 95th (ft)	#169	351	164	278	124	272	16	330	276	29
Internal Link Dist (ft)		1168		2435		1529			9418	
Turn Bay Length (ft)	300		300		300		200	300		200
Base Capacity (vph)	201	1043	233	1166	233	403	455	476	663	646
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.84	0.66	0.74	0.48	0.72	0.25	0.77	0.53	0.20

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	112	528	166	121	373	310	88	230	92	290	278	101
Future Volume (veh/h)	112	528	166	121	373	310	88	230	92	290	278	101
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	142	668	210	153	472	392	111	291	116	367	352	128
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	173	771	242	186	547	453	140	340	288	405	618	524
Arrive On Green	0.10	0.29	0.29	0.10	0.30	0.30	0.08	0.18	0.18	0.23	0.33	0.33
Sat Flow, veh/h	1781	2661	836	1781	1844	1528	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	142	446	432	153	455	409	111	291	116	367	352	128
Grp Sat Flow(s),veh/h/ln	1781	1777	1720	1781	1777	1595	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	7.7	23.5	23.5	8.3	23.9	23.9	6.0	14.9	6.4	19.8	15.3	5.8
Cycle Q Clear(g_c), s	7.7	23.5	23.5	8.3	23.9	23.9	6.0	14.9	6.4	19.8	15.3	5.8
Prop In Lane	1.00		0.49	1.00		0.96	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	173	515	498	186	527	473	140	340	288	405	618	524
V/C Ratio(X)	0.82	0.87	0.87	0.82	0.86	0.86	0.79	0.86	0.40	0.91	0.57	0.24
Avail Cap(c_a), veh/h	226	591	572	262	627	563	262	451	383	533	736	624
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.7	33.2	33.2	43.3	32.8	32.8	44.6	39.1	35.6	37.0	27.2	24.0
Incr Delay (d2), s/veh	16.4	11.7	12.1	13.5	10.5	11.7	9.6	11.8	0.9	15.8	0.8	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	11.0	10.7	4.2	11.0	10.1	2.9	7.5	2.4	9.8	6.4	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.1	44.9	45.3	56.8	43.3	44.5	54.2	50.9	36.5	52.9	28.0	24.3
LnGrp LOS	E	D	D	E	D	D	D	D	D	D	C	C
Approach Vol, veh/h		1020			1017			518			847	
Approach Delay, s/veh		47.2			45.8			48.4			38.2	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.9	23.1	14.8	33.8	12.3	37.8	14.1	34.4
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	21.8	16.9	10.3	25.5	8.0	17.3	9.7	25.9
Green Ext Time (p_c), s	0.7	1.0	0.1	2.9	0.1	2.2	0.1	3.3

Intersection Summary	
HCM 6th Ctrl Delay	44.7
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

1: N FRIANT RD & N WILLOW AVE

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰↑	↱	↰	↑↑↱		↰	↑↑↱	
Traffic Vol, veh/h	10	10	10	30	10	591	10	470	70	634	470	10
Future Vol, veh/h	10	10	10	30	10	591	10	470	70	634	470	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	-	-	-	-	-	220	205	-	-	300	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	11	11	32	11	635	11	505	75	682	505	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2155	2477	258	2187	2445	-	516	0	0	580	0	0
Stage 1	1875	1875	-	565	565	-	-	-	-	-	-	-
Stage 2	280	602	-	1622	1880	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	-	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	-	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	27	29	741	~ 25	31	0	1046	-	-	990	-	-
Stage 1	74	119	-	477	506	0	-	-	-	-	-	-
Stage 2	703	487	-	107	119	0	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 9	741	-	~ 10	-	1046	-	-	990	-	-
Mov Cap-2 Maneuver	-	~ 9	-	-	~ 10	-	-	-	-	-	-	-
Stage 1	73	37	-	472	500	-	-	-	-	-	-	-
Stage 2	681	482	-	~ 23	37	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0.2	9.3
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1046	-	-	-	-	-	990	-	-
HCM Lane V/C Ratio	0.01	-	-	-	-	-	0.689	-	-
HCM Control Delay (s)	8.5	-	-	-	-	0	16.3	-	-
HCM Lane LOS	A	-	-	-	-	A	C	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-	5.8	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

2: MILLBROOK AVE & E COPPER AVE

Intersection	
Int Delay, s/veh	112.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↱	
Traffic Vol, veh/h	70	775	50	111	487	100	50	50	174	60	20	40
Future Vol, veh/h	70	775	50	111	487	100	50	50	174	60	20	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	240	-	210	265	-	260	330	-	150	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	75	833	54	119	524	108	54	54	187	65	22	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	632	0	0	887	0	0	1494	1853	417	1356	1799	262
Stage 1	-	-	-	-	-	-	983	983	-	762	762	-
Stage 2	-	-	-	-	-	-	511	870	-	594	1037	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	947	-	-	759	-	-	85	73	585	108	79	737
Stage 1	-	-	-	-	-	-	267	325	-	363	412	-
Stage 2	-	-	-	-	-	-	514	367	-	458	307	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	947	-	-	759	-	-	~ 49	57	585	~ 10	61	737
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 49	57	-	~ 10	61	-
Stage 1	-	-	-	-	-	-	246	299	-	334	347	-
Stage 2	-	-	-	-	-	-	383	309	-	235	283	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.7	102.3	$ 1615.8
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	NBLn3	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	49	57	585	947	-	-	759	-	-	10	157
HCM Lane V/C Ratio	1.097	0.943	0.32	0.079	-	-	0.157	-	-	6.452	0.411
HCM Control Delay (s)	292.1	219.6	14	9.1	-	-	10.6	-	$	3188.4	43.1
HCM Lane LOS	F	F	B	A	-	-	B	-	-	F	E
HCM 95th %tile Q(veh)	4.8	4.3	1.4	0.3	-	-	0.6	-	-	9.4	1.8

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Intersection Delay, s/veh	201.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱			✢	
Traffic Vol, veh/h	40	603	150	24	671	10	150	10	77	10	10	20
Future Vol, veh/h	40	603	150	24	671	10	150	10	77	10	10	20
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	678	169	27	754	11	169	11	87	11	11	22
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	2
HCM Control Delay	254.9	213.1	16.5	14.9
HCM LOS	F	F	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	100%	0%	25%
Vol Thru, %	0%	11%	0%	80%	0%	99%	25%
Vol Right, %	0%	89%	0%	20%	0%	1%	50%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	150	87	40	753	24	681	40
LT Vol	150	0	40	0	24	0	10
Through Vol	0	10	0	603	0	671	10
RT Vol	0	77	0	150	0	10	20
Lane Flow Rate	169	98	45	846	27	765	45
Geometry Grp	7	7	7	7	7	7	6
Degree of Util (X)	0.39	0.196	0.089	1.532	0.054	1.418	0.108
Departure Headway (Hd)	9.664	8.482	7.678	7.02	7.807	7.281	10.622
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	376	426	470	525	462	505	340
Service Time	7.364	6.182	5.378	4.72	5.507	4.981	8.622
HCM Lane V/C Ratio	0.449	0.23	0.096	1.611	0.058	1.515	0.132
HCM Control Delay	18.4	13.2	11.1	267.9	11	220.2	14.9
HCM Lane LOS	C	B	B	F	B	F	B
HCM 95th-tile Q	1.8	0.7	0.3	41.2	0.2	33.6	0.4

Intersection	
Intersection Delay, s/veh	538.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	91	455	83	93	455	320	155	300	130	410	201	123
Future Vol, veh/h	91	455	83	93	455	320	155	300	130	410	201	123
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	98	489	89	100	489	344	167	323	140	441	216	132
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	432.4	703.6	378.3	561.7
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	14%	11%	56%
Vol Thru, %	51%	72%	52%	27%
Vol Right, %	22%	13%	37%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	585	629	868	734
LT Vol	155	91	93	410
Through Vol	300	455	455	201
RT Vol	130	83	320	123
Lane Flow Rate	629	676	933	789
Geometry Grp	1	1	1	1
Degree of Util (X)	1.669	1.8	2.445	2.114
Departure Headway (Hd)	23.691	23.17	19.237	20.725
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	164	162	205	189
Service Time	21.691	21.17	17.237	18.725
HCM Lane V/C Ratio	3.835	4.173	4.551	4.175
HCM Control Delay	378.3	432.4	703.6	561.7
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	18	20.6	38.3	28.9

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Traffic Vol, veh/h	515	19	18	435	11	11
Future Vol, veh/h	515	19	18	435	11	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	92	92	89	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	579	21	20	489	12	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	600	0	1119	590
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	529	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	977	-	229	508
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	591	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	977	-	223	508
Mov Cap-2 Maneuver	-	-	-	-	223	-
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	574	-

Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		17.6	
HCM LOS					C	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	310	-	-	977	-
HCM Lane V/C Ratio	0.077	-	-	0.02	-
HCM Control Delay (s)	17.6	-	-	8.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Traffic Vol, veh/h	469	57	55	419	34	32
Future Vol, veh/h	469	57	55	419	34	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	92	92	89	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	527	62	60	471	37	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	589	0	1149	558
Stage 1	-	-	-	-	558	-
Stage 2	-	-	-	-	591	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	986	-	219	529
Stage 1	-	-	-	-	573	-
Stage 2	-	-	-	-	553	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	986	-	201	529
Mov Cap-2 Maneuver	-	-	-	-	201	-
Stage 1	-	-	-	-	573	-
Stage 2	-	-	-	-	508	-

Approach	EB		WB		NB	
HCM Control Delay, s	0		1		21.7	
HCM LOS					C	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	287	-	-	986	-
HCM Lane V/C Ratio	0.25	-	-	0.061	-
HCM Control Delay (s)	21.7	-	-	8.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1	-	-	0.2	-

5: E INTERNATIONAL AVE & N CHESTNUT AVE

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	102	193	34	136	238	68	34	156	68	91	186	159
v/c Ratio	0.33	0.26	0.08	0.40	0.30	0.16	0.15	0.37	0.16	0.33	0.16	0.26
Control Delay	35.3	26.4	0.4	34.4	25.0	2.9	39.2	28.6	3.1	37.5	19.7	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.3	26.4	0.4	34.4	25.0	2.9	39.2	28.6	3.1	37.5	19.7	5.9
Queue Length 50th (ft)	32	32	0	43	38	0	11	49	0	29	20	0
Queue Length 95th (ft)	128	88	0	159	102	12	59	150	13	123	81	45
Internal Link Dist (ft)		2482			2416			777			1023	
Turn Bay Length (ft)	200		150	245		150	190		85	200		200
Base Capacity (vph)	982	1934	896	982	1951	903	266	1095	957	408	2251	1047
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.10	0.04	0.14	0.12	0.08	0.13	0.14	0.07	0.22	0.08	0.15

Intersection Summary

HCM 6th Signalized Intersection Summary
5: E INTERNATIONAL AVE & N CHESTNUT AVE

PM CUM PLUS PROJECT

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↑	↱
Traffic Volume (veh/h)	90	170	30	120	209	60	30	137	60	80	164	140
Future Volume (veh/h)	90	170	30	120	209	60	30	137	60	80	164	140
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	102	193	34	136	238	68	34	156	68	91	186	159
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	150	560	248	184	628	278	70	344	289	141	795	352
Arrive On Green	0.08	0.16	0.16	0.10	0.18	0.18	0.04	0.18	0.18	0.08	0.22	0.22
Sat Flow, veh/h	1781	3554	1570	1781	3554	1572	1781	1870	1572	1781	3554	1574
Grp Volume(v), veh/h	102	193	34	136	238	68	34	156	68	91	186	159
Grp Sat Flow(s),veh/h/ln	1781	1777	1570	1781	1777	1572	1781	1870	1572	1781	1777	1574
Q Serve(g_s), s	2.3	2.0	0.8	3.0	2.4	1.5	0.8	3.0	1.5	2.0	1.7	3.6
Cycle Q Clear(g_c), s	2.3	2.0	0.8	3.0	2.4	1.5	0.8	3.0	1.5	2.0	1.7	3.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	150	560	248	184	628	278	70	344	289	141	795	352
V/C Ratio(X)	0.68	0.34	0.14	0.74	0.38	0.24	0.49	0.45	0.23	0.65	0.23	0.45
Avail Cap(c_a), veh/h	1290	2425	1071	1290	2425	1072	328	1460	1227	503	3122	1383
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.1	15.3	14.8	17.7	14.8	14.4	19.2	14.8	14.2	18.2	13.0	13.7
Incr Delay (d2), s/veh	5.4	0.4	0.3	5.7	0.4	0.5	5.2	0.9	0.4	4.9	0.1	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.7	0.2	1.3	0.8	0.5	0.4	1.1	0.4	0.9	0.6	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.5	15.6	15.0	23.5	15.2	14.9	24.3	15.7	14.6	23.1	13.1	14.6
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		329			442			258			436	
Approach Delay, s/veh		18.0			17.7			16.6			15.7	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.7	12.7	8.7	11.6	6.1	14.3	7.9	12.4
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	11.5	31.8	29.5	27.8	7.5	35.8	29.5	27.8
Max Q Clear Time (g_c+I1), s	4.0	5.0	5.0	4.0	2.8	5.6	4.3	4.4
Green Ext Time (p_c), s	0.1	1.0	0.3	1.2	0.0	1.7	0.2	1.6

Intersection Summary	
HCM 6th Ctrl Delay	17.0
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

6: N CHESTNUT AVE & E BEHYMER AVE

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	112	225	22	44	287	101	45	176	101	112	173	124
v/c Ratio	0.36	0.22	0.04	0.18	0.38	0.22	0.18	0.40	0.20	0.37	0.31	0.21
Control Delay	34.4	22.0	0.1	36.5	27.1	1.7	36.4	27.4	1.0	36.2	23.0	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.4	22.0	0.1	36.5	27.1	1.7	36.4	27.4	1.0	36.2	23.0	2.3
Queue Length 50th (ft)	36	35	0	15	48	0	15	57	0	36	52	0
Queue Length 95th (ft)	131	95	0	66	129	5	67	155	1	137	148	15
Internal Link Dist (ft)		2486			2397			1359			1717	
Turn Bay Length (ft)	255		120	225		75	105		135	115		115
Base Capacity (vph)	814	1655	801	524	1087	599	416	1086	994	488	1131	1028
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.14	0.03	0.08	0.26	0.17	0.11	0.16	0.10	0.23	0.15	0.12

Intersection Summary

HCM 6th Signalized Intersection Summary
6: N CHESTNUT AVE & E BEHYMER AVE

PM CUM PLUS PROJECT

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	100	200	20	39	255	90	40	157	90	100	154	110
Future Volume (veh/h)	100	200	20	39	255	90	40	157	90	100	154	110
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	112	225	22	44	287	101	45	176	101	112	173	124
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	162	719	321	87	570	254	88	320	271	162	397	336
Arrive On Green	0.09	0.20	0.20	0.05	0.16	0.16	0.05	0.17	0.17	0.09	0.21	0.21
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	112	225	22	44	287	101	45	176	101	112	173	124
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	2.3	2.1	0.4	0.9	2.8	2.2	0.9	3.3	2.2	2.3	3.1	2.6
Cycle Q Clear(g_c), s	2.3	2.1	0.4	0.9	2.8	2.2	0.9	3.3	2.2	2.3	3.1	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	162	719	321	87	570	254	88	320	271	162	397	336
V/C Ratio(X)	0.69	0.31	0.07	0.51	0.50	0.40	0.51	0.55	0.37	0.69	0.44	0.37
Avail Cap(c_a), veh/h	1044	2018	900	673	1277	570	533	1534	1300	626	1632	1383
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.9	13.0	12.4	17.8	14.7	14.5	17.8	14.6	14.1	16.9	13.1	12.9
Incr Delay (d2), s/veh	5.2	0.2	0.1	4.5	0.7	1.0	4.5	1.5	0.8	5.2	0.8	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.6	0.1	0.4	0.9	0.7	0.4	1.2	0.7	1.0	1.1	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.2	13.3	12.5	22.3	15.4	15.5	22.3	16.0	14.9	22.2	13.9	13.6
LnGrp LOS	C	B	B	C	B	B	C	B	B	C	B	B
Approach Vol, veh/h		359			432			322			409	
Approach Delay, s/veh		16.0			16.1			16.6			16.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	11.1	6.4	13.0	6.4	12.6	8.0	11.4
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	13.5	31.5	14.5	21.8	11.5	33.5	22.5	13.8
Max Q Clear Time (g_c+I1), s	4.3	5.3	2.9	4.1	2.9	5.1	4.3	4.8
Green Ext Time (p_c), s	0.2	1.3	0.0	1.2	0.0	1.4	0.2	1.3

Intersection Summary	
HCM 6th Ctrl Delay	16.2
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

1: N FRIANT RD & N WILLOW AVE

	→	←	↖	↰	↑	↘	↓
Lane Group	EBT	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	33	43	635	11	580	682	516
v/c Ratio	0.15	0.21	0.40	0.09	0.73	0.77	0.18
Control Delay	22.4	30.6	0.8	39.5	33.2	26.4	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.4	30.6	0.8	39.5	33.2	26.4	5.1
Queue Length 50th (ft)	9	19	0	5	123	256	24
Queue Length 95th (ft)	32	45	0	24	#258	#661	121
Internal Link Dist (ft)	1803	10507			9484		648
Turn Bay Length (ft)			220	205		600	
Base Capacity (vph)	621	555	1583	128	934	886	2849
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.08	0.40	0.09	0.62	0.77	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			↰	↱	↰	↑↱		↰	↑↱	
Traffic Volume (veh/h)	10	10	10	30	10	591	10	470	70	634	470	10
Future Volume (veh/h)	10	10	10	30	10	591	10	470	70	634	470	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	11	11	11	32	11	0	11	505	75	682	505	11
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	124	42	36	198	26		25	707	105	768	2292	50
Arrive On Green	0.06	0.06	0.06	0.06	0.06	0.00	0.01	0.23	0.23	0.43	0.64	0.64
Sat Flow, veh/h	464	653	559	1170	403	1585	1781	3105	459	1781	3556	77
Grp Volume(v), veh/h	33	0	0	43	0	0	11	288	292	682	252	264
Grp Sat Flow(s),veh/h/ln	1676	0	0	1573	0	1585	1781	1777	1788	1781	1777	1856
Q Serve(g_s), s	0.0	0.0	0.0	0.3	0.0	0.0	0.3	7.7	7.7	18.1	3.0	3.0
Cycle Q Clear(g_c), s	0.9	0.0	0.0	1.2	0.0	0.0	0.3	7.7	7.7	18.1	3.0	3.0
Prop In Lane	0.33		0.33	0.74		1.00	1.00		0.26	1.00		0.04
Lane Grp Cap(c), veh/h	202	0	0	224	0		25	405	407	768	1145	1197
V/C Ratio(X)	0.16	0.00	0.00	0.19	0.00		0.44	0.71	0.72	0.89	0.22	0.22
Avail Cap(c_a), veh/h	939	0	0	911	0		174	634	638	1198	1656	1730
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.9	0.0	0.0	23.0	0.0	0.0	25.1	18.3	18.3	13.5	3.8	3.8
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.4	0.0	0.0	11.5	2.3	2.4	5.5	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0	0.4	0.0	0.0	0.2	2.7	2.7	5.7	0.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.2	0.0	0.0	23.4	0.0	0.0	36.5	20.6	20.7	18.9	3.9	3.9
LnGrp LOS	C	A	A	C	A		D	C	C	B	A	A
Approach Vol, veh/h		33			43	A		591			1198	
Approach Delay, s/veh		23.2			23.4			20.9			12.4	
Approach LOS		C			C			C			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	26.6	16.9		7.8	5.2	38.3		7.8				
Change Period (Y+Rc), s	4.5	5.2		4.5	4.5	5.2		4.5				
Max Green Setting (Gmax), s	34.5	18.3		27.0	5.0	47.8		27.0				
Max Q Clear Time (g_c+I1), s	20.1	9.7		2.9	2.3	5.0		3.2				
Green Ext Time (p_c), s	2.0	2.0		0.1	0.0	2.7		0.1				

Intersection Summary			
HCM 6th Ctrl Delay			15.6
HCM 6th LOS			B

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Queues

PM CUM PLUS PROJECT

2: MILLBROOK AVE & E COPPER AVE

W IMPROVEMENTS

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	75	833	54	119	524	108	54	54	187	65	22	43
v/c Ratio	0.35	0.68	0.09	0.51	0.36	0.15	0.26	0.17	0.44	0.31	0.07	0.11
Control Delay	38.1	22.7	0.3	42.6	17.9	4.8	36.7	25.1	7.7	37.3	24.2	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	22.7	0.3	42.6	17.9	4.8	36.7	25.1	7.7	37.3	24.2	0.6
Queue Length 50th (ft)	26	140	0	43	78	0	19	19	0	23	8	0
Queue Length 95th (ft)	#104	316	0	#183	187	34	73	50	46	85	26	0
Internal Link Dist (ft)		1334			1174			566			314	
Turn Bay Length (ft)	240		210	265		260	330		150	175		100
Base Capacity (vph)	232	1985	938	232	1985	938	232	1119	1026	232	1119	1000
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.42	0.06	0.51	0.26	0.12	0.23	0.05	0.18	0.28	0.02	0.04

Intersection Summary

\#   95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
2: MILLBROOK AVE & E COPPER AVE

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	70	775	50	111	487	100	50	50	174	60	20	40
Future Volume (veh/h)	70	775	50	111	487	100	50	50	174	60	20	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	75	833	54	119	524	108	54	54	187	65	22	43
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	112	1201	536	153	1283	572	92	308	261	104	320	271
Arrive On Green	0.06	0.34	0.34	0.09	0.36	0.36	0.05	0.16	0.16	0.06	0.17	0.17
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	75	833	54	119	524	108	54	54	187	65	22	43
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	2.2	10.7	1.2	3.5	5.9	2.5	1.6	1.3	5.9	1.9	0.5	1.2
Cycle Q Clear(g_c), s	2.2	10.7	1.2	3.5	5.9	2.5	1.6	1.3	5.9	1.9	0.5	1.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	112	1201	536	153	1283	572	92	308	261	104	320	271
V/C Ratio(X)	0.67	0.69	0.10	0.78	0.41	0.19	0.59	0.18	0.72	0.63	0.07	0.16
Avail Cap(c_a), veh/h	252	2147	958	252	2147	958	252	1211	1026	252	1211	1026
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.3	15.2	12.0	23.7	12.7	11.6	24.6	19.0	20.9	24.4	18.4	18.7
Incr Delay (d2), s/veh	6.6	0.7	0.1	8.2	0.2	0.2	5.8	0.3	3.7	6.1	0.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	3.3	0.3	1.6	1.8	0.7	0.7	0.5	2.1	0.9	0.2	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.9	15.9	12.1	31.9	12.9	11.8	30.3	19.3	24.6	30.5	18.5	19.0
LnGrp LOS	C	B	B	C	B	B	C	B	C	C	B	B
Approach Vol, veh/h		962			751			295			130	
Approach Delay, s/veh		16.8			15.7			24.7			24.7	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.6	13.2	9.1	23.1	7.2	13.6	7.8	24.3
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	34.3	7.5	32.0	7.5	34.3	7.5	32.0
Max Q Clear Time (g_c+I1), s	3.9	7.9	5.5	12.7	3.6	3.2	4.2	7.9
Green Ext Time (p_c), s	0.0	0.9	0.0	5.2	0.0	0.2	0.0	3.5

Intersection Summary	
HCM 6th Ctrl Delay	18.0
HCM 6th LOS	B

	↗	→	↘	↙	←	↖	↖	↑	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	45	678	169	27	754	11	169	98	11	11	22
v/c Ratio	0.25	0.70	0.19	0.15	0.82	0.01	0.51	0.20	0.07	0.05	0.07
Control Delay	52.8	23.6	5.8	51.8	29.9	0.0	46.4	10.1	53.3	43.3	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	23.6	5.8	51.8	29.9	0.0	46.4	10.1	53.3	43.3	0.4
Queue Length 50th (ft)	24	210	7	14	356	0	88	4	6	6	0
Queue Length 95th (ft)	82	687	59	55	#840	0	222	49	31	25	0
Internal Link Dist (ft)		2508			690			1488		777	
Turn Bay Length (ft)	280		200	170		150	150		125		100
Base Capacity (vph)	212	1381	1209	269	1403	1225	553	737	212	418	466
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.49	0.14	0.10	0.54	0.01	0.31	0.13	0.05	0.03	0.05

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary
3: N CHESTNUT AVE & E COPPER AVE

PM CUM PLUS PROJECT
W IMPROVEMENTS

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↑	↱
Traffic Volume (veh/h)	40	603	150	24	671	10	150	10	77	10	10	20
Future Volume (veh/h)	40	603	150	24	671	10	150	10	77	10	10	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	45	678	169	27	754	11	169	11	87	11	11	22
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	77	907	768	53	882	747	217	33	258	25	134	114
Arrive On Green	0.04	0.48	0.48	0.03	0.47	0.47	0.12	0.18	0.18	0.01	0.07	0.07
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	181	1432	1781	1870	1585
Grp Volume(v), veh/h	45	678	169	27	754	11	169	0	98	11	11	22
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	0	1613	1781	1870	1585
Q Serve(g_s), s	1.6	18.8	3.9	1.0	22.9	0.2	5.9	0.0	3.4	0.4	0.4	0.8
Cycle Q Clear(g_c), s	1.6	18.8	3.9	1.0	22.9	0.2	5.9	0.0	3.4	0.4	0.4	0.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.89	1.00		1.00
Lane Grp Cap(c), veh/h	77	907	768	53	882	747	217	0	290	25	134	114
V/C Ratio(X)	0.59	0.75	0.22	0.51	0.85	0.01	0.78	0.00	0.34	0.45	0.08	0.19
Avail Cap(c_a), veh/h	208	1745	1479	264	1803	1528	542	0	616	208	365	309
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.1	13.3	9.5	30.6	15.0	9.0	27.3	0.0	23.0	31.4	27.8	28.0
Incr Delay (d2), s/veh	7.0	1.3	0.1	7.4	2.5	0.0	5.9	0.0	0.7	12.0	0.3	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	6.1	1.0	0.5	7.7	0.1	2.7	0.0	1.3	0.2	0.2	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.1	14.6	9.7	38.0	17.5	9.0	33.2	0.0	23.6	43.4	28.0	28.8
LnGrp LOS	D	B	A	D	B	A	C	A	C	D	C	C
Approach Vol, veh/h		892			792			267			44	
Approach Delay, s/veh		14.8			18.1			29.7			32.3	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.4	16.0	6.4	36.3	12.3	9.1	7.3	35.4
Change Period (Y+Rc), s	4.5	4.5	4.5	5.2	4.5	4.5	4.5	5.2
Max Green Setting (Gmax), s	7.5	24.5	9.5	59.8	19.5	12.5	7.5	61.8
Max Q Clear Time (g_c+I1), s	2.4	5.4	3.0	20.8	7.9	2.8	3.6	24.9
Green Ext Time (p_c), s	0.0	0.4	0.0	5.2	0.3	0.0	0.0	5.3

Intersection Summary	
HCM 6th Ctrl Delay	18.5
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

4: N WILLOW AVE & COPPER AVE

	↗	→	↙	←	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	98	578	100	833	167	323	140	441	216	132
v/c Ratio	0.59	0.64	0.56	0.85	0.78	0.87	0.33	0.93	0.34	0.21
Control Delay	64.7	39.6	61.8	41.0	73.4	68.4	8.5	69.7	30.7	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.7	39.6	61.8	41.0	73.4	68.4	8.5	69.7	30.7	5.8
Queue Length 50th (ft)	71	192	72	256	122	233	0	328	120	0
Queue Length 95th (ft)	131	261	131	338	#239	#407	52	#563	196	44
Internal Link Dist (ft)		1168		2435		1529			9418	
Turn Bay Length (ft)	300		300		300		200	300		200
Base Capacity (vph)	200	1042	232	1150	232	401	453	473	655	642
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.55	0.43	0.72	0.72	0.81	0.31	0.93	0.33	0.21

Intersection Summary

\#   95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	91	455	83	93	455	320	155	300	130	410	201	123
Future Volume (veh/h)	91	455	83	93	455	320	155	300	130	410	201	123
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	98	489	89	100	489	344	167	323	140	441	216	132
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	124	845	153	127	564	396	198	366	310	472	653	553
Arrive On Green	0.07	0.28	0.28	0.07	0.28	0.28	0.11	0.20	0.20	0.26	0.35	0.35
Sat Flow, veh/h	1781	3005	544	1781	1995	1400	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	98	288	290	100	435	398	167	323	140	441	216	132
Grp Sat Flow(s),veh/h/ln	1781	1777	1772	1781	1777	1618	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	5.6	14.4	14.6	5.7	24.1	24.2	9.5	17.4	8.1	25.1	8.8	6.1
Cycle Q Clear(g_c), s	5.6	14.4	14.6	5.7	24.1	24.2	9.5	17.4	8.1	25.1	8.8	6.1
Prop In Lane	1.00		0.31	1.00		0.87	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	124	500	499	127	503	458	198	366	310	472	653	553
V/C Ratio(X)	0.79	0.58	0.58	0.79	0.87	0.87	0.84	0.88	0.45	0.94	0.33	0.24
Avail Cap(c_a), veh/h	215	562	560	249	596	543	249	429	364	506	699	593
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.5	32.0	32.0	47.4	35.3	35.4	45.2	40.6	36.8	37.3	24.9	24.0
Incr Delay (d2), s/veh	10.5	1.2	1.2	10.3	11.3	12.5	18.5	17.1	1.0	24.0	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	6.0	6.0	2.8	11.3	10.5	5.0	9.3	3.1	13.3	3.7	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.0	33.1	33.2	57.7	46.6	47.8	63.8	57.7	37.8	61.3	25.1	24.2
LnGrp LOS	E	C	C	E	D	D	E	E	D	E	C	C
Approach Vol, veh/h		676			933			630			789	
Approach Delay, s/veh		36.8			48.3			54.9			45.2	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	32.0	25.5	11.9	34.4	16.1	41.4	11.7	34.5
Change Period (Y+Rc), s	4.5	5.2	4.5	5.2	4.5	5.2	4.5	5.2
Max Green Setting (Gmax), s	29.5	23.8	14.5	32.8	14.5	38.8	12.5	34.8
Max Q Clear Time (g_c+I1), s	27.1	19.4	7.7	16.6	11.5	10.8	7.6	26.2
Green Ext Time (p_c), s	0.4	0.9	0.1	2.7	0.1	1.5	0.1	3.1

Intersection Summary	
HCM 6th Ctrl Delay	46.3
HCM 6th LOS	D

Notes

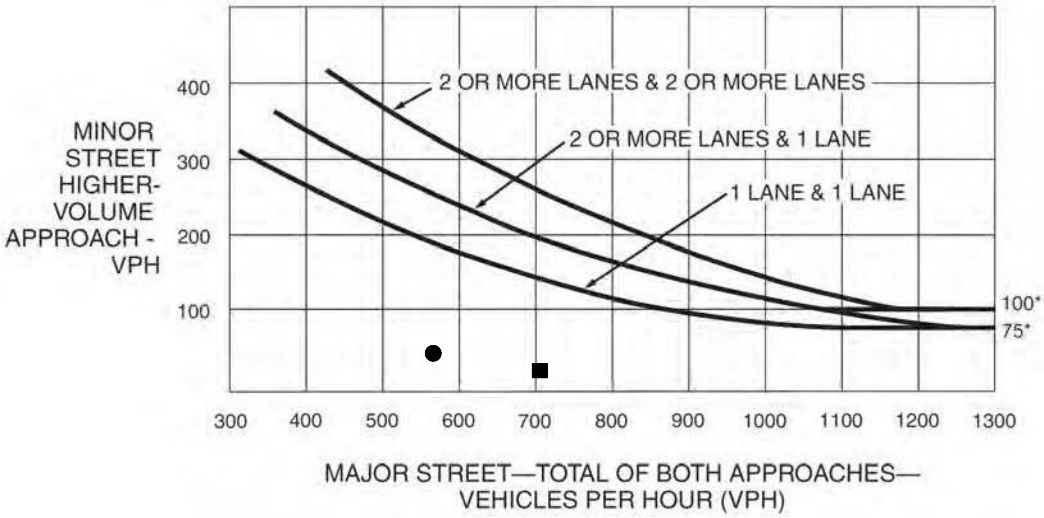
User approved pedestrian interval to be less than phase max green.

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

N FRIANT ROAD – N WILLOW AVENUE: EXISTING

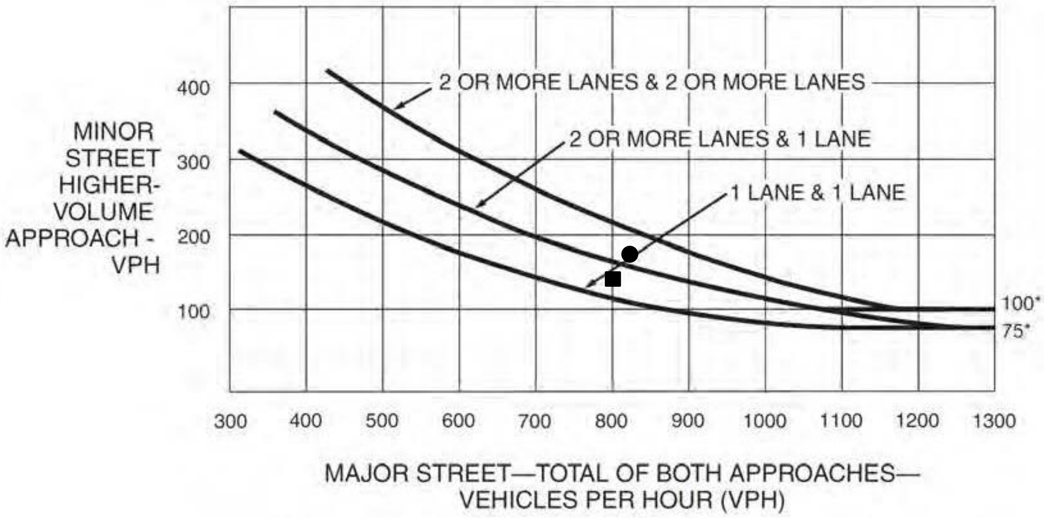
AM (●) : MAJOR 577 MINOR 53
PM (■) : MAJOR 706 MINOR 21

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – MILLBROOK AVENUE: EXISTING

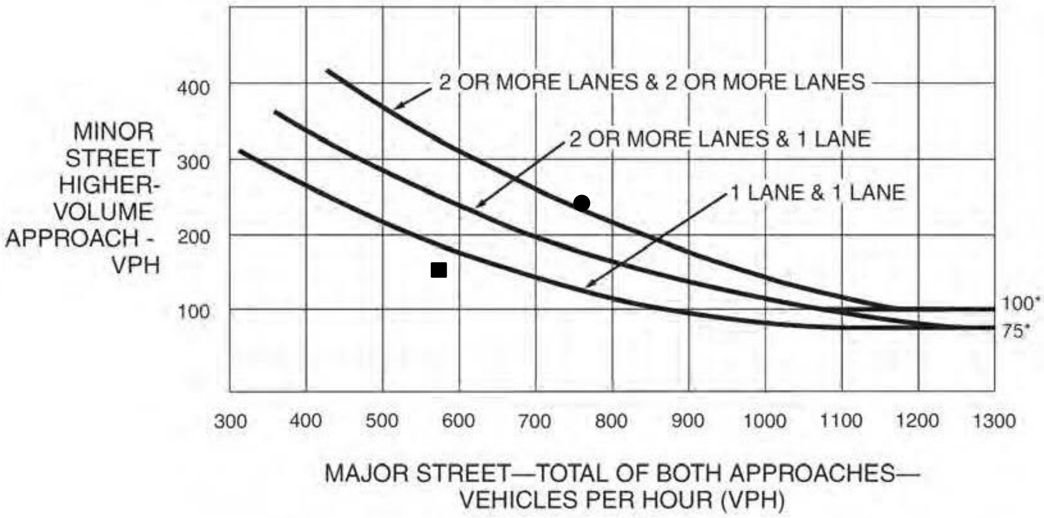
AM (●) : MAJOR 820	MINOR 180
PM (■) : MAJOR 803	MINOR 158

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – N CHESTNUT AVENUE: EXISTING

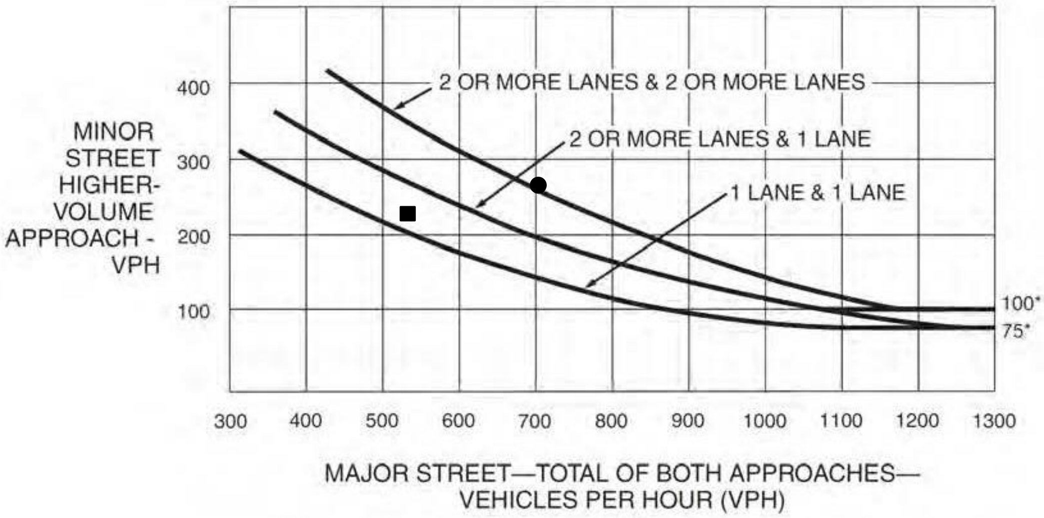
AM (●) : MAJOR 767 MINOR 244
PM (■) : MAJOR 587 MINOR 158

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – WILLOW AVENUE: EXISTING

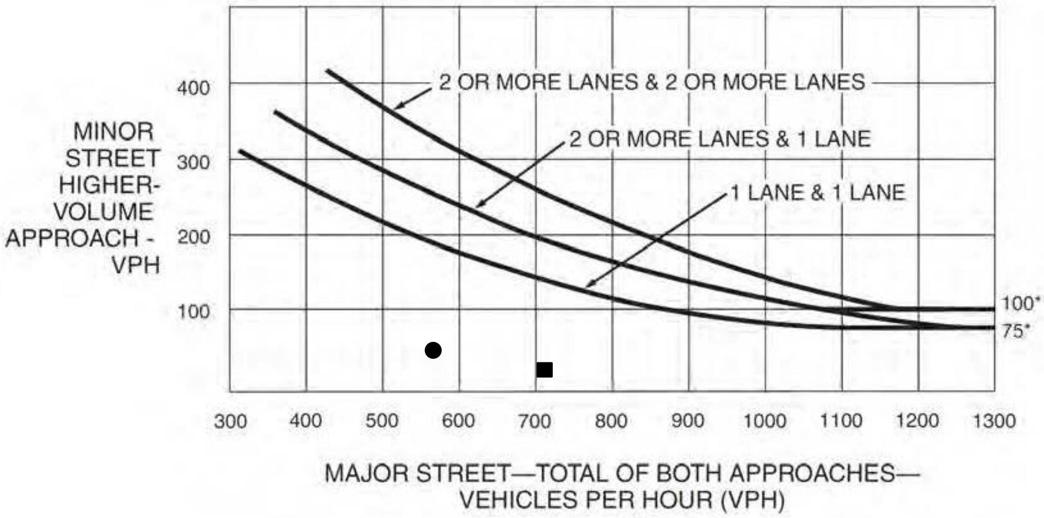
AM (●) : MAJOR 703 MINOR 281
PM (■) : MAJOR 538 MINOR 221

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

N FRIANT ROAD – N WILLOW AVENUE: EXISTING PLUS PROJECT

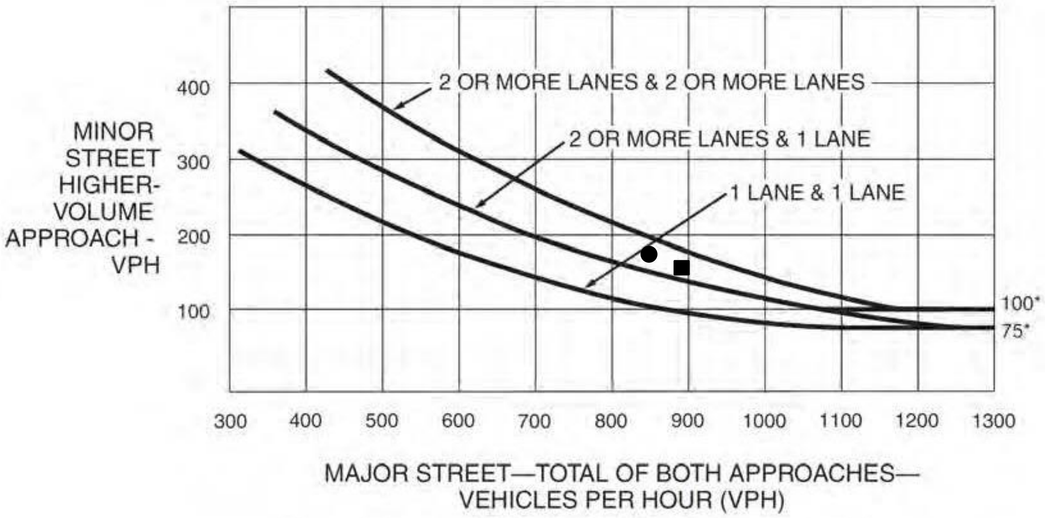
AM (●) :	MAJOR 578	MINOR 53
PM (■) :	MAJOR 710	MINOR 21

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

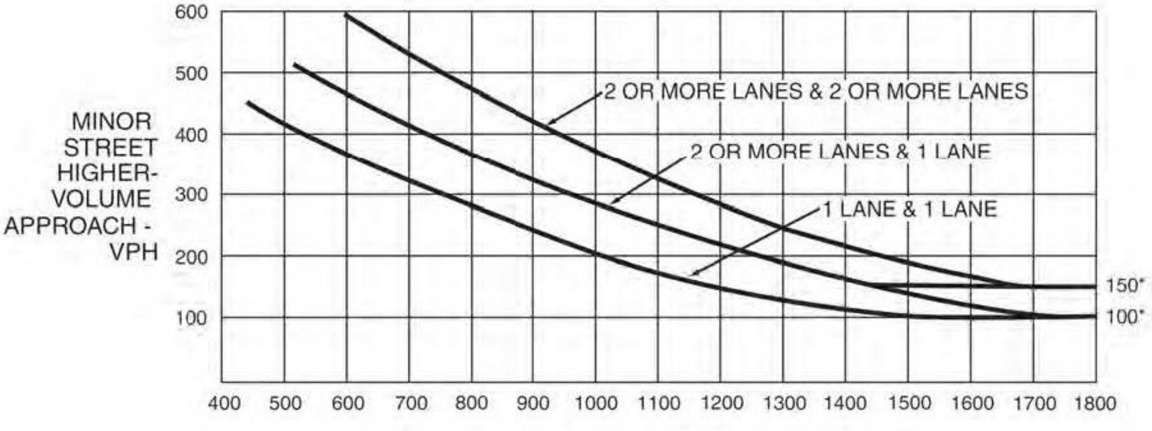


*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – MILLBROOK AVENUE: EXISTING PLUS PROJECT

AM (●) : MAJOR 861 MINOR 181
PM (■) : MAJOR 896 MINOR 162

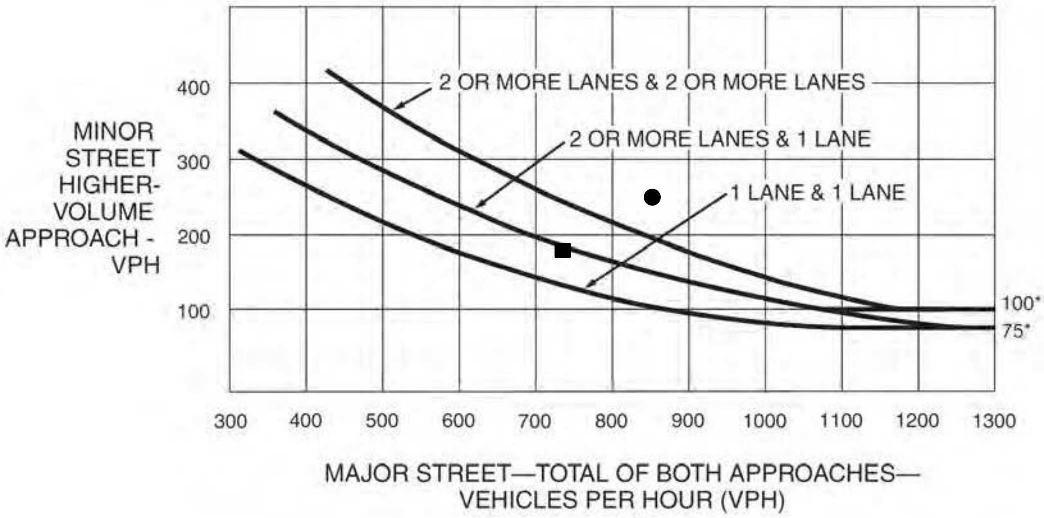
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – N CHESTNUT AVENUE: EXISTING PLUS PROJECT

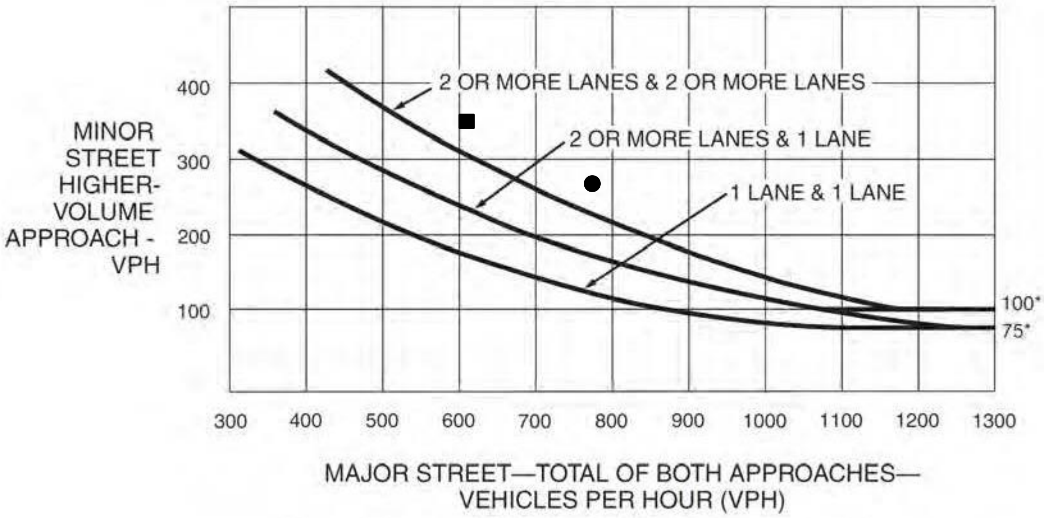
AM (●) : MAJOR 855 MINOR 262
PM (■) : MAJOR 728 MINOR 187

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – WILLOW AVENUE: EXISTING PLUS PROJECT

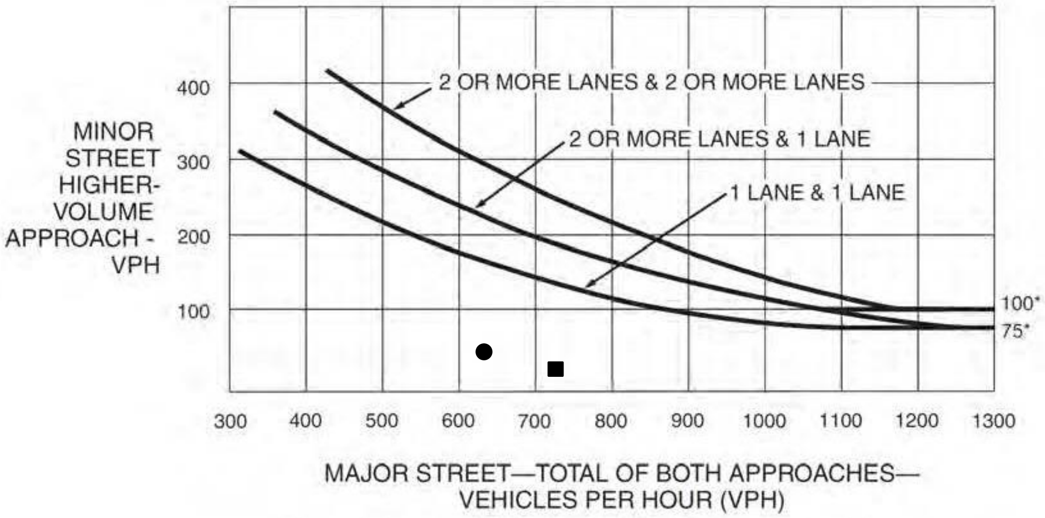
AM (●) : MAJOR 776 MINOR 282
PM (■) : MAJOR 609 MINOR 346

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

N FRIANT ROAD – N WILLOW AVENUE: EXISTED PLUS APPROVED PROJECT

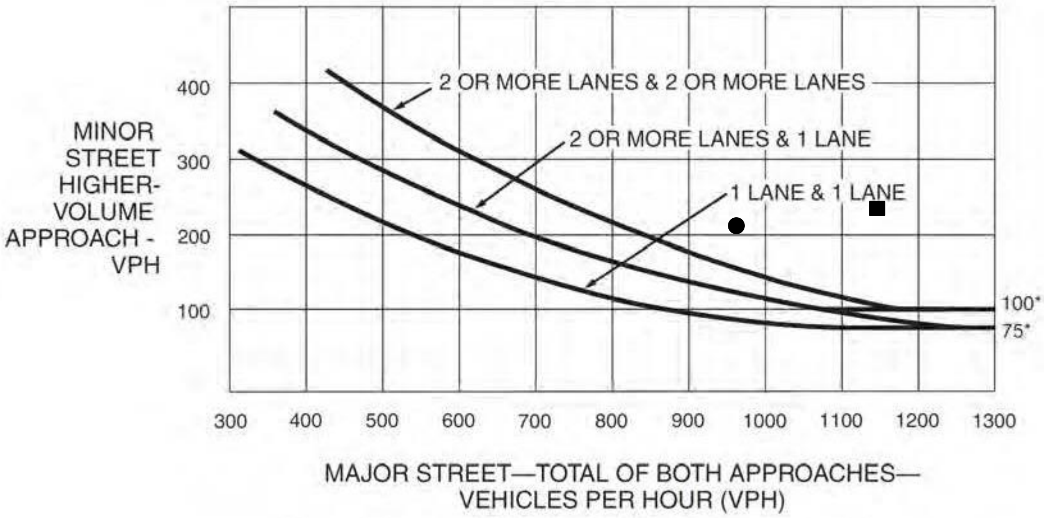
AM (●) :	MAJOR 587	MINOR 53
PM (■) :	MAJOR 722	MINOR 21

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – MILLBROOK AVENUE: EXISTING PLUS APPROVED PROJECT

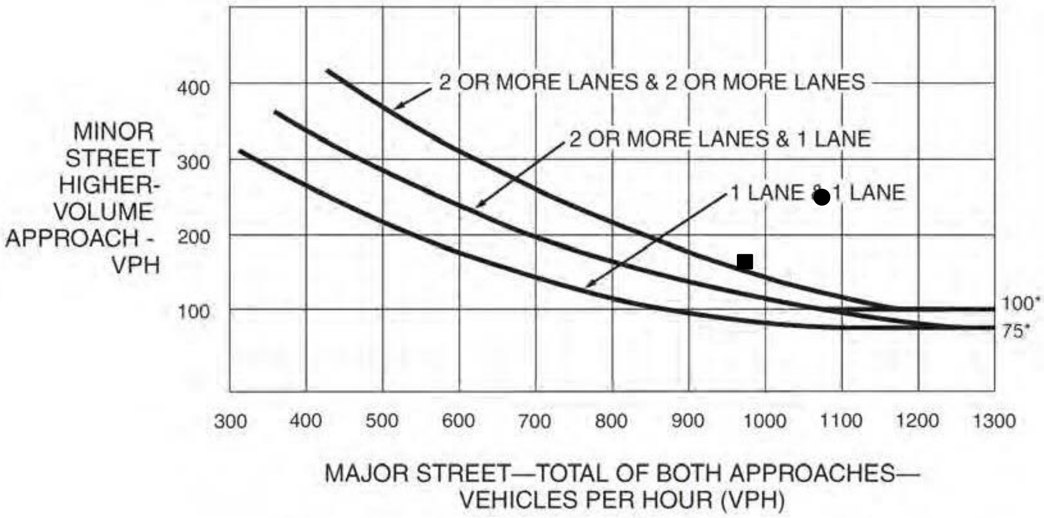
AM (●) : MAJOR 961 MINOR 207
PM (■) : MAJOR 1142 MINOR 243

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – N CHESTNUT AVENUE: EXISTING PLUS APPROVED PROJECT

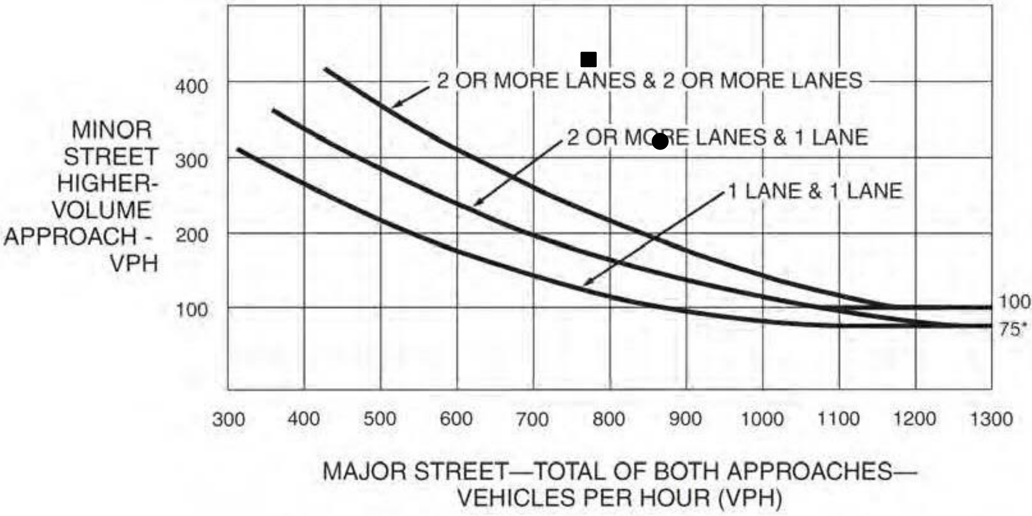
AM (●) : MAJOR 994 MINOR 250
PM (■) : MAJOR 936 MINOR 168

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – WILLOW AVENUE: EXISTING PLUS APPROVED PROJECT

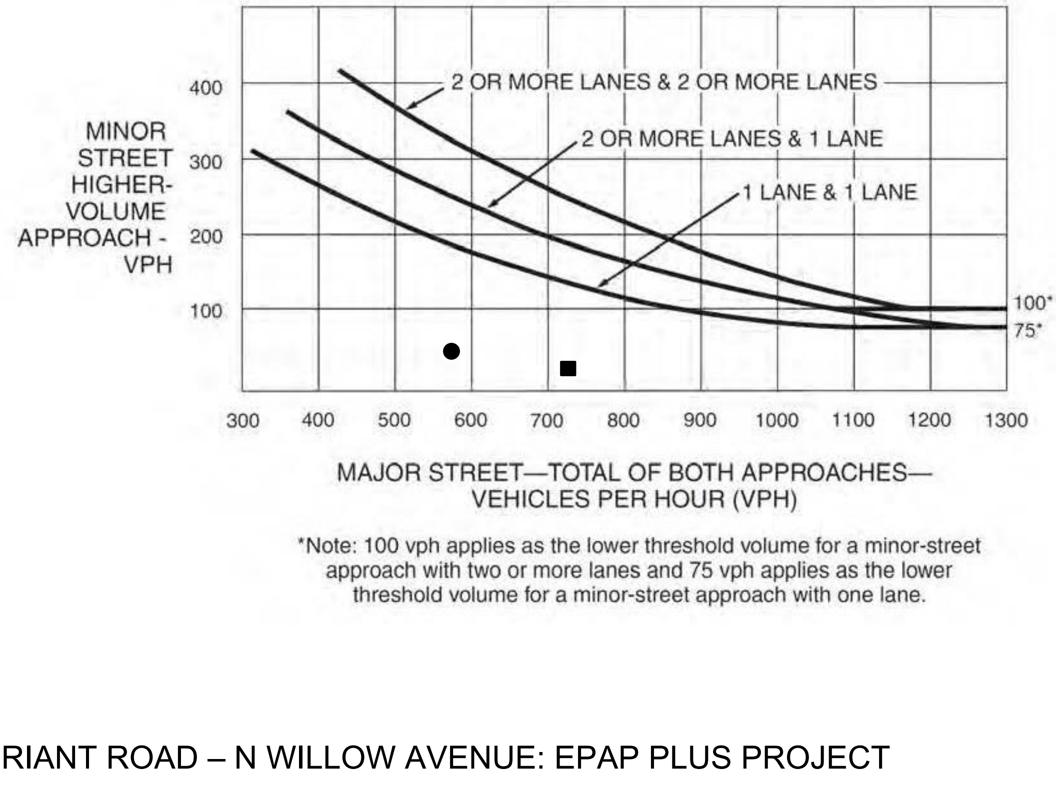
AM (●) : MAJOR 881 MINOR 312
PM (■) : MAJOR 785 MINOR 413

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

N FRIANT ROAD – N WILLOW AVENUE: EPAP PLUS PROJECT

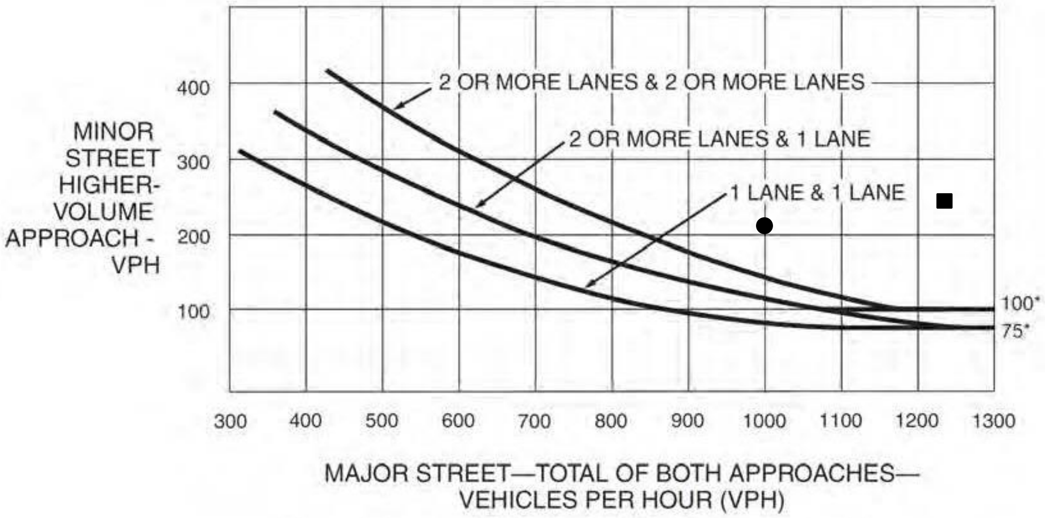
AM (●) : MAJOR 588 MINOR 53
PM (■) : MAJOR 726 MINOR 21

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – MILLBROOK AVENUE: EPAP PLUS PROJECT

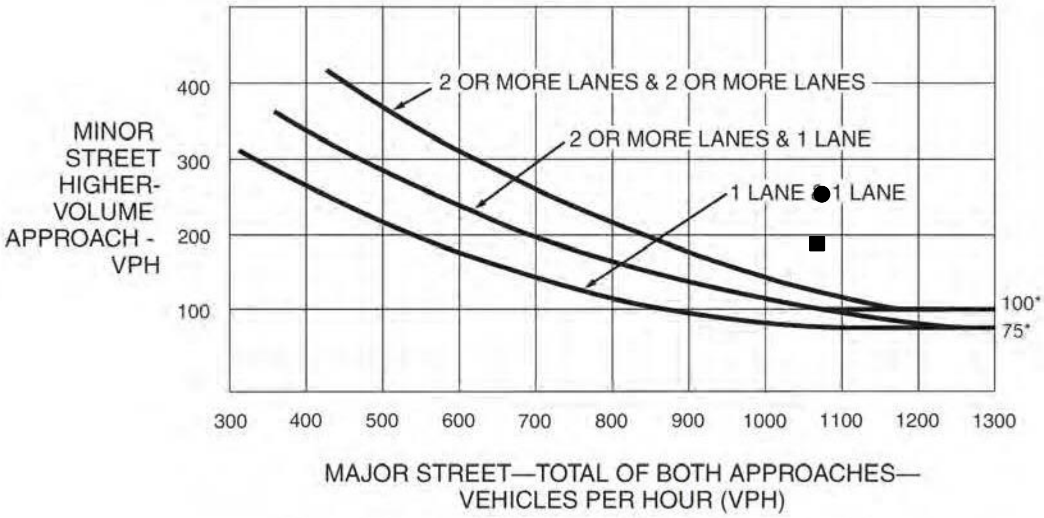
AM (●) : MAJOR 1002 MINOR 208
PM (■) : MAJOR 1235 MINOR 247

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – N CHESTNUT AVENUE: EPAP PLUS PROJECT

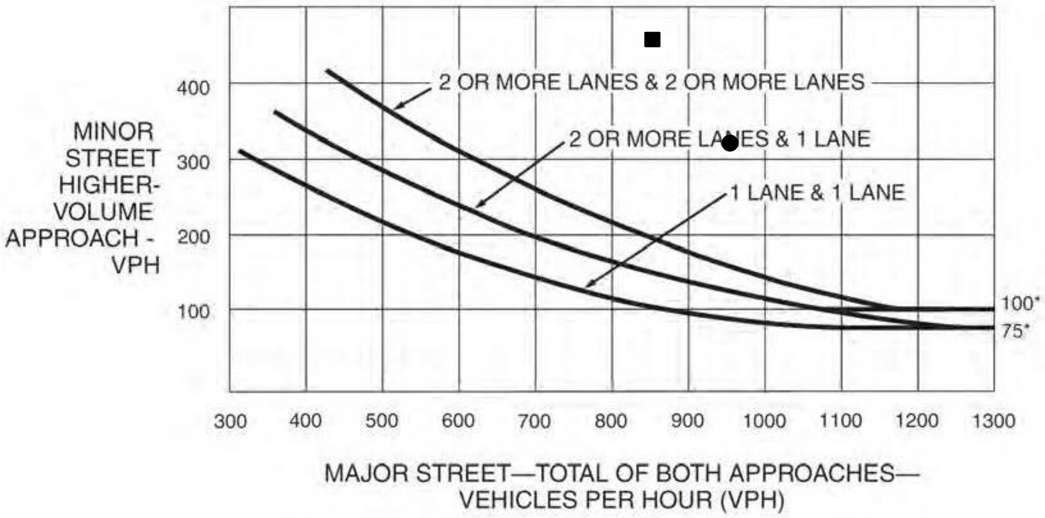
AM (●) : MAJOR 1082 MINOR 268
PM (■) : MAJOR 1077 MINOR 195

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – WILLOW AVENUE: EPAP PLUS PROJECT

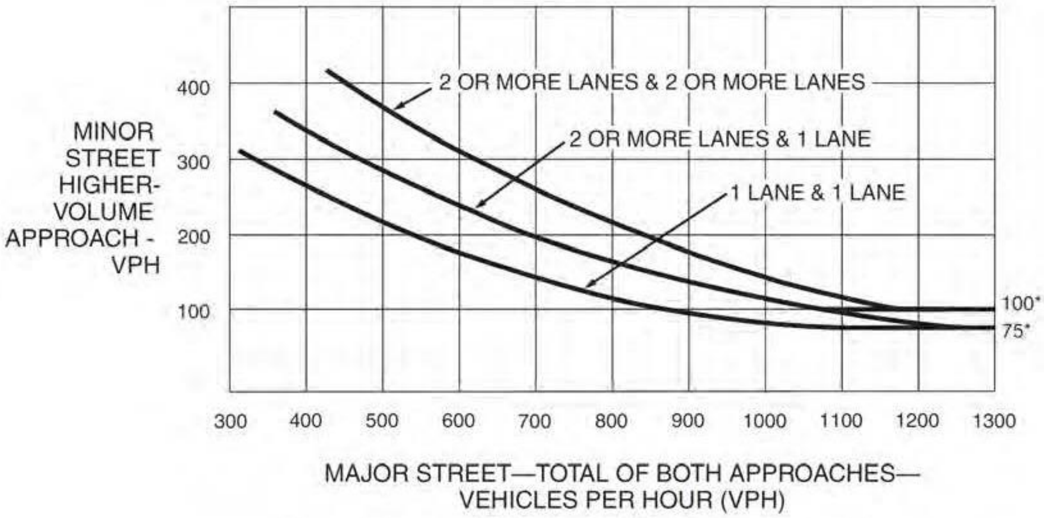
AM (●) :	MAJOR 954	MINOR 313
PM (■) :	MAJOR 856	MINOR 468

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

N FRIANT ROAD – N WILLOW AVENUE: CUMULATIVE BASE

AM (●) : MAJOR 720 MINOR 540
PM (■) : MAJOR 550 MINOR 630

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – MILLBROOK AVENUE: CUMULATIVE BASE

AM (●) : MAJOR 1450 MINOR 260
PM (■) : MAJOR 1510 MINOR 270

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)

*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – N CHESTNUT AVENUE: CUMULATIVE BASE

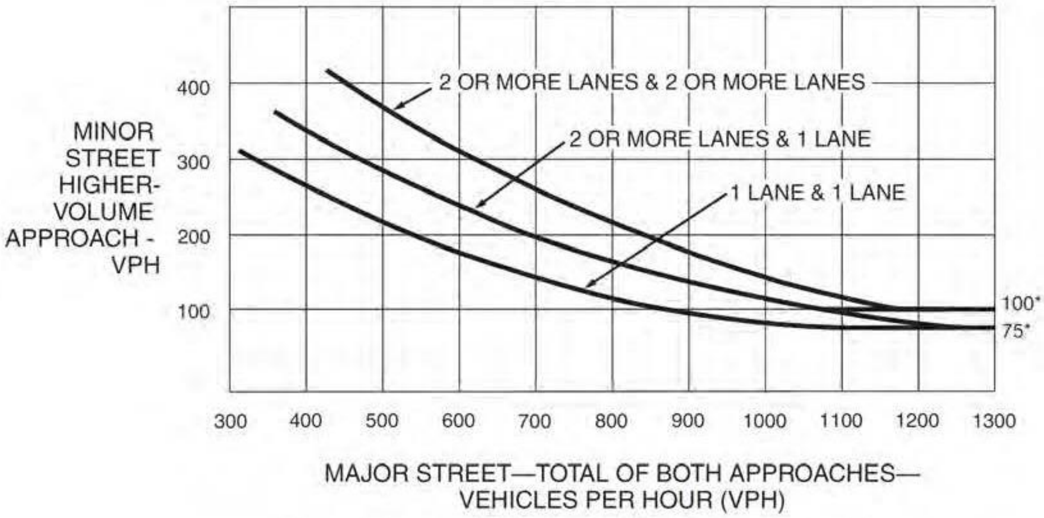
AM (●) : MAJOR 1480 MINOR 290
PM (■) : MAJOR 1370 MINOR 220

Figure 4C-3. Warrant 3, Peak Hour

*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor) ■ ●

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

COPPER AVENUE – WILLOW AVENUE: CUMULATIVE

AM (●) : MAJOR 1550 MINOR 670
PM (■) : MAJOR 1440 MINOR 730

Appendix C

Project Agency Comments

June 28, 2019

Operational Statement for Tract 6249

Tract 6249 is being submitted by Keith Jolly of Morton & Pitalo on behalf of Lennar and pertains to 24.03 acres of property located at 2711, 2797, 2917, & 2929 E. Copper Avenue in Fresno between Chestnut Avenue and Willow Avenue (APNs: 578-010-35, 578-010-23S, 578-010-24S & 578-010-47S). The project is located within the Woodward Park Community Plan and the parcels are zoned RS-5 (Residential Single Family, Medium Density) and BP (Business Park).

Plan Amendment Application No. P19-01470, is requesting authorization to amend the general plan for APN 578-010-47S (5.18 acres) from Employment, Business Park to Corridor/Center Mixed-Use planned land use. In addition, APN 578-010-24S will be amended from the Employment, Business Park and Residential, Medium Density (12.11 acres) to the Residential, Medium High Density planned land use. APNs 578-010-35 (3.72 acres) & 578-010-23S (3.02 acres) will be amended from Residential, Medium Density to the Residential, Medium High Density planned land use.

Rezone Application No. P19-01470, is requesting to amend the Official Zoning Map of the city of Fresno to change APN 578-010-47S (5.18 acres) from BP (Business Park) zone district to CMX (Corridor/Center Mixed-Use) zone district. In addition, the proposed rezone will reclassify APN 578-010-24S from BP (Business Park) and RS-5 (Residential Single Family, Medium Density) zone districts to the RM-1 (Residential Multiple Family, Medium High Density) zone district. APNs 578-010-35 & 578-010-23S will be reclassified from the RS-5 (Residential Single Family, Medium Density) zone district to RM-1 (Residential Multiple Family, Medium High Density) zone district. In total, 18.85 acres will be zoned RM-1 (Residential Multiple Family, Medium High Density) and 5.18 acres will be zoned CMX (Corridor/Center Mixed-Use).

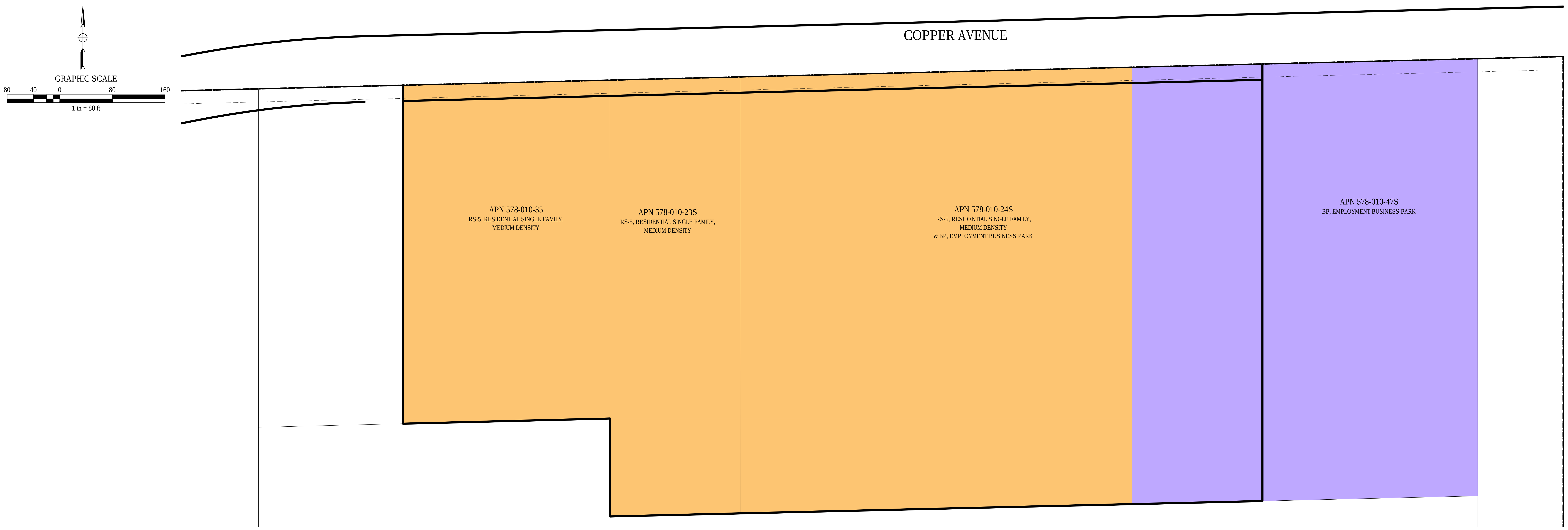
Vesting Tentative Tract Map No. 6249 (P19-01469), requests authorization to subdivide APNs 578-010-35, 578-010-23S, 578-010-24S (18.85 acres) for a 239 lot subdivision. The subdivision will allow for a mix of attached and detached single family residences. 9.55 acres will be maintained for mixed use/existing operation designated for private road, public road, landscaping recreational, private walkway, private and public utility, and private communications purposes.

Planned Development Application No. P19-01259, proposes to modify the RM-1 zone district setback standards to allow for a 0 foot minimum front, side and rear setback. In addition, the planned development application will allow 90% maximum lot coverage. Flexibility of the RM-1 development standards will mostly serve the single-family, attached residences proposed within the tract map.

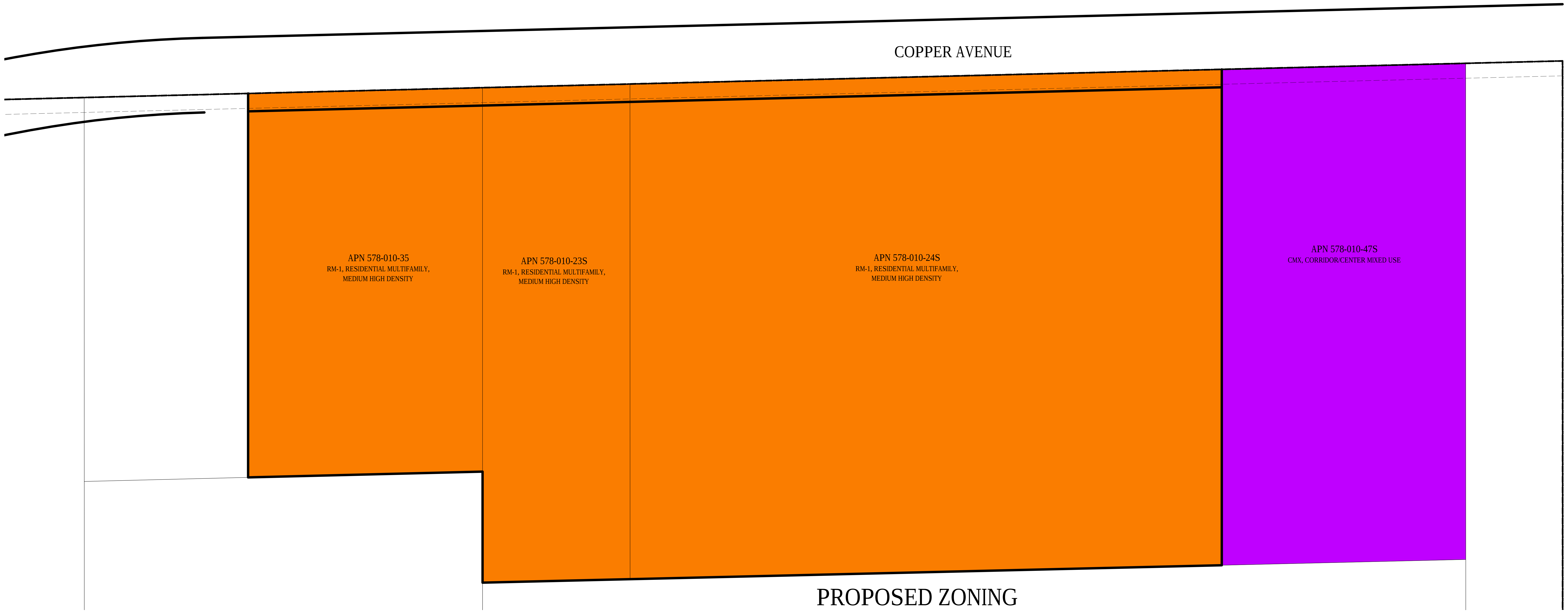
The proposed project helps implement the 2035 Fresno General Plan as it is consistent with Goal 8 by proposing a complete neighborhood with a diverse building types and affordability which are attractive, bordered by a high school, with commercial services down the street and future commercial area across the street. The proposed change in use and zoning is consistent with the adjacent properties. The land to the north of the project is vacant and zoned to be residential and commercial, Clovis North High School is south of the project, existing residential homes at to the west and to the east are agricultural land and existing residential homes.

The project's existing conditions on APN 578-010-23S consists of a residential home serviced by a well and septic tank, shed structures, trees and landscape, fencing and utility poles and overhead line that are to be removed. The existing conditions on APN 578-010-35 is agricultural land with a utility pole and an electric panel that are to be removed. The existing conditions on APN 578-010-24S is agricultural land with an existing irrigation line, fence and, palm tree to be removed. On APN 578-010-24S there is an existing cell tower to remain and the utility poles and overhead lines are to be relocated.

The proposed project will have minimal impact on neighbors and on Copper Avenue. The project will generate construction noise during the construction of the tract and homes as well as noise and vehicle traffic from residences. The construction site will be gated for security and the tract will be a gated community.



EXISTING ZONING



PROPOSED ZONING

SCALE:
HORIZ. 1" = 80'
VERT. 1" = N/A

BENCH MARK

COMPUTED
DESIGNED
DRAWN
PROJ. ENGR.

MORTON & PITALO, INC.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Folsom * Sacramento * Fresno
2870 Gateway Oaks Drive, Suite #120
Sacramento, CA 95833
phone: (916) 927-2400
survey email: staking@mpengr.com s web: www.mpengr.com

ZONING EXHIBIT
FOR TRACT 6249
FRESNO CITY, CALIFORNIA

DATE MARCH 13, 2018
SHEET 1
OF 1

JOB NO. 18-0064-00

Dwg: Z:\2018\18-0064-00 (COPPER & WILLOW)\DWG\ENGR\EXHIBITS\ZONING EXHIBIT\TRACT 6249 - ZONING EXHIBIT.DWG | Saved: 03-13-19 05:22pm KFENTERS | Plotted: 03-13-19 05:22pm KFENTERS

City of
FRESNO

Development and Resource Management Department

2600 Fresno Street, Third Floor
Fresno, California 93721-3604
(559) 621-8277, FAX (559) 498-1026

Jennifer K. Clark
Director

March 26, 2019

7017 3040 0000 4246 0488

Dumna Wo Wah Tribal Government
2191 West Pico Avenue
Fresno, CA 93705

RE: Project Notification Pursuant to Assembly Bill 52 for Plan Amendment Application, Rezone Application, Planned Development and Vesting Tentative Tract Map No. 6249, submitted to the City of Fresno, Fresno County

Dear Chairman Ledger,

Pursuant to the provisions of Assembly Bill 52 (AB 52), which is described in more detail below, as the lead agency under the California Environmental Quality Act (CEQA), the City of Fresno hereby extends an invitation to consult on the CEQA review of the proposed Plan Amendment Application, Rezone Application, Planned Development and Vesting Tentative Tract Map No. 6249 in order to assist with identifying and/or preserving and/or mitigating project impacts to tribal cultural resources. A summary of the proposed project, including a map of the project location, is included as Exhibit A to this letter.

AB 52, which became law January 1, 2015, requires that, as part of the CEQA review process, public agencies provide early notice of a project to California Native American Tribes to allow for consultation between the tribe and the public agency. The purpose of AB 52 is to provide an opportunity for public agencies and tribes to consult and consider potential impacts to Tribal Cultural Resources (TCRs), as defined by the Public Resources Code (PRC) Section 21074(a).[1] Outlined below is the general process for AB 52 compliance:

- *Pursuant to AB 52, tribes must formally request to the public agency in writing to be notified of projects within the jurisdiction of that public agency [Public Resources Code Section 5097.4]. Tribe requests in writing to the public agency to be notified of projects for which a Negative Declaration (ND), Mitigated Negative Declaration (MND), or Environmental Impact Report (EIR) is required;*

---

[1] PRC Section 21074(a) defines a Tribal Cultural Resource as either of the following:
- Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that area either (1) included or determined to be eligible for inclusion in the California Register of Historical Resources; or (2) included in a local register of historical resources as defined in subdivision (k) of PRC Section 5020.1; or
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1.

- *Following receipt of such request, the lead agency shall, within fourteen (14) days of determining that an application for a project is complete or a decision by a public agency to undertake a project shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice [PRC Section 21080.3.1(d)];*

- *Upon notification from the lead agency, tribes have thirty (30) days to formally request consultation [PRC Section 21080.3(d)]; and,*

- *The lead agency shall initiate consultation within thirty (30) days of receiving the request for consultation [PRC Section 21080.3(e)].*

- *Consultation shall be considered concluded when either of the following occurs: (1) the parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a TCR; or (2) a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.*[2]

If you would like to consult with the City pursuant to AB 52, **please respond in writing by 5:00 p.m. on April 25, 2019** to Jose Valenzuela, Planner III, at Jose.Valenzuela@fresno.gov or 2600 Fresno Street, Room 3043, Fresno, CA 93721-3600. Please include in your request, at a minimum, (1) name, title, and contact information of the tribal representative(s); (2) suggested dates and location of consultation; (3) any preliminary concerns or questions related to the project (optional).

If no written request is received by the aforementioned date, it will be assumed that you have declined consultation. If a request for consultation is received by the date above, the City will follow up within thirty (30) days to set up a date and location for consultation.

Thank you for your consideration on this matter and please do not hesitate to contact me should you have any questions or need additional information.

Sincerely,

Jose Valenzuela

Jose Valenzuela
Planner III
(559) 621-8070

CC: Eric Smith (nuem2007@yahoo.com)
John Ledger (ledgerrobert@ymail.com)
Chris Acree (cacree@hotmail.com)

---

[2] If consultation is conducted, the City, as lead agency, shall ensure that, unless provided with written consent by the consulting tribe, information exchanged during consultation will remain confidential for the purposes of preventing looting, vandalism, or damage to tribal cultural resources and shall not disclose third party confidential information regarding tribal cultural resources [PRC Section 21082.3].

Attachment: Exhibit A: Project Description and Project Location Map

Exhibit A – Project Description and Project Location Map

Project Address: 2929 East Copper Avenue

APN: 578-010-35, 578-010-23S, 578-010-24S & 578-010-47S

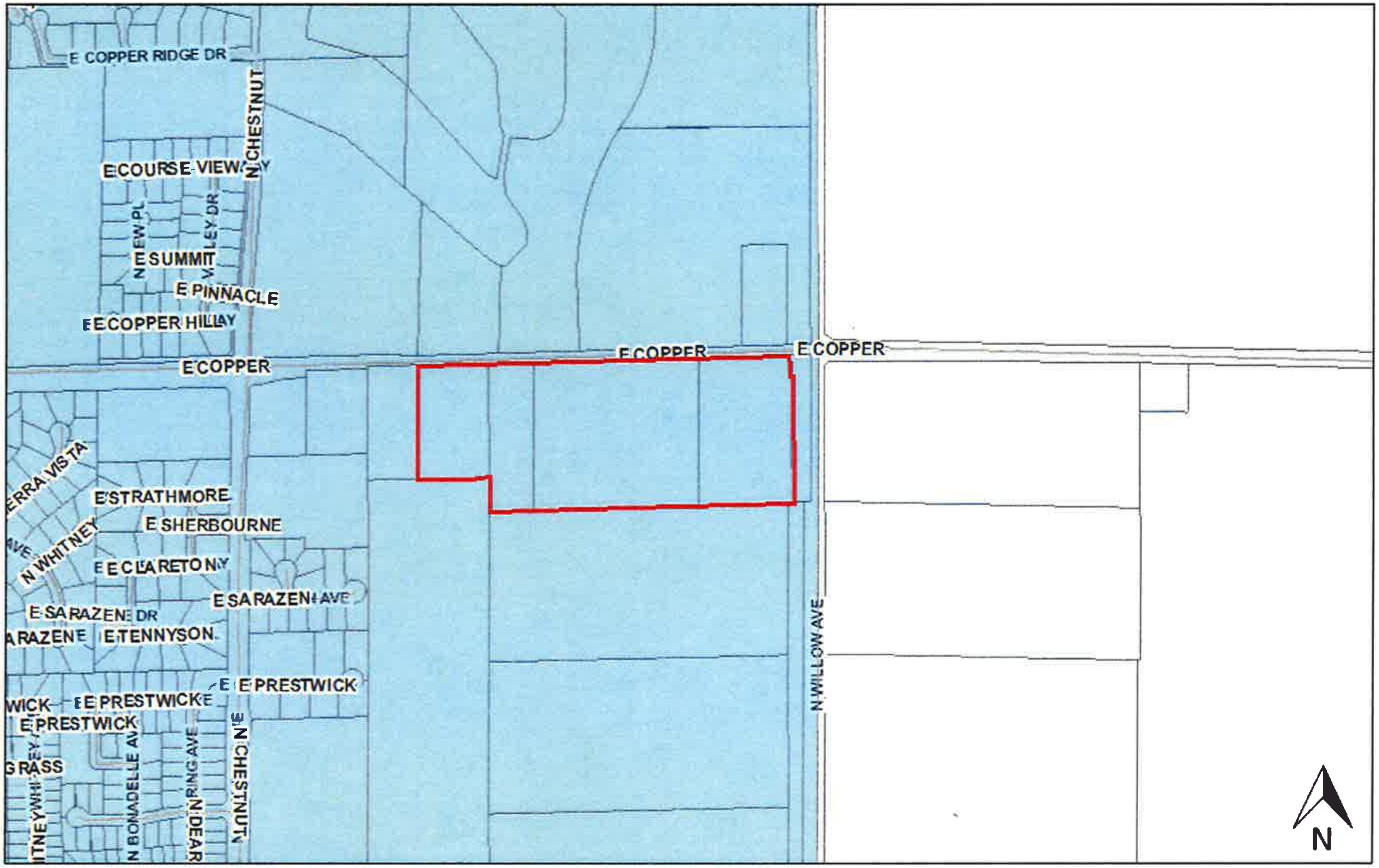
Project Description: Vesting Tentative Tract Map No. 6249 was submitted by Keith Jolly of Morton & Pitalo, Inc. on behalf of Lennar Homes. Plan Amendment Application for Vesting Tentative Tract Map No. 6249 proposes to amend the Fresno General Plan and Woodward Community Plan to change the planned land use designations for the subject property from Residential, Medium Density (±14.91) and Employment, Business Park (±8.21 acres) to Residential, Medium High Density (±17.94 acres) and Mixed-Use, Corridor/Center (±5.18 acres).

Rezone application proposes to amend the Official Zoning Map of the City of Fresno to rezone the subject property from the RS-5 (Residential Single-Family, Medium Density) (14.91 acres) and BP (Business Park) (8.21 acres) to the RM-1 (Residential Multi-Family, Medium High Density) (17.94 acres) and CMX (Corridor/Center Mixed-Use) (5.18 acres) zone districts in accordance with the proposed Plan Amendment application.

Vesting Tentative Tract Map No. 6249 proposes to subdivide approximately 18.14 acres of the subject property for the purpose of creating a 239-lot single-family residential development at a density of approximately 13.17 dwelling units per acre. The proposed subdivision will produce 12 outlots for landscaping, utility, open space, a trail and private communication purposes.

Planned Development Application proposes modifications to the RM-1 (Residential Multi-Family, Medium High Density) development standards to allow for reduced lot sizes, setbacks, and lot coverage.

Vesting Tentative Tract Map No. 6249



3/25/2019, 1:47:53 PM

🟦 City Limits

□ Subject Project

1:9,028

0 0.075 0.15 0.3 mi

0 0.1 0.2 0.4 km

Web AppBuilder for ArcGIS

TENTATIVE TRACT MAP NO. 6249

A SINGLE FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT
IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

PREPARED MARCH 11, 2019

GENERAL NOTES

1. 578-01-35 & 578-01-24 ARE VACANT / IDLE, 578-01-23S HAS RESIDENTIAL HOME
2. SITE ACREAGE TO BE SUBDIVIDED IS 18.85± GROSS ACRES AND 18.14± NET ACRES (GROSS ACREAGE LESS PUBLIC ROADS)
3. THE TRACT IS NOT WITHIN 200' OF ANY RAILROAD, FREEWAY OR EXPRESSWAY.
4. ABANDON ALL WELL AND SEPTIC TANKS TO COUNTY STANDARDS
5. NO IRRIGATION CANAL IS ON SITE
6. ALL PUBLIC UTILITIES (GAS & ELECTRIC – PG&E, TELEPHONE – AT&T, CABLE TELEVISION – COMCAST, AND CITY OF FRESNO WATER & SEWER) SHALL BE INSTALLED TO CITY STANDARDS
7. THERE ARE EXISTING ABOVE GROUND USES OR STRUCTURES SUCH AS BUILDINGS, WATER WELLS, POWER LINES, TOWERS, ETC. WITHIN THE PROPOSED SUBDIVISION ON APN 578-01-23S
8. THIS AREA IS NOT SUBJECT TO FLOOD INUNDATION
9. THERE ARE EXISTING UNDERGROUND FEATURES SUCH AS WELLS, CESSPOOLS, SEWERS, CULVERTS, STORM DRAIN, DUMP SITES AND OTHER UNDERGROUND STRUCTURES WITHIN THE PROPOSED SUBDIVISION ON APN 578-01-23S
10. ALL IMPROVEMENTS SHALL BE AS REQUIRED BY THE CITY OF FRESNO AND BUILT TO CITY STANDARDS AND SHALL INCLUDE SANITARY SEWER, DOMESTIC WATER, UNDERGROUND POWER, TELEPHONE, GAS, CONCRETE CURBS, GUTTERS, SIDEWALKS, PERMANENT STREET PAVEMENT, STREET LIGHTS, ETC. ON-SITE STREETS WILL BE PRIVATE AND AS APPROVED BY THE CITY OF FRESNO.
11. THE DESIGN OF THE PROPOSED SUBDIVISION SHALL PROVIDE, TO THE EXTENT FEASIBLE, FOR FUTURE PASSIVE OR NATURAL HEATING OR COOLING OPPORTUNITIES AND OTHER MEASURES THAT CONSERVE NON-RENEWABLE ENERGY RESOURCES.
12. ALL STREETS ADJACENT TO THE BOUNDARIES OF THIS SUBDIVISION HAVE BEEN PREVIOUSLY DEDICATED FOR PUBLIC STREET PURPOSES AND ALL ARE TO REMAIN (UNLESS OTHERWISE NOTED)
13. THERE WILL BE GRADE DIFFERENTIALS GREATER THAN SIX INCHES BETWEEN THE SUBJECT AND ADJACENT PROPERTIES ON THE EAST, SOUTH AND WEST BOUNDARIES
14. ALL INTERIOR ROAD AND OPEN SPACE SHALL BE CONTAINED WITHIN A PRIVATE EASEMENT PROVIDING FOR PUBLIC USE AND THE INSTALLATION AND MAINTENANCE OF PUBLIC AND PRIVATE UNDERGROUND UTILITIES
15. DIRECT VEHICULAR ACCESS RIGHTS FROM LOTS ABUTTING COPPER AVENUE SHALL BE RELINQUISHED.

OWNER/SUBDIVIDER

APN 578-020-23
[illegible] FRESNO LLC
CHRIS [illegible]
[illegible] E. ELM
FRESNO, CA 93706

APN 578-020-24 & 35
PATRICK VINCENT [illegible] FAMILY TRUST
2520 E. [illegible]
FRESNO, CA 93720

APPLICANT

LENNAR
8080 N. PALM AVE, STE 110
FRESNO, CA 93711
(559)437-4269

CIVIL DESIGN CONSULTANT

MORTON & PITALO, INC.
[illegible] N. [illegible] AVE, STE 109
FRESNO, CA 93711
(559) 412-4906

ASSESSOR'S PARCEL NUMBER
578-01-35, 578-01-23S, 578-01-24S & 578-010-47S

SITE ADDRESS
2211, 2207, 2317 & 2323 E. COPPER AVE, FRESNO, CA 93619

SITE AREA TO BE SUBDIVIDED
(APNs 578-01-35, 578-01-23S, 578-01-24S)
18.85± ACRES (GROSS)
18.14± ACRES (NET)

NUMBER OF LOTS IN SUBDIVISION
239 NUMBERED LOTS, 12 LETTERED LOTS

DENSITY
RESIDENTIAL
12.68 DWELLING UNITS/ACRE

EXISTING BUILDINGS
RESIDENTIAL HOME ON APN 578-01-23

EXISTING TREES
TREES ON APN 578-01-23

EXISTING USE
578-01-35 & 578-01-24S VACANT, 578-01-23S RESIDENTIAL HOME,
578-010-47S PACKING COMPANY

SOURCE OF WATER
CITY OF FRESNO / PRIVATE

SOURCE OF SEWAGE DISPOSAL
CITY OF FRESNO / PRIVATE

SOURCE OF WASTE DISPOSAL
CITY OF FRESNO

SOURCE OF ELECTRICITY
PG&E

SOURCE OF GAS
PG&E

SOURCE OF CABLE T.V.
COMCAST

SOURCE OF TELEPHONE
AT&T

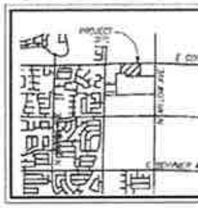
EXISTING GENERAL PLAN DESIGNATION
APN 578-01-35 – MEDIUM DENSITY RESIDENTIAL
APN 578-01-23 – MEDIUM DENSITY RESIDENTIAL
APN 578-01-24S – MEDIUM DENSITY RESIDENTIAL / BUSINESS PARK
APN 578-010-47S – BUSINESS PARK

PROPOSED GENERAL PLAN DESIGNATION
APN 578-01-35 – MEDIUM HIGH DENSITY RESIDENTIAL
APN 578-01-23S – MEDIUM HIGH DENSITY RESIDENTIAL
APN 578-01-24S – MEDIUM HIGH DENSITY RESIDENTIAL
APN 578-010-47S – CORRIDOR/CENTER MIXED USE

EXISTING ZONING
APN 578-01-35 – RS-5 (RESIDENTIAL SINGLE FAMILY)
APN 578-01-23S – RS-5 (RESIDENTIAL SINGLE FAMILY)
APN 578-01-24S – RS-5 (RESIDENTIAL SINGLE FAMILY) & BP (BUSINESS PARK)
APN 578-010-47S – BP (BUSINESS PARK)

PROPOSED ZONING
APN 578-01-35 – RM-1 (RESIDENTIAL MULTI-FAMILY)
APN 578-01-23S – RM-1 (RESIDENTIAL MULTI-FAMILY)
APN 578-01-24S – RM-1 (RESIDENTIAL MULTI-FAMILY)
APN 578-010-47S – CMX (CORRIDOR/CENTER MIXED-USE)

PROPOSED USE
APN 578-01-35 – SINGLE FAMILY RESIDENTIAL
APN 578-01-23S – SINGLE FAMILY RESIDENTIAL
APN 578-01-24S – SINGLE FAMILY RESIDENTIAL
APN 578-010-47S – PACKING SHED (REMAIN AS IS)

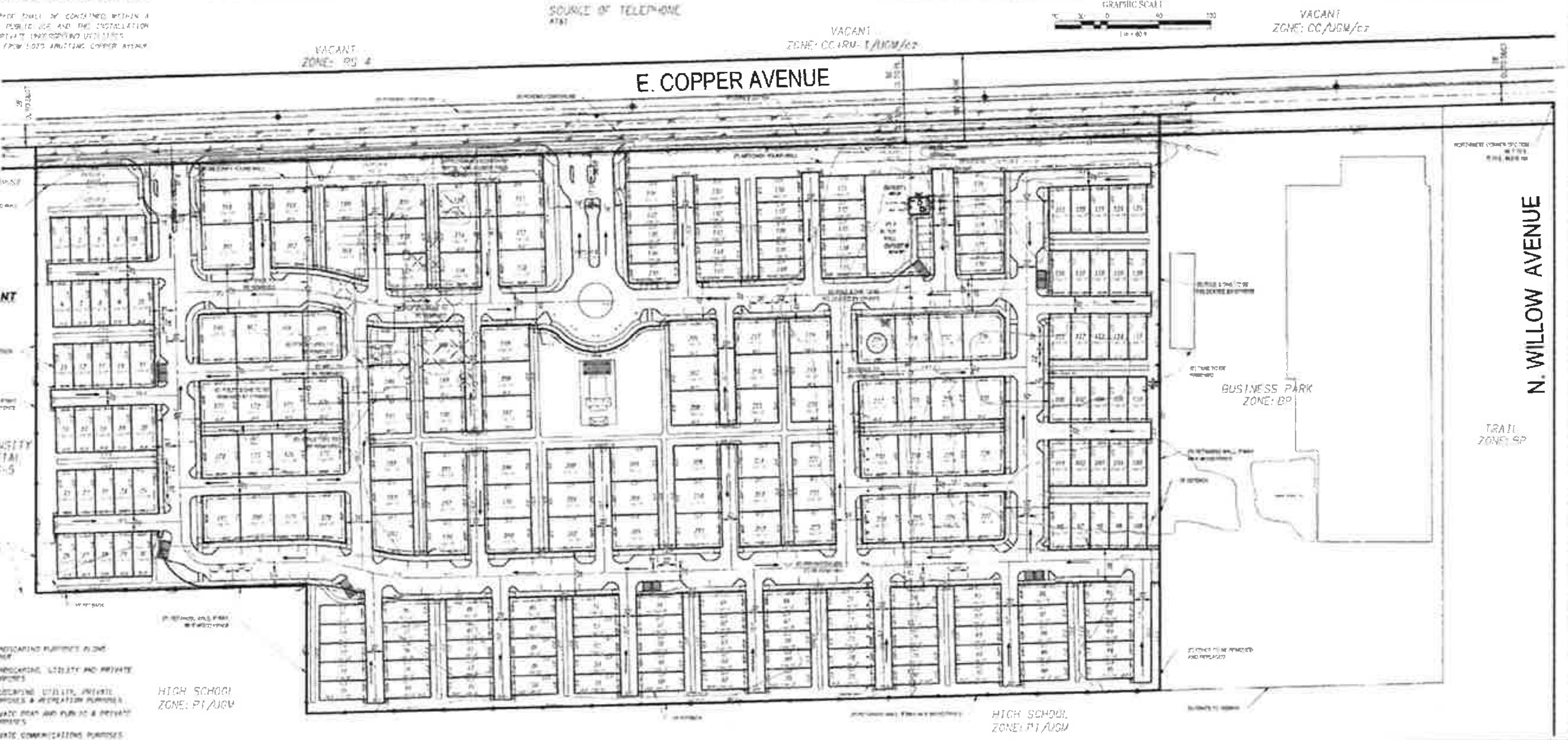


VICINITY MAP
N.T.S.

LEGEND

- ● — MANHOLE
- DI — DRAIN INLET
- DMH — DRAIN MANHOLE
- (E) — EXISTING
- INV — INVERT
- L.E. — LANDSCAPE EASEMENT
- P.E. — PEDESTRIAN EASEMENT
- P.U.E. — PUBLIC UTILITY EASEMENT
- → — DRAINAGE SLOPE
- ▮▮ — RECYCLING AND REFUSE ENCLOSURE CITY STD. DTLS. P-33, P-34 & P-35
- ⊗ — TREES TO BE REMOVED
- — ADA PARALLEL PARKING
- — UNDERGROUND SEWER PIPE
- — UNDERGROUND STORM DRAIN PIPE
- — UNDERGROUND WATER PIPE

GRAPHIC SCALE
(IN FEET)
1 inch = 60 ft.



OUTLOTS

OUTLOTS A, B & C	ARE FOR LANDSCAPING PURPOSES ALONG COPPER AVENUE
OUTLOTS D, E, F, G, H & I	ARE FOR LANDSCAPING, UTILITY AND PRIVATE WALKWAY PURPOSES
OUTLOTS J	IS FOR LANDSCAPING, UTILITY, PRIVATE WALKWAY PURPOSES & RECREATION PURPOSES
OUTLOT K	IS FOR PRIVATE ROAD AND PUBLIC & PRIVATE UTILITY PURPOSES
OUTLOT L	IS FOR PRIVATE COMMUNICATIONS PURPOSES

SCALE:
HORIZ. 1" = 60'
VERT. 1" = N/A

BENCH MARK COUNTY BM [illegible]
ELEVATION = 39[illegible] USGS DATUM
[illegible]

CORRECTED
DESIGNED GJB
DRAWN KLF
PROJ. ENGR. GJB

MORTON & PITALO, INC.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Folsom • Sacramento • Fresno

SINGLE AND MULTIPLE FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT
TENTATIVE TRACT MAP NO. 6249
IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

DATE MARCH 11, 2019
SHEET TM-1
OF 2

JOB NO. 18.0054.00

City of
FRESNO
Development and Resource Management Department

2600 Fresno Street, Third Floor
Fresno, California 93721-3604
(559) 621-8277, FAX (559) 498-1026

Jennifer K. Clark
Director

March 26, 2019

7017 3040 0000 4246 0471

Table Mountain Rancheria of California
Bob Pennell, Cultural Resources Director
P.O. Box 410
Friant, CA 93626
rpennell@tmr.org

RE: Project Notification Pursuant to Assembly Bill 52 for Plan Amendment Application, Rezone Application, Planned Development and Vesting Tentative Tract Map No. 6249, submitted to the City of Fresno, Fresno County

Dear Mr. Pennell,

Pursuant to the provisions of Assembly Bill 52 (AB 52), which is described in more detail below, as the lead agency under the California Environmental Quality Act (CEQA), the City of Fresno hereby extends an invitation to consult on the CEQA review of the proposed Plan Amendment Application, Rezone Application, Planned Development and Vesting Tentative Tract Map No. 6249 in order to assist with identifying and/or preserving and/or mitigating project impacts to tribal cultural resources. A summary of the proposed project, including a map of the project location, is included as Exhibit A to this letter.

AB 52, which became law January 1, 2015, requires that, as part of the CEQA review process, public agencies provide early notice of a project to California Native American Tribes to allow for consultation between the tribe and the public agency. The purpose of AB 52 is to provide an opportunity for public agencies and tribes to consult and consider potential impacts to Tribal Cultural Resources (TCRs), as defined by the Public Resources Code (PRC) Section 21074(a).[1] Outlined below is the general process for AB 52 compliance:

- *Pursuant to AB 52, tribes must formally request to the public agency in writing to be notified of projects within the jurisdiction of that public agency [Public Resources Code Section 5097.4]. Tribe requests in writing to the public agency to be notified of projects for which a Negative Declaration (ND), Mitigated Negative Declaration (MND), or Environmental Impact Report (EIR) is required;*

---

[1] PRC Section 21074(a) defines a Tribal Cultural Resource as either of the following:
- Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that area either (1) included or determined to be eligible for inclusion in the California Register of Historical Resources; or (2) included in a local register of historical resources as defined in subdivision (k) of PRC Section 5020.1; or
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1.

- *Following receipt of such request, the lead agency shall, within fourteen (14) days of determining that an application for a project is complete or a decision by a public agency to undertake a project shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice [PRC Section 21080.3.1(d)];*

- *Upon notification from the lead agency, tribes have thirty (30) days to formally request consultation [PRC Section 21080.3(d)]; and,*

- *The lead agency shall initiate consultation within thirty (30) days of receiving the request for consultation [PRC Section 21080.3(e)].*

- *Consultation shall be considered concluded when either of the following occurs: (1) the parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a TCR; or (2) a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.*[2]

If you would like to consult with the City pursuant to AB 52, **please respond in writing by 5:00 p.m. on April 25, 2019** to Jose Valenzuela, Planner III, at Jose.Valenzuela@fresno.gov or 2600 Fresno Street, Room 3043, Fresno, CA 93721-3600. Please include in your request, at a minimum, (1) name, title, and contact information of the tribal representative(s); (2) suggested dates and location of consultation; (3) any preliminary concerns or questions related to the project (optional).

If no written request is received by the aforementioned date, it will be assumed that you have declined consultation. If a request for consultation is received by the date above, the City will follow up within thirty (30) days to set up a date and location for consultation.

Thank you for your consideration on this matter and please do not hesitate to contact me at should you have any questions or need additional information.

Sincerely,

Jose Valenzuela
Planner III
(559) 621-8070

CC: Eric Smith (nuem2007@yahoo.com)
John Ledger (ledgerrobert@ymail.com)
Chris Acree (cacree@hotmail.com)

---

[2] If consultation is conducted, the City, as lead agency, shall ensure that, unless provided with written consent by the consulting tribe, information exchanged during consultation will remain confidential for the purposes of preventing looting, vandalism, or damage to tribal cultural resources and shall not disclose third party confidential information regarding tribal cultural resources [PRC Section 21082.3].

Attachment: Exhibit A: Project Description and Project Location Map

Exhibit A – Project Description and Project Location Map

Project Address: 2929 East Copper Avenue

APN: 578-010-35, 578-010-23S, 578-010-24S & 578-010-47S

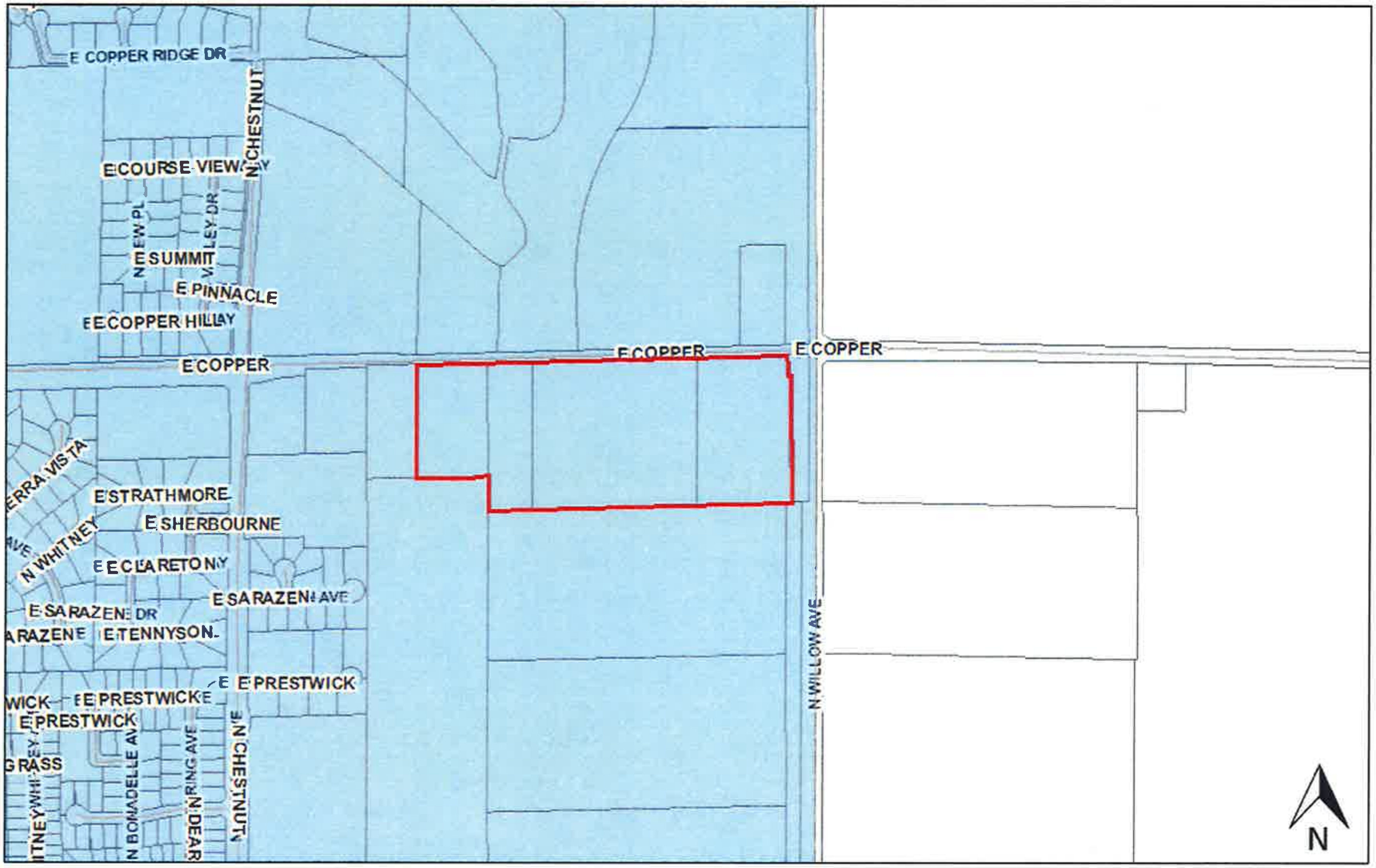
Project Description: Vesting Tentative Tract Map No. 6249 was submitted by Keith Jolly of Morton & Pitalo, Inc. on behalf of Lennar Homes. Plan Amendment Application for Vesting Tentative Tract Map No. 6249 proposes to amend the Fresno General Plan and Woodward Community Plan to change the planned land use designations for the subject property from Residential, Medium Density (±14.91) and Employment, Business Park (±8.21 acres) to Residential, Medium High Density (±17.94 acres) and Mixed-Use, Corridor/Center (±5.18 acres).

Rezone application proposes to amend the Official Zoning Map of the City of Fresno to rezone the subject property from the RS-5 (Residential Single-Family, Medium Density) (14.91 acres) and BP (Business Park) (8.21 acres) to the RM-1 (Residential Multi-Family, Medium High Density) (17.94 acres) and CMX (Corridor/Center Mixed-Use) (5.18 acres) zone districts in accordance with the proposed Plan Amendment application.

Vesting Tentative Tract Map No. 6249 proposes to subdivide approximately 18.14 acres of the subject property for the purpose of creating a 239-lot single-family residential development at a density of approximately 13.17 dwelling units per acre. The proposed subdivision will produce 12 outlots for landscaping, utility, open space, a trail and private communication purposes.

Planned Development Application proposes modifications to the RM-1 (Residential Multi-Family, Medium High Density) development standards to allow for reduced lot sizes, setbacks, and lot coverage.

Vesting Tentative Tract Map No. 6249



3/25/2019, 1:47:53 PM

🟦 City Limits

☐ Subject Project

1:9,028

0 0.075 0.15 0.3 mi

0 0.1 0.2 0.4 km

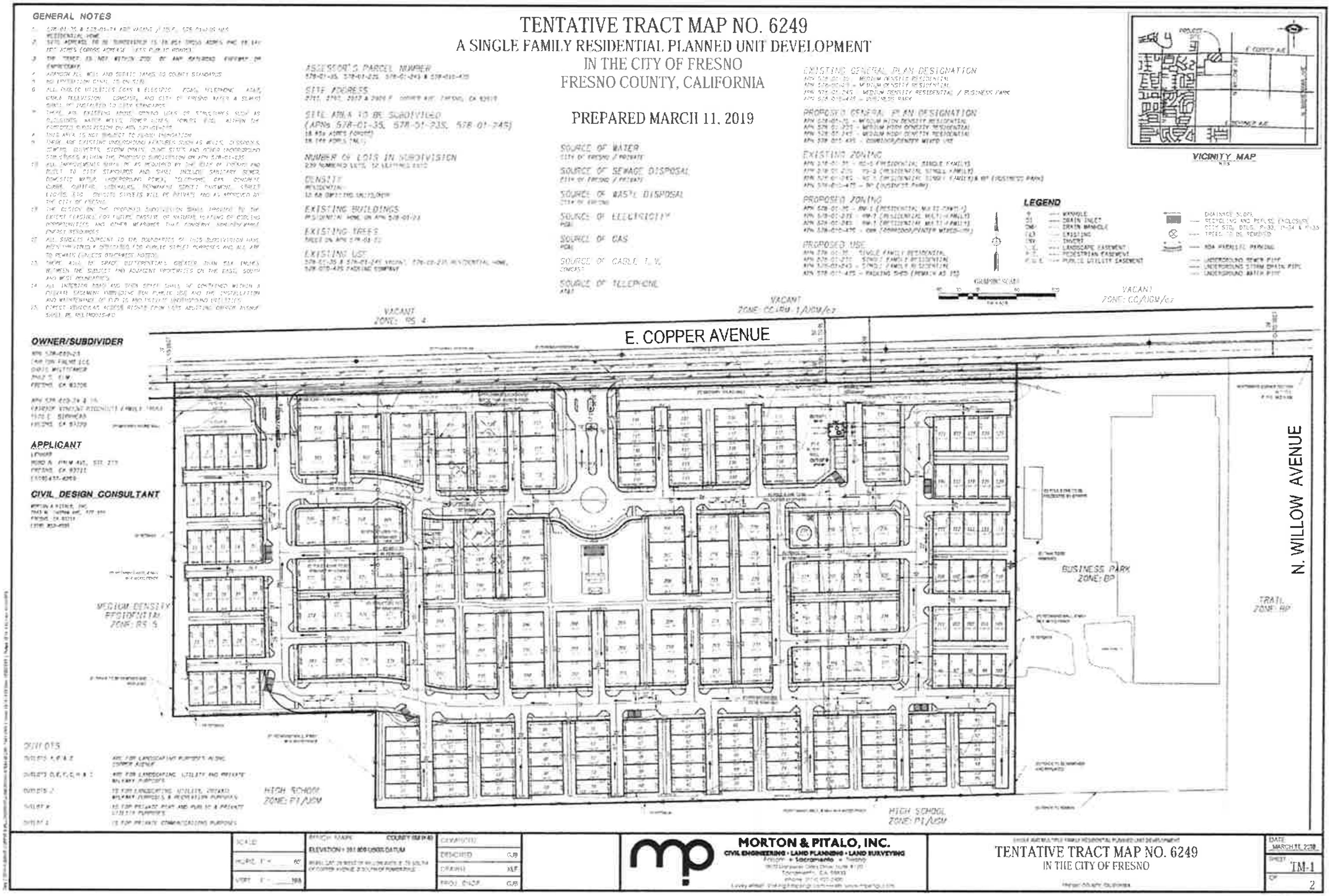
Web AppBuilder for ArcGIS

TENTATIVE TRACT MAP NO. 6249

A SINGLE FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT

IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

PREPARED MARCH 11, 2019



LENNAR

4/25/19

To: Jose Valenzuela
City of Fresno, Development Services
2600 Fresno Street
Fresno, CA 93721
Jose.Valenzuela@fresno.gov

Subject: Planned Development Findings;
Tract No. 6224, Single Family Subdivision—Planned development
Southeast corner of East Shields Avenue and North Temperance Avenue

Lennar Homes is requesting a planned development on a portion of the tentative map for Tract No. 6224, in the City of Fresno, located along the southeast corner of East Shields Avenue and North Temperance Avenue. The total tract consists of approximately 57-acres and 349 single family lots. The portion for the planned development consists of 280 single family lots within 42.6-acres. Of the 280 lots within the planned development portion of the tract, 128 (1 thru 128) of the lots will be approximately 4000 square feet, with 10-feet minimum front yard setbacks (18' min. to garage) and 5-foot minimum rear yard setbacks. The other 152 lots (129 thru 280) within the planned development will be approximately 3800 square feet, and will have reduced front yard setbacks of 10-foot minimum (18' min. to garage) and rear yard setbacks ranging from 5-feet to 10-feet, the side yards shall remain at 5-feet. The remaining 14.6-acre portion of the subdivision consist of 68, 6000 square foot single family lots that are 60' wide by 100' deep.

The property is located within the 2035 Fresno General Plan designation of Medium Density with a minimum 5-lots per acre to a maximum of 12-lots per acre; and Medium Low density residential, with a minimum 3.5-lots per acre to a maximum 6-lots per acre. The T-6224 tentative map has been designed to be in conformance with the City's General Plan density with 6.6-lots per net acre in the Medium Density areas, and 5.3-lots per acre within the Medium Low Density areas. The property is bounded to the East by Tract No. 5592, a single family subdivision under construction, North and West by existing single family homes in the 6000+ square foot range (60'x100'), and rural residential type lots to the South.

The property is physically suitable for the density as outlined by the 2035 General Plan for the area, as demonstrated, by the property lot layout.

As part of the overall tentative subdivision design, once the tract is constructed, East Shields Avenue will be built to the City's collector standard from North Temperance Avenue, east to the tracts east property line, where it will tire-in with Tract No. 5592 street improvements; North Temperance will be completed from the north property line (at Shields) to East Clinton Avenue as a Super Arterial street. Once these streets are completed, along with the intersection controls recommended in the traffic impact report prepared by Yamabe & Horn, the subdivision will have adequate transportation facilities, public utilities and public services. The planned development will not result in a reduction of public services for the area. This proposed planned development is consistent with the surrounding residential land uses and will not have an adverse effect in the area, and in fact once built out, the linear park, connecting trails layout and the infrastructure will enhance the services for the overall surrounding areas.

LENNAR

Tract No. 6224 Planned Development Finding Continued.

The Planned Development as proposed, facilitates the implementation of the City's vision for the 2035 general plan, in achieving the required density for this 57-acre property. The lots and homes will be similar in nature, with more contemporary designs to what has been built in the immediate area in the past.

The 280-lot Planned Development portion of the tentative map proposed provides for larger mix of housing, home sizes, home types with varying size yards to insure a more affordable community that appeals to a wider variety of home buyer needs. The Planned Development gives the home buyer the option of purchasing a mainstream type of home with less annual expense on yard maintenance, water consumption, and property taxes.

The proposed public streets for the Planned Development help ensure that this project fits within the larger community and the surrounding areas, and the added density reduces the burden on each homeowners' CFD cost for the overall tract to maintain the infrastructure.

The proposed tentative tract map provides for a total of approximately 4.0% combined aggregate open space, trail system, and landscaping area for the entire 349-lot subdivision which exceeds the City's requirement of 2.5%. The Planned Development portion abuts the proposed park which is centrally located within the subdivision. The park's unique linear design and central location for the development, allow for functional outdoor use of the site, pedestrian connectivity to the public transportation areas and the neighborhood, and provides general aesthetic enjoyment for those who pass by the project. Additionally, the oversized park ensures that the area and the City reduce urban heat islands, reduce air pollution, and energy use.

The entire subdivision was designed to conform to City standards and implement elements and goals of the 2035 general plan, Fresno Metropolitan Flood Control District's master drainage plan, to take advantage of natural heating and cooling with lot orientation, providing additional open space area, and to fully utilizing infrastructure construction. The planned unit portion of Tract No. 6224 subdivision will integrate a wider array of home buying opportunities with traditional type homes, while also giving the homeowner a sense of community connectivity with homes that contribute to the creation of a complete diverse neighborhood.

Planned development portion recap:

- 42.6 acres, 280-lots
- Lots 100 through 128, 4000 Sq. Ft. Minimum, RS-5 zoning
- Lots 129 through 280, below 4000 Sq. Ft. RS-5 & RS-4 Zoning
- All homes will have 2-car garages, 18' from property line with roll-up doors.
- Deviate from the City's Development Code to allow "garage fronted" homes with less than 4' offset from the front façade for all lots within the tract.

Sincerely;

Jeff Callaway,
Project Manager
Lennar Homes of California, INC.

8080 N. Palm Ave. • Suite 110 • Fresno, CA 93711 • Office: 559-447-3400 • Fax: 559-447-3404

LENNAR.COM

City of FRESNO

Development & Resource Management Department
Development Services Division
2600 Fresno Street, Third Floor, Room 3043
Fresno, CA 93721-3604

Planned Development Permit Supplemental Application

The following items must be submitted in order to process your application. Please submit this information on a separate document if additional room is needed.

Code Section or Plan Policy #	Description of standard or requirement	Requested Modification	Describe how proposed modification is demonstratively superior and will achieve superior community design, environmental preservation, and/or substantial public benefit
15-1003	Minimum Side Setback 10 ft total 4/side	Minimum Side Setback 0 ft	The project proposes attached single family homes, where property lines will be delineated by the party wall system of the building.
15-1003	Minimum Front Setback 10 ft	Minimum Front Setback 0 ft	The front setback is limited by the proposes 20 ft common space outlots between homes for the purpose of communal sidewalk, utilities and landscaping.
15-1003	Minimum Rear Setback 20 ft	Minimum Rear Setback 0 ft	The rear setback is limited by the proposes 20 ft road outlots between homes.
15-1003	Maximum Lot Coverage 50% of Lot	Maximum Lot Coverage 90% of Lot	The project proposes attached single family homes, where property lines will be delineated by the party wall system of the building and the surrounding outlots. Therefore, the building will cover the majority of the property limits with outlots providing common space.

On a separate piece of paper please provide sufficient information to support the following findings:

- ☐ The proposed development is consistent with the General Plan, any applicable operative plan, and adopted policies, including the density and intensity limitations that apply;
- ☐ The subject site is physically suitable for the type and intensity of the land use being proposed;
- ☐ The proposed development is demonstratively superior to the development that could occur under the standards applicable to the underlying base district, and will achieve superior community design, environmental preservation, and/or substantial public benefit.

Supplemental Information

The proposed development is consistent with the 2025 Fresno General Plan that designates the project areas as Medium Density Residential and Business Park with areas of Medium High Density and Community Commercial in the vicinity of the project. The proposed change in use and zoning from RS-5 (Residential Single Family, Medium Density) to RM-1 (Residential Multiple Family, Medium High Density) is consistent with the adjacent properties.

The subject site is physically suitable for the type and intensity of the land use being proposed as it contributes to the up in coming growth in north Fresno. Surrounding parcels are zoned for residential development from medium low density to medium high density. Commercial Community is planned just north of the project with commercial community down Copper Avenue.

The proposed development is demonstratively superior as the increased density of the project gives the opportunity to offer diverse building types. The project offers a feeling of community as the products do not have front or rear yards but instead have communal shared areas.

ACOUSTICAL ANALYSIS

TRACT 6249
FRESNO, CALIFORNIA

WJVA Project No. 19-001

PREPARED FOR

LENNAR HOMES OF CENTRAL CALIFORNIA
8080 NORTH PALM AVENUE, SUITE 110
FRESNO, CA 93711

PREPARED BY

WJV ACOUSTICS, INC.
VISALIA, CALIFORNIA

wjv acoustics

JANUARY 10, 2019

INTRODUCTION

The project is a proposed 239-lot single-family residential development to be located in Fresno, California. The project site is located south of East Copper Avenue and west of North Willow Avenue. The City of Fresno has requested an acoustical analysis to quantify project site noise exposure and determine noise mitigation requirements. This analysis, prepared by WJV Acoustics, Inc. (WJVA), is based upon a project lot layout map provided by the project applicant, Lennar Homes, traffic data provided by the Fresno Council of Governments (Fresno COG) and the findings of on-site noise level measurements. Revisions to the lot layout plan may affect the findings and recommendations of this report. The site plan is provided as Figure 1.

Appendix A provides a description of the acoustical terminology used in this report. Unless otherwise stated, all sound levels reported are in A-weighted decibels (dB). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards utilize A-weighting, as it provides a high degree of correlation with human annoyance and health effects. Appendix B provides typical A-weighted sound levels for common noise sources.

NOISE EXPOSURE CRITERIA

The City of Fresno Noise Element of the General Plan (adopted 12/18/14) sets noise compatibility standards for transportation noise sources in terms of the Day-Night Average Level (L_{dn}). Implementing Policy NS-1-a of the noise element establishes a land use compatibility criterion as 65 dB L_{dn} for exterior noise exposure within outdoor activity areas of residential land uses. Outdoor activity areas generally include backyards of single-family residences, individual patios or decks of multi-family developments and common outdoor recreation areas of multi-family developments. The intent of the exterior noise level requirement is to provide an acceptable noise environment for outdoor activities and recreation.

Additionally, Implementing Policy NS-1-h of the noise element requires that interior noise levels attributable to exterior transportation noise sources not exceed 45 dB L_{dn}. The intent of the interior noise level standard is to provide an acceptable noise environment for indoor communication and sleep.

PROJECT SITE NOISE EXPOSURE

The project site is located south of East Copper Avenue and west of North Willow Avenue. The project site is exposed traffic noise. The distance from center of the backyards of the closest proposed lots to the centerline of East Copper Avenue is approximately 90 feet (based upon the proposed centerline of the future alignment of the roadway). Additionally, North Willow Avenue is located approximately 500 feet east of the closest proposed residences.

Traffic Noise Exposure:

Noise exposure from traffic on North Willow Avenue and East Copper Avenue was calculated for existing and future (2035) conditions using the FHWA Traffic Noise Model and traffic data obtained from Fresno COG.

WJVA utilized the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA Model is a standard analytical method used for roadway traffic noise calculations. The model is based upon reference energy emission levels for automobiles, medium trucks (2 axles) and heavy trucks (3 or more axles), with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions, and is generally considered to be accurate within ±1.5 dB. To predict L_{dn} values, it is necessary to determine the hourly distribution of traffic for a typical day and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

Noise level measurements and concurrent traffic counts were conducted by WJVA staff within the project site on January 8, 2019. The purpose of the measurement was to evaluate the accuracy of the FHWA Model in describing traffic noise exposure within the project site. The measurement site was located within the project site at a distance of approximately 65 feet from the centerline of East Copper Avenue. The speed limit posted in the project vicinity was 50 mph (miles per hour), however, due to the presence of an existing stop sign at the intersection of North Willow Avenue and East Copper Avenue, WJVA staff observed vehicles to be traveling at approximately 40-45 mph in the vicinity of the measurement site. Due to the distance from the roadway to the project site as well as the presence of existing industrial noise sources, it was not possible to conduct a traffic noise measurement along North Willow Avenue. The project vicinity and noise monitoring site location are provided as Figure 2. A photograph showing the noise measurement site is provided as Figure 3.

Noise monitoring equipment consisted of Larson-Davis Laboratories Model LDL-820 sound level analyzer equipped with a B&K Type 4176 1/2” microphone. The equipment complies with the specifications of the American National Standards Institute (ANSI) for Type I (Precision) sound level meters. The meter was calibrated in the field prior to use with a B&K Type 4230 acoustic calibrator to ensure the accuracy of the measurements. The microphone was located on a tripod at 5 feet above the ground. The project site presently consists of undeveloped land and a portion is currently used for industrial purposes.

Noise measurements were conducted in terms of the equivalent energy sound level (L_{eq}). Measured L_{eq} values were compared to L_{eq} values calculated (predicted) by the FHWA Model using as inputs the traffic volumes, truck mix and vehicle speed observed during the noise measurements. The results of the comparison are shown in Table I.

From Table I it may be determined that the traffic noise levels predicted by the FHWA Model were 0.1 dB lower than those measured for the traffic conditions observed at the time of the noise measurements for East Copper Avenue. This is considered to be excellent agreement with the model and therefore no adjustments to the model are necessary.

TABLE I

COMPARISON OF MEASURED AND PREDICTED (FHWA MODEL) NOISE LEVELS TRACT 6249, FRESNO

	E. Copper Ave.
Measurement Start Time	10:30 a.m.
Observed # Autos/Hr.	132
Observed # Medium Trucks/Hr.	24
Observed # Heavy Trucks/Hr.	0
Observed Speed (MPH)	45
Distance, ft. (from center of roadway)	65
L_{eq}, dBA (Measured)	60.3
L_{eq}, dBA (Predicted)	60.2
Difference between Measured and Predicted L_{eq}, dBA	**+0.1**

Note: FHWA “soft” site assumed for calculations.
Source: WJV Acoustics, Inc.

Annual Average Daily Traffic (AADT) data for East Copper Avenue and North Willow Avenue in the project vicinity was obtained from Fresno COG. Truck percentages and the day/night distribution of traffic were estimated by WJVA, based upon previous studies conducted in the project vicinity since project-specific data were not available from government sources. A speed limit of 50 mph was assumed for both roadways. Table II summarizes annual average traffic data used to model noise exposure within the project site.

TABLE II

TRAFFIC NOISE MODELING ASSUMPTIONS
TRACT 6249, FRESNO

	E. Copper Ave.		N. Willow Ave.	
	Existing	2035	Existing	2035
Annual Avenue Daily Traffic (AADT)	4,590	12,157	6,761	19,888
Day/Night Split (%)	90/10		90/10	
Assumed Vehicle Speed (mph)	50		50	
% Medium Trucks (% AADT)	2		2	
% Heavy Trucks (% AADT)	2		1	

Sources: Fresno COG
WJV Acoustics, Inc.

Using data from Table II, the FHWA Model, annual average traffic noise exposure was calculated for the closest proposed backyards from East Copper Avenue and North Willow Avenue. The calculated noise exposures for existing and future (2035) traffic conditions for the closest proposed setbacks to East Copper Avenue were approximately 60 dB L_{dn} and 65 dB L_{dn}, respectively. The calculated noise exposures for existing and future (2035) traffic conditions for the closest proposed setbacks to North Willow Avenue were approximately 51 dB L_{dn} and 55 dB L_{dn}, respectively. Noise exposure levels for future (2035) traffic conditions at the closest proposed residences to East Copper Avenue are approximately equal to the applicable City of Fresno exterior noise level standard of 65 dB L_{dn}, and further mitigation is required. Due to the distance from North Willow Avenue, mitigation from traffic noise associated with North Willow Avenue is not required for compliance with the City's exterior noise level standard.

NOISE MITIGATION

Exterior Noise Mitigation:

The City of Fresno Noise Element of the General Plan establishes a 65 dB L_{dn} criterion within outdoor activity areas (backyards) of single-family homes. The project site traffic noise exposure for future (2035) traffic conditions was calculated to be approximately 65 dB L_{dn} within the closest lots along East Copper Avenue. Such noise exposure levels meet the City of Fresno exterior noise level standard and mitigation must be considered.

To mitigate exterior traffic noise exposure along East Copper Avenue it will be necessary to construct a sound wall along the project roadway frontage. The sound wall would provide acoustical shielding of the outdoor activity areas located closest to the roadway.

A sound wall insertion loss program based on the FHWA Model was used to calculate the insertion loss (noise reduction) provided by the proposed sound walls. The model calculates the insertion loss of a wall of given height based on the effective height of the noise source, height of the receiver, distance from the receiver to the wall, and distance from the noise source to the wall. The standard assumptions used in the sound wall calculations are effective source heights of 8, 2 and 0 feet above the roadway for heavy trucks, medium trucks and automobiles, respectively. The standard height of a residential receiver is five feet above the ground elevation. It was assumed by WJVA that the building pad elevations at the closest proposed homes to East Copper Avenue would be approximately the same elevation as the roadway pavement.

Based upon the above-described assumptions and method of analysis, the noise level insertion loss values for sound walls of various heights were calculated. The calculations indicated that a sound wall along East Copper Avenue constructed to a minimum height of six (6) feet relative to the closest building pad elevations would reduce traffic noise exposure within individual backyards by approximately 6 dB, resulting in a projected future noise exposure of approximately 59 dB L_{dn}. In order to be effective, the sound wall should be turned inward (southward) for a minimum distance of twenty (20) feet at lots located adjacent to project site access points (lots 143 and 153).

It should be noted, the above-described sound wall would be effective at first-floor receiver locations only, and would not provide acoustical shielding to any proposed second-floor receivers. Therefore, individual second-floor balconies should not be constructed facing East Copper Avenue for the first row of homes adjacent to the roadway.

Interior Noise Exposure:

The City of Fresno interior noise level standard is 45 dB L_{dn}. The worst-case future noise exposure within the proposed residential development would be approximately 59 dB L_{dn} at first-floor receiver locations and approximately 65 dB L_{dn} at second-floor receiver locations. This means that the proposed residential construction must be capable of providing a minimum outdoor-to-indoor noise level reduction (NLR) of approximately 20 dB (65-45=20).

A specific analysis of interior noise levels was not performed. However, it may be assumed that residential construction methods complying with current building code requirements will reduce exterior noise levels by approximately 25 dB if windows and doors are closed. This will be sufficient for compliance with the City's 45 dB L_{dn} interior standard at all proposed lots. Requiring that it be possible for windows and doors to remain closed for sound insulation means that air conditioning or mechanical ventilation will be required.

CONCLUSIONS AND RECOMMENDATIONS

Exterior Noise Compliance:

The proposed 239-lot residential development will comply with applicable City of Fresno exterior noise level requirements provided the following mitigation measures are incorporated into final project design.

1. A sound wall with a minimum height of six (6) feet is constructed along the lot property lines adjacent to East Copper Avenue. The wall should be turned inward (southward) along the lots adjacent to project site access points (lots 143 and 153). Suitable construction materials include concrete blocks, masonry or stucco on both sides of a wood or steel stud wall.

2. If two-story construction is proposed for the first row of homes facing East Copper Avenue, second story balconies, first the first row of houses facing East Copper Avenue, should not be incorporated into project design.

Interior Noise Compliance:

The proposed 239-lot residential development will comply with applicable City of Fresno interior noise level requirements provided the following mitigation measures are incorporated into final project design.

1. Mechanical ventilation or air conditioning must be provided for all homes so that windows and doors can remain closed for sound insulation purposes.

2. Acoustic baffles should be installed on the interior side of gable vents that face, or are perpendicular to, East Copper Avenue. An example of a suitable attic vent baffle is shown by Appendix C.

The conclusions and recommendations of this acoustical analysis are based upon the best information known to WJV Acoustics Inc. (WJVA) at the time the analysis was prepared concerning the proposed lot layout plan, project site elevation, traffic volumes and roadway configurations. Any significant changes in these factors will require a reevaluation of the findings of this report. Additionally, any significant future changes in motor vehicle technology, noise regulations or other factors beyond WJVA's control may result in long-term noise results different from those described by this analysis.

Respectfully submitted,

Walter J. Van Groningen
President

WJV:wjv

FIGURE 1: SITE PLAN

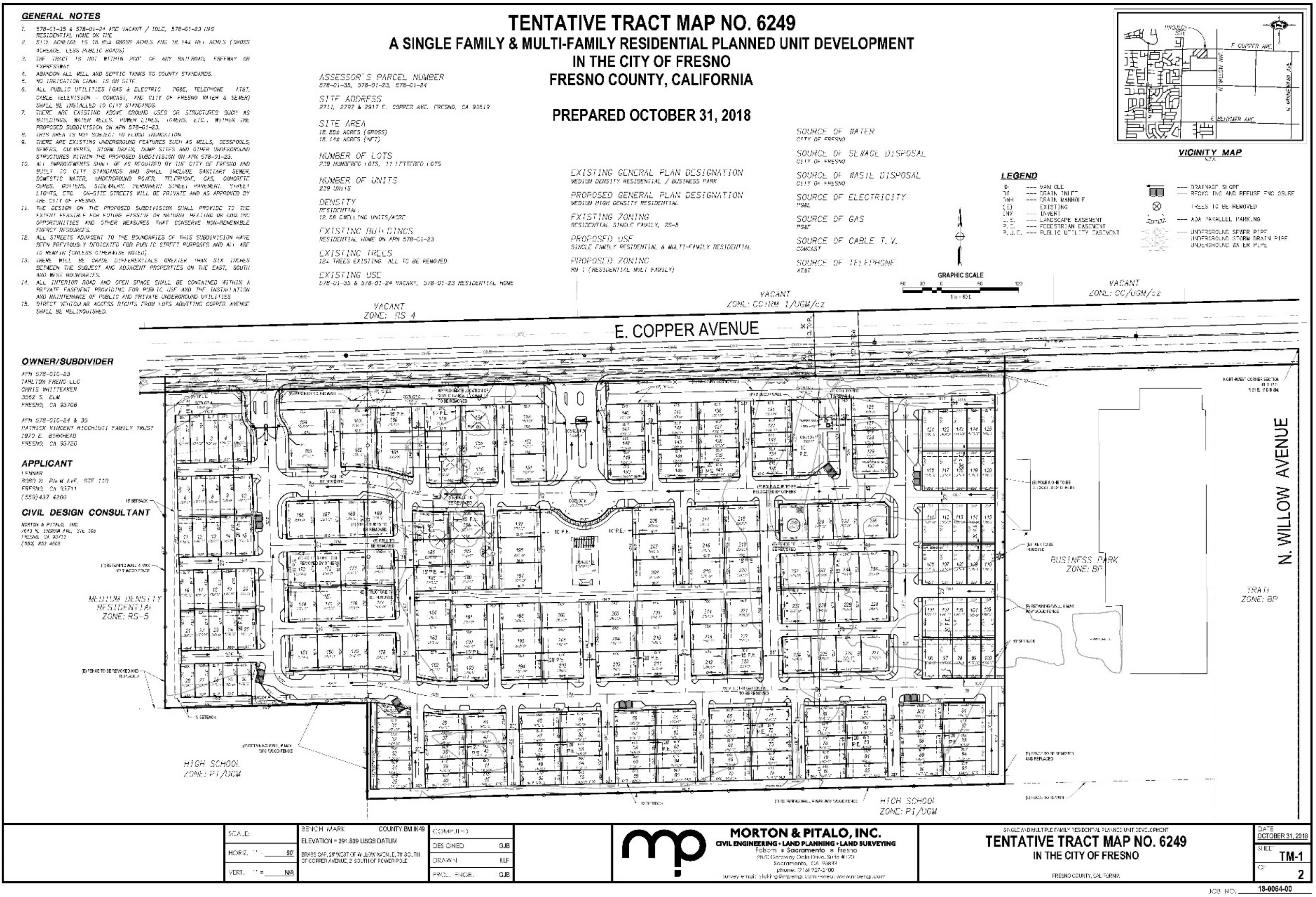


FIGURE 2: PROJECT SITE VICINITY AND NOISE MEASUREMENT LOCATION

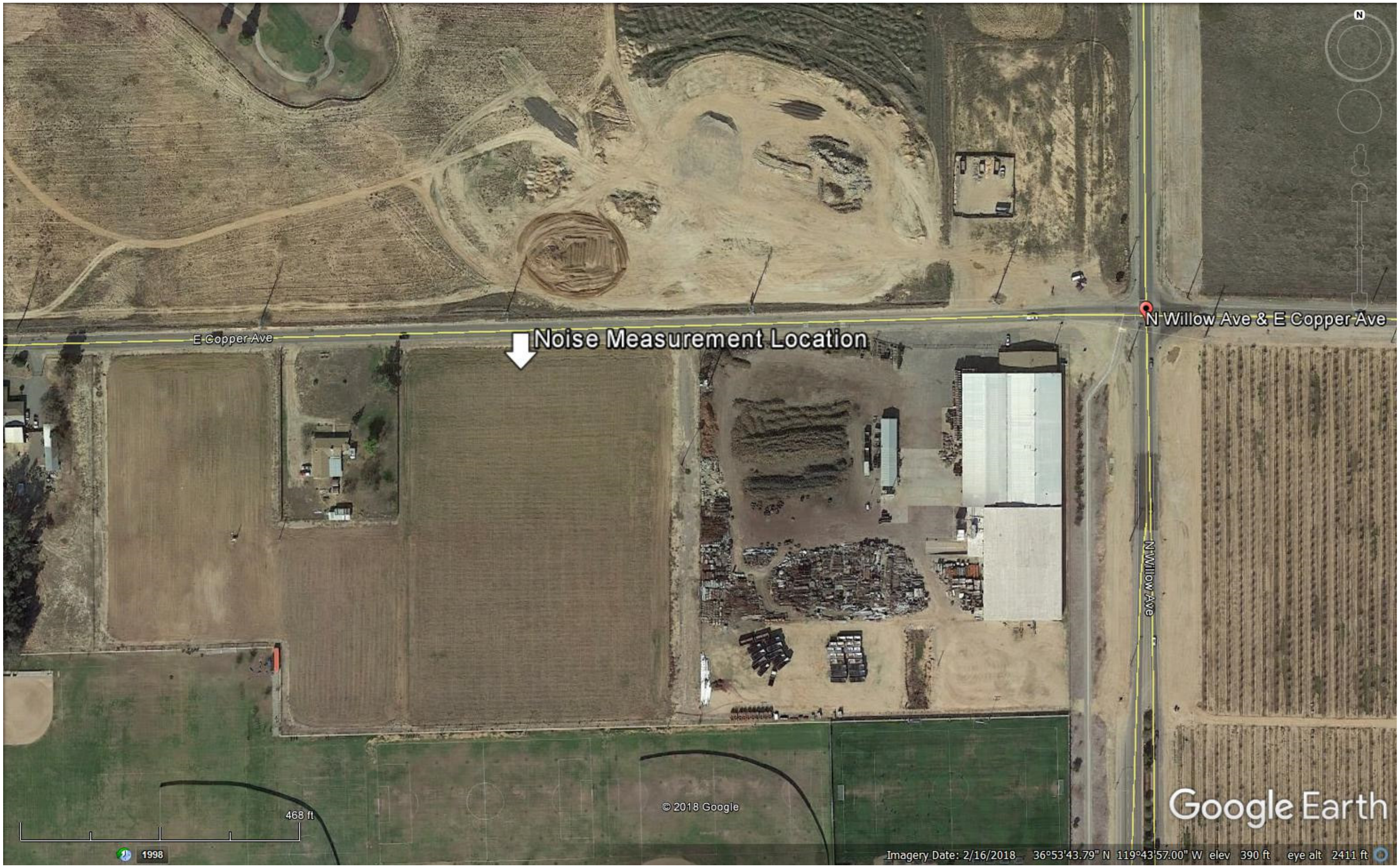


FIGURE 3: NOISE MEASUREMENT SITE

APPENDIX A

ACOUSTICAL TERMINOLOGY

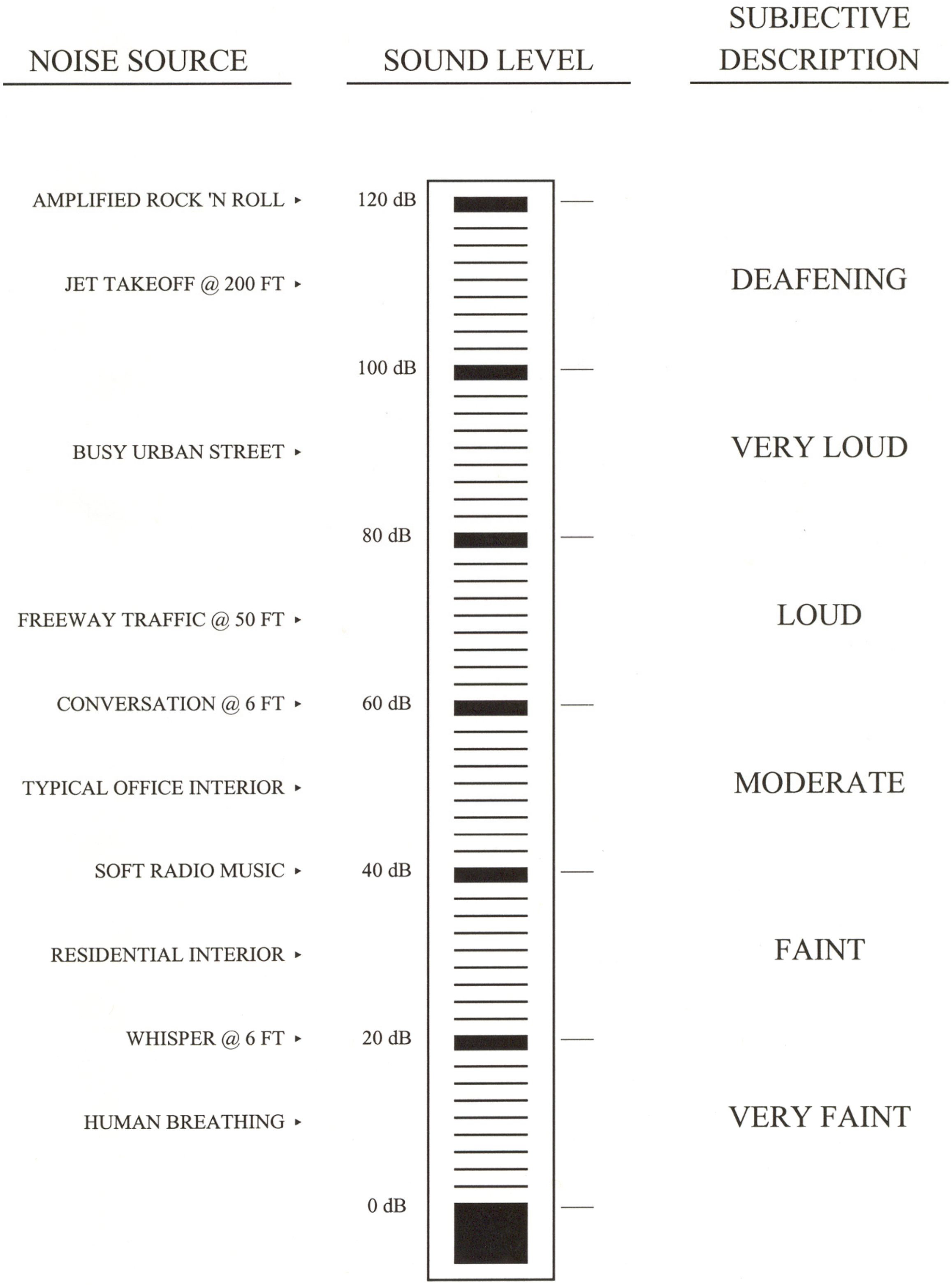
AMBIENT NOISE LEVEL:	The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.
CNEL:	Community Noise Equivalent Level. The average equivalent sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.
DECIBEL, dB:	A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
DNL/L_{dn}:	Day/Night Average Sound Level. The average equivalent sound level during a 24-hour day, obtained after addition of ten decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.
L_{eq}:	EquivaClent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L_{eq} is typically computed over 1, 8 and 24-hour sample periods.
NOTE:	The CNEL and DNL represent daily levels of noise exposure averaged on an annual basis, while L_{eq} represents the average noise exposure for a shorter time period, typically one hour.
L_{max}:	The maximum noise level recorded during a noise event.
L_n:	The sound level exceeded "n" percent of the time during a sample interval (L_{90}, L_{50}, L_{10}, etc.). For example, L_{10} equals the level exceeded 10 percent of the time.

A-2

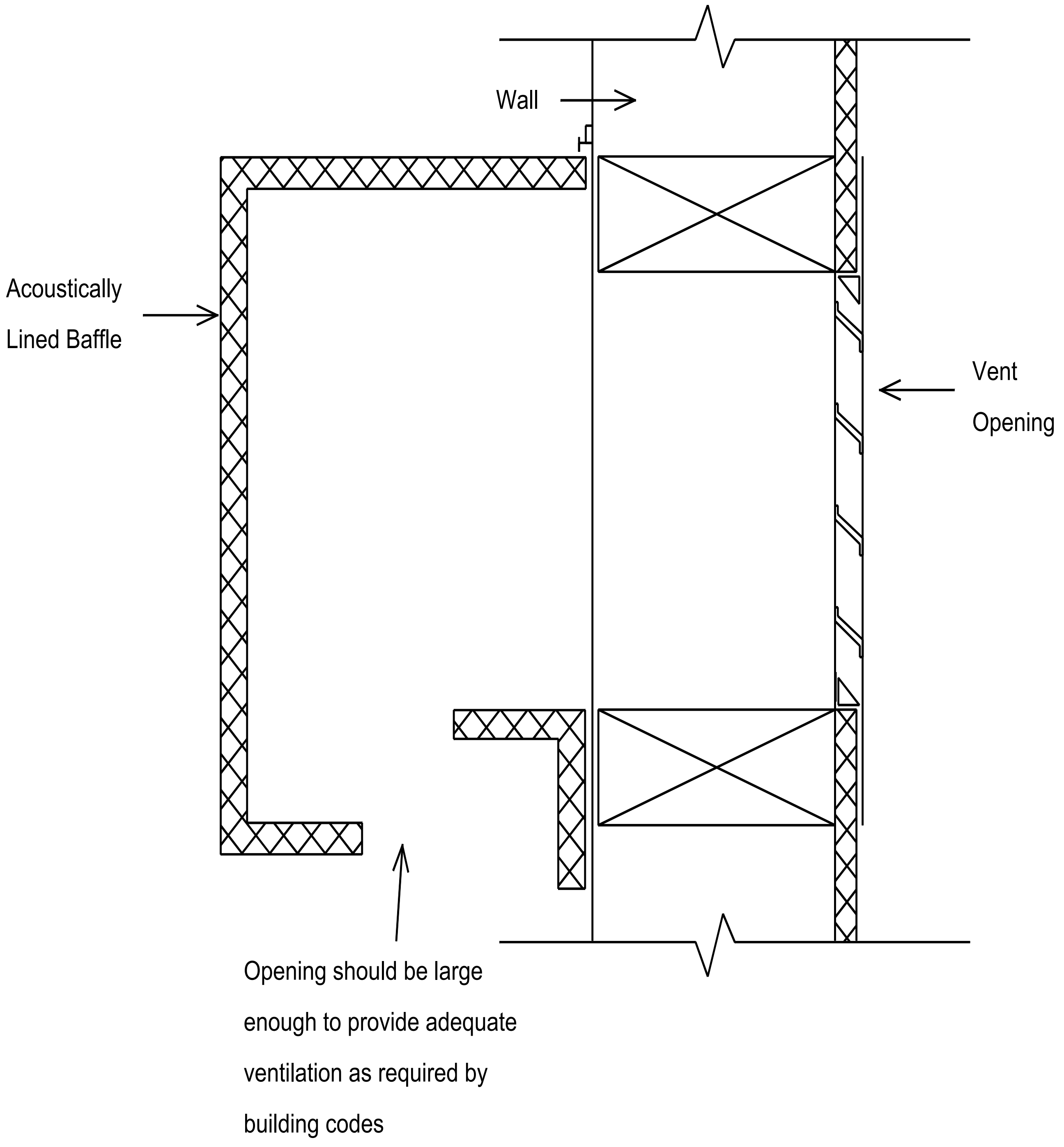
ACOUSTICAL TERMINOLOGY

NOISE EXPOSURE CONTOURS:	Lines drawn about a noise source indicating constant levels of noise exposure. CNEL and DNL contours are frequently utilized to describe community exposure to noise.
NOISE LEVEL REDUCTION (NLR):	The noise reduction between indoor and outdoor environments or between two rooms that is the numerical difference, in decibels, of the average sound pressure levels in those areas or rooms. A measurement of “noise level reduction” combines the effect of the transmission loss performance of the structure plus the effect of acoustic absorption present in the receiving room.
SEL or SENEL:	Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to a duration of one second. More specifically, it is the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on a reference pressure of 20 micropascals and a reference duration of one second.
SOUND LEVEL:	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.
SOUND TRANSMISSION CLASS (STC):	The single-number rating of sound transmission loss for a construction element (window, door, etc.) over a frequency range where speech intelligibility largely occurs.

APPENDIX B
EXAMPLES OF SOUND LEVELS



Appendix C
Example of Attic Vent Baffle Treatment



City of FRESNO

Development and Resource Management

2600 Fresno Street, Third Floor
Fresno, California 93721-3604
(559) 621-8277 FAX (559) 498-1026

May 29, 2019

Review Comments for Tentative Map Tract application: P19-01469

Airports
This review was performed by:
Status: No Comment

The City of Fresno Airports Department anticipates no adverse impacts on Fresno Yosemite International Airport or Fresno Chandler Executive Airport from the proposed project.

Building and Safety Services
This review was performed by: Christian Mendez
Status: Review Complete

1. Demolition plans are required to be submitted to the Building and Safety Services Department for approval and permits.
2. Plans are required to be submitted to the Building and Safety Services Department for approval and permits for the proposed gates.
- Plans shall include all structural and electrical drawings for the proposed gates.

County PW and Planning
This review was performed by: County Planning
Status: Review Complete

County recommends TIS for cumulative impact potential. Contact County Staff to coordinate TIS process.

DPU Planning and Engineering
This review was performed by: Kevin Gray
Status: Reviewed with Conditions

Sewer Requirements

The nearest sanitary sewer main to serve the proposed project is a 10-inch sewer main located at the intersection of the North Chestnut and East Copper Avenue. Sanitary sewer facilities are available to provide service to the site subject to the following requirements:

1. Construct a 10-inch sanitary sewer main (including sewer house branches to adjacent properties) in East Copper Avenue from the existing 10-inch main located at the intersection of the North Chestnut and East Copper Avenue.

2. Street easements and/or deeds shall be recorded prior to approval of improvement plans.

3. All underground utilities shall be installed prior to permanent street paving.

4. All sanitary sewer mains shall be extended within the proposed tract to provide service to each lot.

5. Engineered improvement plans prepared by a Registered Civil Engineer shall be submitted for Department of Public Utilities review and approvals for proposed additions to the City Sewer System.

6. All public sanitary sewer facilities shall be constructed in accordance with City Standards, specifications, and policies.

7. Installation of sewer house branch(s) shall be required.

8. Separate sewer house branches are required for each lot.

9. All sewer main easements shall be clear and unobstructed by buildings or other structures. No fencing or wall shall either enclose or be located above the sewer main. The planting plan, for any proposed landscape within the easement, shall be approved by the Department of Public Utilities. No Trees shall be located within 8 feet of the sewer main.

10. Street work permit is required for any work in the Right-of-Way.

11. On-site sanitary sewer facilities shall be private.

12. Abandon any existing on-site private septic systems.

Sanitary Sewer Fees

The following Sewer Connection Charges are due and shall be paid for the Project:

1. Sewer Lateral Charge.

2. Sewer Oversize Area #43.

3. Wastewater Facilities Charge (Residential Only)

4. Herndon Trunk Enhancement Fee.

5. Trunk Sewer Charge: Herndon

DPU Solid Waste Management
This review was performed by: Kevin Gray
Status: Revisions Required

Purpose
The intent of these procedures is to establish minimum service requirements for Multi-Family customers, based on the health and safety needs of the community. These minimum service requirements are established to ensure timely and sufficient service of putrid food wastes in order to control vector issues and unnecessary odors.

Multi-Family Service Requirements
For the purpose of establishing city solid waste service policies, multi-family complexes are defined as complexes composed of three (3) dwelling units or more per parcel. These service requirements apply to all multi-family complexes within the City of Fresno.

1. All trash bins provided to multi-family complexes must be serviced with a frequency of at least twice per week. This standard does not apply to frequency of service for recycling bins. Solid Waste bin service will be provided by the City of Fresno, per FMC 9-405.

2. All multi-family complexes are required to subscribe for recycling services, per FMC 9-405.1. Recycling services may be provided by the City of Fresno or any private recycling service provider. Recycling services must include at the minimum cardboard, newspaper, paper, glass, plastics, beverage containers, and metal recycling.

3. All trash and recyclable material must be placed in approved containers, per FMC 9-404. At no time may trash and recyclable material be placed on the ground or pavement.

4. Bin enclosures, if provided on site, must be used exclusively for the storage of trash and recycling bins, per public works standard specifications P-33 & P-34.

5. All Solid Waste and Recycling service collectively must equal or exceed a 2:1 ratio of 2 units per one cubic yard of service per week. This minimum service applies to all multi-family complexes. (i.e. 24 unit complex must have a minimum of 12 cubic yards of solid waste and recycling service per week.)

6. Service Route Permits and Location Permits are required for all private trash company service within the City of Fresno, per FMC 9-408. All private company trash service arrangements must be pre-approved through Solid Waste Management Division.

7. Developer will need to provide a 44' (centerline) turning radius at all corners and a T-turnaround (or hammerhead) area where the solid waste vehicle is to turn around.

8. ADA requirement for multifamily residential

9. Developer shall install (or construct) a trash enclosure for the project that complies with the City's ADA requirements as defined in the City's standard drawings, details and specifications. The certificate of occupancy for the project shall be withheld until developer installs (constructs) the trash enclosure in accordance with the City's ADA requirements.

DPU Water Division
This review was performed by: Robert Diaz
Status: Review Complete

1. Install a 16-inch water main (including City fire hydrants) in East Copper Avenue from the existing 16-inch water main at North Chestnut Avenue east to North Willow Avenue.

2) Install a 16-inch water main (including City fire hydrants) in North Willow Avenue from East Copper Avenue south, approximately 630-linear feet, to the existing 14-inch water main in North Willow Avenue.

3. Installation of water service(s) & meter box(es) shall be required to each lot created..

4. Destruct any existing on-site well in compliance with the State of California Well Standards, Bulletin 74-81 and 74-90 or current revisions issued by California Department of Water Resources and City of Fresno standards.

5. Engineered improvement plans prepared by a Registered Civil Engineer are required for proposed additions to the City Water System.

6. All Public water facilities shall be constructed in accordance with The Department of Public Works standards, specifications, and policies.

The water supply requirements for this project are as follows:

1. The project applicant shall be required to pay Water Capacity Fee charges for the installation of new water services and meters to serve the property.

a. The Water Capacity Fee charge assessed to the applicant shall be based on the number and size of service connections and water meters required to serve the property.

b. The Water Capacity Fee charges by meter size are defined in the City’s Master Fee Schedule.

c. The City reserves the right to require an applicant to increase or decrease the size of a water meter for a project or a property to ensure that the meter is properly sized to accommodate fire protection requirements, and to allow for accurate volumetric flow measurements at low- and high-flow conditions.

d. The Water Capacity Fee Charge for any new or expanded service connection shall be payable prior to the issuance of a building permit at the fee level in effect on the date such permit is issued.

2. The project applicant shall be required to pay all other water-related fees and charges in accordance with the City’s Master Fee Schedule and Municipal Code.

Fire Review
This review was performed by: Byron Beagles
Status: Revisions Required

1. The following conditions were noted in Fire's comments to Accela P18-03301 on 12-13-18. Notes reflecting the following conditions are not on the 7 plan sheets for the CUP submitted for P19--01469; add these notes to Sheet SP 2 of 7:
    a. Provide Fire X-1 gate hardware as well as Click-2-Enter radio frequency gate opening hardware at each vehicle gate entrance
    b. Fire lanes must be designated throughout the complex with "FIRE LANE NO PARKING" in 3 inch white letters every 50 feet on a red curb. Provide CVC 22658 fire lane tow away warning signs at the two entry gates.
    c. Fire hydrants and fire access with weather surface and two points of fire access must be in service prior to the delivery of combustible material to the site and maintained during all phases of construction.
2. Fire hydrant locations within the complex are not shown. The locations are indicated on a site plan mark up in "Documents" posted in P18-03301 and added to Documents under P19-01469. Show these fire hydrant location on Sheet SP 2 of 7.
3. The following comment was not entered before; add a note to SP 1 of 7: "Provide approved graphic address directories in accordance with Development Department Policy at both vehicle entry gates".

Flood Control District
This review was performed by:
Status: Review Complete

See attached FMFCD Notice of Requirements.
NOR & Grading Plan Review Fees due.
Drainage Fees due.

Fresno County Environmental Health
This review was performed by:
Status: Reviewed with Conditions

Recommended Conditions of Approval:

• Construction permits for the proposed project should be subject to assurance of sewer capacity of the Regional Wastewater Treatment Facility. Concurrence should be obtained from the California Regional Water Quality Control Board (RWQCB). For more information, contact staff at
(559) 445-5116.

• Construction permits for the proposed project should be subject to assurance that the City of Fresno community water system has the capacity and quality to serve this project. Concurrence should be obtained from the State Water Resources Control Board, Division of Drinking Water-Southern Branch. For more information call (559) 447-3300.

• The proposed construction project has the potential to expose nearby residents to elevated noise levels. Consideration should be given to the City's municipal code.

• Prior to the issuance of building permits, the applicant shall submit complete pool facility plans and specifications to the Fresno County Department of Public Health, Environmental Health Division, for review and approval. Contact the Recreational Health Program at (559) 600-3357 for more information.

• Prior to operation, the applicant shall apply for and obtain a permit to operate a public swimming pool from the Fresno County Department of Public Health, Environmental Health Division. A permit, once issued, is nontransferable. Contact the Recreational Health Program at
(559) 600-3357 for more information.

• If the applicant proposes to use and/or store hazardous materials and/or hazardous wastes, they shall meet the requirements set forth in the California Health and Safety Code (HSC), Division 20, Chapter 6.95, and the California Code of Regulations (CCR), Title 22, Division 4.5. Any business that handles a hazardous material or hazardous waste may be required to submit a Hazardous Materials Business Plan pursuant to the California Health and Safety Code (HSC), Division 20, Chapter 6.95, Section 25507 (http://cers.calepa.ca.gov/). Contact the Certified Unified Program Agency at (559) 600-3271 for more information.

• As a measure to protect ground water, all water wells and/or septic systems that exist or have been abandoned within the project area should be properly destroyed by an appropriately licensed contractor.

• Should any underground storage tank(s) be found during the project, the applicant shall apply for and secure an Underground Storage Tank Removal Permit from the Fresno County Department of Public Health, Environmental Health Division. Contact the Certified Unified Program Agency at (559) 600-3271 for more information.

The following comments pertain to the demolition of existing structure(s):

• Should the structure(s) have an active rodent or insect infestation, the infestation should be abated prior to demolition of the structure(s) in order to prevent the spread of vectors to adjacent properties.

• In the process of demolishing the existing structure(s), the contractor may encounter asbestos containing construction materials and materials coated with lead based paints.

• If asbestos containing materials are encountered, contact the San Joaquin Valley Air Pollution Control District at (559) 230-6000 for more information.

• If the structure(s) were constructed prior to 1979 or if lead-based paint is suspected to have been used in these structure(s), then prior to demolition work the contractor should contact the following agencies for current regulations and requirements.
? California Department of Public Health, Childhood Lead Poisoning Prevention Branch, at (510) 620-5600.

? United States Environmental Protection Agency, Region 9, at (415) 947-8000.

? State of California, Industrial Relations Department, Division of Occupational Safety and Health, Consultation Service (CAL-OSHA) at (559) 454-5302.

Irrigation District
This review was performed by:
Status: Review Complete

Please refer to FID's Comment Letter in Documents

Long Range Planning
This review was performed by: Amber Piona
Status: Review Complete

This project includes two sites listed in the Housing Element Sites Inventory (2013-2023 RHNA). The Housing Sites Inventory (2013-2023 RHNA) establishes the minimum capacity of one site (APN 579-010-35) to be 18 units with an affordability categorization of Above Moderate, and the minimum capacity of the second site (APN 579-010-24S) to be 39 units of Above Moderate. The proposed project includes rezoning both sites from RS-5 to RM-1, and a 239 unit subdivision, of which 46 units are on the first Housing Element site, 87 units are on the second and the remaining 106 units on sites not in the Housing Element Sites Inventory. Although the new zone district RM-1 has the capacity to support housing at the Moderate income level, the proposed subdivision does not include affordable housing and therefore all proposed units are Above Moderate. This project represents an increase of 18 Above Moderate units on one housing element site and an increase of 48 Above Moderate units on the other site, and therefore is consistent with the Housing Element.

Public Works Engineering
This review was performed by: Hilary Kimber
Status: Reviewed with Conditions

Same conditions apply as for P18-03301. Discussed utilizing Eleaocarpus or Photinia trees in the buffer on Copper Ave. and vines on the CMU wall. No landscape plans from Broussard and Associates at this time.

Public Works TIS Review
This review was performed by: Jill Gormley
Status: Reviewed with Conditions

See TIS comments dated 05/17/19 jmg

Public Works-CFD
This review was performed by: Erin Augusto
Status: Reviewed with Conditions

This development will have maintenance requirements and will be conditioned upon official submittal. See requirements in Documents tab

School District
This review was performed by:
Status: Review Complete

See uploaded PDF titled "CUSD TM 6249.pdf"

Traffic Planning
This review was performed by: Louise Gilio
Status: Reviewed with Conditions

See attachments for Public Works conditions of approval.

City of
FRESNO

DATE: May 14, 2019

TO: Jose Valenzuela
Development and Resource Management Department

THROUGH: Andrew Benelli, PE, Assistant Director, City Engineer
Public Works Department, Traffic Engineering Operations and Planning Division

FROM: Louise Gilio, Traffic Planning Supervisor
Public Works Department, Traffic Engineering Operations and Planning Division

SUBJECT: Public Works Conditions of Approval for a 239-lot SFR subdivision
TT 6249 (P19-01469) C.U.P. (P19-01259)
2929 East Copper Avenue
Lennar / Morton & Pitalo, Inc.

The Public Works Department, Traffic Engineering Operations and Planning Division, has completed its review and the following requirements are to be placed on this tentative map as a condition of approval by the Public Works Department.

Provide the following information prior to the acceptance of the final map submittal. This can result in additional conditions of approval.

1. Coordinate street alignment, median design and approach locations with approved street plans. Overlay the proposed median and right of way onto the map and site plan. Coordinate proposed median openings with the proposed entrances.
2. Vacation of existing right of way adjacent to this application may be required. Overlay the proposed street alignment on the map and site plan to determine, if necessary.
3. Remove structural section references from the map and site plan. Structural section to be approved with the street plans.
4. Remove the topo lines and grades from the map and site plan.
5. Provide a description for Outlot "M" on the map and site plan.
6. On-site parking shall comply with the Public Works Parking Manual.
7. Identify and provide a map boundary.

General Conditions:

1. Identify all easements on the map.
2. Street Dedications: Provide corner cut dedications at all intersections for accessibility ramps.
3. Outlots: If the subdivider seeks to dedicate to the City, in fee, an outlot for open space purposes, subdivider shall prove to the City that the outlot is free of toxic or hazardous materials pursuant to the requirements of City Administrative Order 8-1, including, but not limited to, performing a Phase I Soils Investigation. The soils Investigation report shall be submitted to the Public Works Department for review and approval. The subdivider must obtain Public Works approval of the soils investigation report and complete any mitigation work identified by the soils investigation prior to subdivider's submittal of the Final Map to the Public Works Department.

Any and all costs associated of the soils investigation and any required mitigation work shall be performed at the sole expense of the subdivider.

4. The construction of any overhead, surface or sub-surface structures and appurtenances in the public right of way is prohibited unless an encroachment covenant is approved by the City of Fresno Public Works Department, Traffic and Engineering Services Division, (559) 621-8681. Encroachment permits must be approved prior to issuance of building permits.
5. Street widening and transitions shall also include utility relocations and necessary dedications.
6. Overhead Utilities: Underground all existing offsite overhead utilities with the limits of this map in accordance with Fresno Municipal Code Section 15-4114.
7. Plan Submittal: Submit the following plans, as applicable, in a single package, to the Public Works Department for review and approval: Street: construction, signing, striping, traffic signal and streetlight.

Frontage Improvement Requirements:

Public Streets:

Copper Avenue: 4-lane Super Arterial

1. Dedication and / or Vacation Requirements:
   a. Dedicate **50’** of property, from center line, for public street purposes, within the limits of this application, per Public Works Standards **P-51** and **P-52**. Center line shall be established per approved street plans. Contact Harmanjit Dhaliwal for coordination of street plans. (559) 621-8694
   b. Dedicate a **2’** easement for pedestrian purposes.
   c. Dedicate corner cuts for public street purposes at both entrances.
   d. Vacation of existing right of way adjacent to this application may be required. Overlay the proposed street alignment on the map and site plan to determine, if necessary.
   e. Relinquish direct access rights to Copper Avenue from all residential lots within this subdivision.
2. Construction Requirements:
   a. Construct concrete curb, gutter and sidewalk to Public Works Standard **P-5**. The curb shall be constructed to a **10’** pattern with a **2’** pedestrian easement. Construct a 6’ residential sidewalk per Public Works Standard **P-52**. 5 ½’ from face of curb to walk – 6’ sidewalk – ½’ from walk to easement.
   b. Construct **20’** of permanent paving within the limits of this subdivision.
   c. Construct an underground street lighting system to Public Works Standard **E-1** within the limits of this subdivision. Spacing and design shall conform to Public Works Standard **E-7** for Arterial Streets.

Interior Streets: Private

1. All streets and pedestrian ways shall connect to other streets and pedestrian ways to form a continuous vehicular and pedestrian network with connections within the subdivision and to adjacent development. Pedestrian paths of travel must meet current accessibility regulations. Sidewalks are recommended on both sides of the street. Identify ramps within the proposed subdivision wherever sidewalks are provided.
2. Garages: Provide 27’ minimum of backup.
3. Dead-end Streets: Provide vehicle turn around capability.
4. Provide a **10’** visibility triangle at all intersections.

Specific Mitigation Requirements: A Traffic Impact Study (TIS) has been is required and has been submitted. Comply with the mitigation measure requirements of the Traffic Engineering Manager.

1. The entry intersections and turning ability to be determined once the approved street plans are overlaid onto this map and site plan.
2. The first order of work shall include a minimum of two points of vehicular access to the major streets for any phase of this development.
3. Entry Gate: Provide a minimum of **40'** from the proposed keypad to the back of walk, for vehicle stacking at both entrances and adjust the gate locations accordingly. Provide an onsite turn around.

Traffic Signal Mitigation Impact (TSMI) Fee: This project shall pay the current Traffic Signal Mitigation Impact Fee (TSMI Fee) at the time of building permit based on the trip generation rate(s) as set forth in the latest edition of the ITE Generation Manual for single family units (fee rate as shown in the Master Fee Schedule). In some cases, traffic signals may be conditioned on multiple maps. If the signal is existing at the time of the final map, the applicant would be not be required to construct the signal but would be required to pay the applicable fee.

TSMI fee is credited against traffic signal and Intelligent Transportation System (ITS) improvements, provided that the improvements are; constructed at ultimate locations, contained within the build out of the General Plan circulation element and are included in the latest Nexus Analysis for TSMI fee. Project specific impacts that are not consistent with the *General Plan*, *Public Works Standard Drawings* or not incorporated in the TSMI fee infrastructure costs, are not reimbursable. Failure to pay this fee or construct improvements that are credited / reimbursable with this fee will result in a significant unmitigated impact as this fee is applied to all projects within the City Sphere of Influence. If the applicant is conditioned with improvements that are credited / reimbursable with this fee, they should work with the Department of Public Works and identify, with a Professional Engineer's estimate, the costs associated with the improvements, prior to paying the TSMI fee at time of building permit.

The following intersections shall be signalized to the City of Fresno Standards, complete with left turn phasing, actuation and signal pre-emption:

a. Copper and Chestnut and
b. Copper and Willow

This work is eligible for reimbursement and/or credit against Traffic Signal Mitigation Impact Fees. The applicant shall design the traffic signal and obtain City approval of the plans **prior** to occupancy of the first dwelling unit. The traffic signal installation shall be limited to the following equipment: poles, safety lights, oversize street name sign, conduits, detectors, service pedestal connected to a PG&E point of service, controller cabinet, ITS vault, ITS communication cabinet and all pull boxes, with the following equipment to be delivered to the City of Fresno's Traffic Signal shop for future installation when warrants are met: 2070L controller, mast arms, heads, Opticom discriminator and receivers.

Fresno Major Street Impact (FMSI) Fee: This Map is in the **New Growth Area**; therefore pay all applicable growth area fees and City-wide regional street impact fees. In some cases, center section improvements may be conditioned on multiple maps. If the improvements have been constructed by another map at the time of the final map, the applicant would be not be required to construct them, but would be required to pay the applicable fee.

Fresno Major Street Impact (FMSI) Requirements:

Copper Avenue: Super Arterial (New Growth Area)

1. Where not existing, dedicate and construct (2) eastbound travel lanes, (2) westbound travel lanes, 5' shoulders and a raised concrete median island within the limits of this subdivision. If applicable, construct a raised concrete median with 250' left turn pockets at all major intersections. Details of said street shall be depicted on the approved tentative tract map. Dedication shall be sufficient to accommodate arterial standard and any other grading or transitions as necessary based on a **55** MPH design speed.

Regional Transportation Mitigation Fee (RTMF): Pay all applicable **RTMF** fees to the Joint Powers Agency located at 2035 Tulare Street, Suite 201, Fresno, CA 93721; (559) 233-4148 ext. 200; www.fresnocog.org. Provide proof of payment or exemption **prior** to certificate of occupancy.

City of FRESNO

PUBLIC WORKS DEPARTMENT

City Hall
2600 Fresno Street, 4th Floor
Fresno, California 93721
Ph. (559) 621-8800
www.fresno.gov

Scott L. Mozier, P.E.
Public Works Director

May 17, 2019

Jose Valenzuela, Planner III
Development and Resources Management Department
2600 Fresno Street, 3rd Floor
Fresno, CA 93721

SUBJECT: REVIEW OF THE TRAFFIC IMPACT ANALYSIS (TIA) DATED APRIL 23, 2019 FOR THE PROPOSED TRACT 6249 ON THE SOUTHWEST CORNER OF COPPER AVENUE AND WILLOW AVENUE
TIS 19-010, P19-01469

PROJECT and ANALYSIS OVERVIEW

Traffic Operations and Planning staff has reviewed the Traffic Impact Analysis (TIA) prepared by KD Anderson & Associates, Inc. for the proposed Tract 6249, "project", which plans to construct 239 single family dwelling units on approximately 18.85 acres on the southwest corner of Copper Avenue and Willow Avenue. The TIA included land use and size as shown in the table below. The project site is currently vacant.

The TIA evaluated the impacts of the project by analyzing six (6) intersections in the vicinity of the project during the AM and PM peak hours. Vehicle trips projected to be generated by the project were calculated using the ITE Trip Generation Manual, 10th Edition. The following table includes the daily (ADT), AM and PM peak hour trips projected to be generated by the current General Plan use and proposed project as shown in the TIA:

Land Use	Size	Weekday						
		ADT	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Proposed Land Use Designation								
Single Family Housing (ITE Code 210)	239 DU	2,256	44	133	177	149	88	237
Current Land Use Designation								
Business Park (ITE Code 770)	77,000 SF	958	19	12	31	15	17	32
Single Family Housing (ITE Code 210)	123 DU	1,161	23	68	91	77	45	122
Total		2,119	42	80	122	92	62	154
Difference		137	2	53	55	57	26	83

DU = dwelling units *SF = square feet*

Based on the analyses included in the TIA, the following study intersections are currently operating below the TIZ III level of service (LOS) standard of LOS D

- Copper Avenue at Chestnut Avenue
- Copper Avenue at Willow Avenue

Traffic signal warrants were prepared for all unsignalized study intersections. The peak hour volume warrants are currently met at all the intersections of Copper Avenue at Chestnut Avenue and Copper Avenue at Willow Avenue.

With the addition of the project, the study intersections shown above are projected to operate below the adopted LOS standard and/or impact operations at the intersections by five seconds or more. An impact is considered significant if the delay at an intersection currently operating below the level of service standard is increased by five or more seconds.

With the build out of the roadway network and infrastructure improvements (traffic signals), all of the study intersections of are projected to operate at or above TIZ III LOS D standard.

GENERAL COMMENTS and CONDITIONS

1. This project shall pay its Traffic Signal Mitigation Impact (TSMI) Fee per single family dwelling unit, per the Master Fee Schedule at the time of building permit.

   The TSMI fee facilitates project impact mitigation to the City of Fresno Traffic Signal infrastructure so that costs are applied to each new project/building based on the generated ADT. The TSMI fee is credited against traffic signal installation/modifications and/or Intelligent Transportation System (ITS) improvements (constructed at their ultimate location) that plan to build out the General Plan circulation element and are included in the Nexus Study for the TSMI fee. If the project is conditioned with traffic signal improvements in excess of their TSMI fee amount, the applicant may apply for fee credits (security/bonding and/or developer agreement required) and/or reimbursement for work in excess of their fee as long as the infrastructure is in place at the ultimate location. The applicant should work with the Public Works Department and identify, with a Professional Engineers estimate, the costs associated with the improvements prior to paying the TSMI fee to determine any applicable fee credits and/or reimbursements.

   For project specific impacts that are not consistent with the General Plan, Public Works Standards, and/or are not incorporated into the TSMI fees, the infrastructure costs will not be eligible. Failure to pay this fee or construct improvements that are credited/reimbursable with this fee will result in a significant unmitigated impact as this fee is applied to all projects within the City Sphere of Influence.

2. This project shall pay its Fresno Major Street Impact (FMSI) Fee, which will be determined at time of building permit. This FMSI fee is creditable towards major street roadway improvements included in the nexus study for the FMSI fee.

City of
FRESNO

DATE: November 15, 2018

TO: Jose Valenzuela, Development Services/Planning
Development and Resource Management Department

FROM: Ann Lillie, Senior Engineering Technician
Public Works Department, Traffic Operations and Planning Division

SUBJECT: PUBLIC WORKS CONDITIONS OF APPROVAL FOR VESTING TENTATIVE TRACT MAP NO. 6249 REGARDING MAINTENANCE REQUIREMENTS

LOCATION: **south side of East Copper Avenue between North Chestnut and Willow Avenues**
APN: **578-010-23, -24S, -35**

The Public Works Department, Traffic and Engineering Services Division, has completed its review and the following requirements are to be placed on this tentative map as a condition of approval. These requirements are based on City of Fresno code, policy, standards and the public improvements depicted on the exhibits submitted for this development.

<table>
<tr><td colspan="4">ATTENTION:
The item below requires a separate process with additional costs and timelines. In order to avoid delays with the final map approval, the following item shall be submitted for processing to the Public Works Department, Traffic and Engineering Services Division <u>prior</u> to final map approval.</td></tr>
<tr><td>X</td><td>CFD Annexation Request Package</td><td>Ann Lillie</td><td>(559) 621-8690
ann.lillie@fresno.gov</td></tr>
</table>

The Community Facilities District annexation process takes from three to four months and SHALL be completed prior to final map approval. INCOMPLETE Community Facilities District ("CFD") Annexation Request submittals may cause delays to the annexation process and final map approval.

All applicable construction plans for this development shall be submitted to the appropriate City Department for review and approval **prior** to the CFD process.

a. Landscape and Irrigation Plans are required to be approved prior to the finalization of the CFD process and the approval of the final map.
b. **Proposed park amenities shall be reviewed and approved by the Building & Safety Services Division or as approved in writing by the City Engineer at time of submittal for the CFD process and prior to final map approval.**

Requirements not addressed due to omission or misrepresentation of information, on which this review process is dependent, will be imposed whenever such conditions are disclosed and shall require a revision of this letter.

Any change affecting the items in these conditions shall require a revision of this letter.

1. The Property Owner's Maintenance Requirements

The long term maintenance and operating costs, including repair and replacement, of certain required public improvements ("Services") associated with all new Single-Family developments are the ultimate responsibility of the Developer. The Developer shall provide these Services either by a mechanism approved by the Public Works Department or by annexing to the City of Fresno's Community Facilities District No. 11 ("CFD No. 11").

The following public improvements (Existing and Proposed) are eligible for Services by CFD No. 11 as associated with this development:

- All landscaped areas, trees and irrigation systems, as approved by the Public Works Department, within the street rights-of-way and landscape easements; including without limitation, the median island (1/2, if fronting only one side of median), parkways, buffers, street entry medians and sides **(10' wide minimum landscaped areas allowed**) in **all Local and Major Streets.**

- All landscaping, trees, irrigation systems, hardscaping and amenities within Outlots, open spaces and trails.

- Concrete curb and gutters, valley gutters, sidewalks, curb ramps, traffic calming structures, median island concrete maintenance band and cap (1/2, if fronting only one side of median), and street lights in **all Major Streets**.

- Concrete curb and gutters, valley gutters, sidewalks, curb ramps, traffic calming structures, and street entry and interior median island curbing and hardscape, street paving, street name signage and street lights in **all Local Streets**.

2. The Property Owner may choose to do one or both of the following:

a. The Property Owner may petition the City of Fresno to request annexation to CFD No. 11 by completing and submitting an Annexation Request Package to the Public Works Department, Traffic and Engineering Services Division for review and approval. The Annexation Request Form is available, along with current costs, on-line at the City's website at http://www.fresno.gov, under the Public Works Department, Developer Doorway.

  - **Proceedings to annex the final map to CFD No. 11 SHALL NOT commence** unless the final map is within the City limits and all construction plans (this includes Street, Street Light, Signal, Landscape and Irrigation plans, and any other plans needed to complete the process) and the final map are considered technically correct.

  - The annexation process will be put on **HOLD** and the developer notified if all of the requirements for processing are not in compliance. **Technically Correct shall mean that the facilities and quantities to be maintained by CFD No. 11 are not subject to change and after acceptance for processing**.

  - Public improvements not listed above will require written approval by the Public Works Department Director or his designee.

  - All areas not within the dedicated street rights-of-way approved for Services by CFD No. 11, including but not limited to outlots, trails and landscaped areas, shall be dedicated in fee to the City of Fresno, dedicated as a public easement for maintenance purposes or as approved by the Public Works Department City Engineer.

b. The Property Owner may provide for Services privately for the above maintenance requirements. All City maintenance requirements not included for annexation to CFD No. 11 for Services **SHALL** be included in the DCC&Rs or some other City approved mechanism for the required Services associated with this development. Contact the Planner in the Development and Resource Management Department for more details.

For questions regarding these conditions please contact me at (559) 621-8690 or ann.lillie@fresno.gov

ACCELA P19-01469 & P18-03301

…T CURB RAMP PER PUBLIC WORKS STD P-28 & P-32

…RUCT CURB RAMP PER PUBLIC WORKS STD P-29 & P-32

…ONSTRUCT CURB RAMP PER PUBLIC WORKS STD P-31 & P-32

INSTALL 30" STATE STANDARD "STOP" SIGN AT LOCATION SHOWN. SIGN SHALL BE MOUNTED ON A 2" GALVANIZED POST WITH THE BOTTOM OF THE SIGN 7' ABOVE GROUND; LOCATED BEHIND CURB AND IMMEDIATELY BEHIND MAJOR STREET SIDEWALK

⑤ DESIGN AND CONSTRUCT PARKING LOT PAVEMENT TO PUBLIC WORKS STANDARDS P-21, P-22 & P-23

OF PARKING SPACES PROV'D: 599
OF PARKING SPACES REQ'D: 389
OF ADA PARKING SPACES PROV'D: 4
OF ADA PARKING SPACES REQ'D: 4

⑥ DESIGN AND CONSTRUCT STREET-TYPE APPROACH TO PUBLIC WORKS STD P-77. REQUIRES MIN. GRADES AND STREET PLANS FOR APPROVAL

⑦ CONSTRUCT AN UNDERGROUND STREET LIGHTING SYSTEM TO PUBLIC WORKS STANDARDS WITHIN THE LIMITS OF THIS APPLICATION. SUBMIT ENGINEERED STREET CONSTRUCTION PLANS TO PUBLIC WORKS DEPARTMENT, ENGINEERING SERVICES

⑧ DESIGN AND CONSTRUCT CURB AND GUTTER, 20 FT PCC PAVING, AND 5 FT RESIDENTIAL SIDEWALK PATTERN TO PUBLIC WORKS STD P-5 (SEE DETAIL)

⑨ DESIGN AND CONSTRUCT CURB AND GUTTER, 24 FT PCC PAVING, AND 5 FT RESIDENTIAL SIDEWALK PATTERN TO PUBLIC WORKS STD P-5 (SEE DETAIL)

⑩ DESIGN AND CONSTRUCT CURB AND GUTTER, 31 FT PCC PAVING, AND 5 FT RESIDENTIAL SIDEWALK PATTERN TO PUBLIC WORKS STD P-5 (SEE DETAIL)

⑪ DESIGN AND CONSTRUCT CURB AND GUTTER, 38 FT PCC PAVING, AND 5 FT RESIDENTIAL SIDEWALK PATTERN TO PUBLIC WORKS STD P-5 (SEE DETAIL)

C.U.P. SITE PLAN FOR TRACT MAP NO. 6249

A SINGLE FAMILY & MULTI-FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT
IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

PREPARED OCTOBER 31, 2018

LEGEND

⊕	MANHOLE
DI	DRAIN INLET
DMH	DRAIN MANHOLE
(E)	EXISTING
⊗	EXISTING TREE TO BE REMOVED
— — —	FIRE LANE
INV	INVERT
L.E.	LANDSCAPE EASEMENT
(P)	PROPOSED
P.E.	PEDESTRIAN EASEMENT
P.U.E.	PUBLIC UTILITY EASEMENT
⟷	ADA PATH OF TRAVEL
U.E.	USE EASEMENT
SMH	SEWER MANHOLE
8"S	UNDERGROUND SEWER PIPE
12"D	UNDERGROUND STORM DRAIN PIPE
12"W	UNDERGROUND WATER PIPE
▬	PHASE BOUNDARY
▨	AREA TO BE DEDICATED TO STREET PURPOSES
▩	RECYCLE AND REFUSE ELCOSURE

🟧 APPARATUS FIRE ACCESS

🟨 FIRE LANE MARKINGS

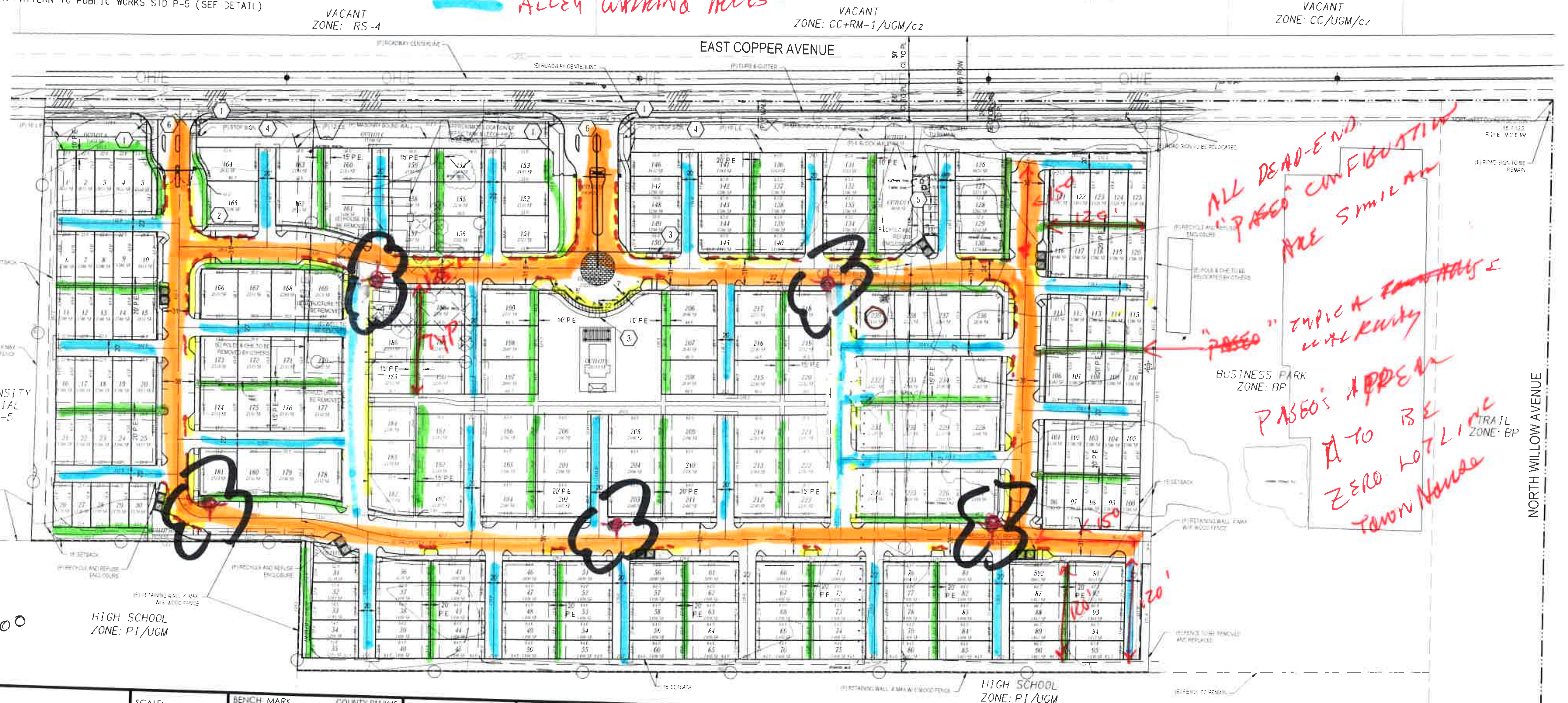
🟩 PASEO WALKING ACCESS to FRONT OF UNITS

🟦 ALLEY WALKING ACCESS

FROM FIRE LANES

NOT MODIFIED (3-)

GRAPHIC SCALE 60 30 0 60 120 1 in = 60 ft



ALL DEAD-END "PASEO" CONFIGURATION ARE SIMILAR

"~~PASEO~~" TYPICAL ~~[illegible]~~ HOUSE WALKWAY

PASEO'S APPEAR TO BE ZERO LOT LINE TOWN HOUSE

1170

[illegible] → 2500

SCALE:	BENCH MARK COUNTY BM IK49	COMPUTED	
HORIZ. 1" = 60	ELEVATION = 351.609 USGS DATUM	DESIGNED	GJB
VERT. 1" = N/A	BRASS CAP 26' WEST OF WILLOW AVENUE 76' SOUTH OF COPPER AVENUE 2' SOUTH OF POWER POLE	DRAWN	TMG
		PROJ. ENGR.	GJB

MORTON & PITALO, INC.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Folsom * Sacramento * Fresno
7643 North Ingram Avenue, Suite #105
Fresno, CA 93711
phone: (559) 888-4505
survey email: [illegible] web: www.mpengr.com

SINGLE AND MULTIPLE FAMILY RESIDENTIAL PLANNED UNIT DEVELOPMENT
C.U.P. SITE PLAN FOR TRACT MAP NO. 6249
IN THE CITY OF FRESNO
FRESNO COUNTY, CALIFORNIA

DATE OCTOBER 31, 2018
SHEET SP-2
OF 3

JOB NO. 18-0064-00

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

JAN 1 1 2019

Planning Department
City of Fresno
2600 Fresno St., 3rd Floor
Fresno, CA 93721-3604

Re: Air Impact Assessment (AIA) Application Approval
ISR Project Number: C-20180513
Land Use Agency: City Of Fresno
Land Use Agency ID Number: Tentative Tract Map 6249

To Whom It May Concern:

The San Joaquin Valley Air Pollution Control District (District) has approved the Air Impact Assessment (AIA) application for the Tract 6249 project located at 2711 E. Copper Ave in Fresno, California. Pursuant to District Rule 9510, Section 8.4, the District is providing the City of Fresno with the following information:

- A notification of AIA approval (this letter)
- A statement of tentative rule compliance (this letter)
- A summary of project emissions and emission reductions
- A summary of the off-site fees
- A copy of the Air Impact Assessment application
- An approved Monitoring and Reporting Schedule

Certain emission mitigation measures proposed by the applicant may be subject to approval or enforcement by the City of Fresno. No provision of District Rule 9510 requires action on the part of the City of Fresno; however, please review the enclosed list of mitigation measures and notify the District if the proposed mitigation measures are inconsistent with your agency's requirements for this project. The District can provide the detailed emissions analysis upon request.

Samir Sheikh
Executive Director/Air Pollution Control Officer

Northern Region
4800 Enterprise Way
Modesto, CA 95356-8718
Tel: (209) 557-6400 FAX: (209) 557-6475

Central Region (Main Office)
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244
Tel: (559) 230-6000 FAX: (559) 230-6061

Southern Region
34946 Flyover Court
Bakersfield, CA 93308-9725
Tel: 661-392-5500 FAX: 661-392-5585

www.valleyair.org www.healthyairliving.com

Printed on recycled paper. ♻

If you have any questions, please contact Mr. Eric S McLaughlin at (559) 230-5808.

Sincerely,

Arnaud Marjollet
Director of Permit Services

Brian Clements
Program Manager

AM: em

Enclosures

Emissions Estimator Worksheet

01/09/2019

Applicant/Business Name:	**Lennar Central Valley**
Project Name:	**Tract 6249**
Project Location:	**E Copper Avenue and N. Willow Avenue**
District Project ID No.:	**20180513**

Project Construction Emissions

If applicant selected Construction Clean Fleet Mitigation Measure - Please select "Yes" from dropdown menu **Yes** ▼

			NOx				PM10			
Project Phase Name	**ISR Phase**	**Construction Start Date**	**Unmitigated Baseline (TPY)**	**Mitigated Baseline (TPY)**	**Achieved Onsite Reductions (tons)**	**Required Offsite Reductions (tons)**	**Unmitigated Baseline (TPY)**	**Mitigated Baseline (TPY)**	**Achieved Onsite Reductions (tons)**	**Required Offsite Reductions (tons)**
Construction (Site Prep, Grading, Paving Entire Site)	1	08/13/2019	1.5227	1.2181	0.3046	0.0000	0.0743	0.0408	0.0335	0.0000
Construction (Site Prep, Grading, Paving Entire Site)	2	01/01/2020	0.3170	0.2536	0.0634	0.0000	0.0173	0.0095	0.0078	0.0000
Construction (120 DU)	3	03/24/2020	1.7879	1.4303	0.3576	0.0000	0.1046	0.0575	0.0471	0.0000
Construction (120 DU)	4	01/01/2021	0.6681	0.5344	0.1337	0.0000	0.0372	0.0204	0.0168	0.0000
	5				0.0000	0.0000			0.0000	0.0000
Construction (119 DU)	6	06/01/2021	1.2261	0.9808	0.2453	0.0000	0.0681	0.0374	0.0307	0.0000
Construction (119 DU)	7	01/01/2022	0.9411	0.7528	0.1883	0.0000	0.0496	0.0272	0.0224	0.0000
	8				0.0000	0.0000			0.0000	0.0000
	9				0.0000	0.0000			0.0000	0.0000
	10				0.0000	0.0000			0.0000	0.0000
		Total	**6.4629**	**5.1700**	**1.2929**	**0.0000**	**0.3511**	**0.1928**	**0.1583**	**0.0000**

Total Achieved On-Site Reductions (tons)

ISR Phase	NOx	PM10
1	0.3046	0.0335
2	0.0634	0.0078
3	0.3576	0.0471
4	0.1337	0.0168
5	1.7348	3.8750
6	0.2453	0.0307
7	0.1883	0.0224
8	1.6785	3.8670
9	0.0000	0.0000
10	0.0000	0.0000
Total	**4.7062**	**7.9003**

Project Operations Emissions (Area + Mobile)

			NOx				PM10			
Project Phase Name	**ISR Phase**	**Operation Start Date**	**Unmitigated Baseline (TPY)**	**Mitigated Baseline (TPY)**	**Achieved Onsite Reductions (tons)**	**Required Offsite Reductions (tons)**	**Unmitigated Baseline (TPY)**	**Mitigated Baseline (TPY)**	**Achieved Onsite Reductions (tons)**	**Required Offsite Reductions (tons)**
	1				0.0000	0.0000			0.0000	0.0000
	2				0.0000	0.0000			0.0000	0.0000
	3				0.0000	0.0000			0.0000	0.0000
	4				0.0000	0.0000			0.0000	0.0000
Operation (120 DU)	5	02/01/2021	1.6722	1.4409	1.7348	2.4458	1.5674	1.1799	3.8750	3.9620
	6				0.0000	0.0000			0.0000	0.0000
	7				0.0000	0.0000			0.0000	0.0000
Operation (119 DU)	8	01/01/2022	1.5482	1.3244	1.6785	2.1920	1.5555	1.1688	3.8670	3.9105
	9				0.0000	0.0000			0.0000	0.0000
	10				0.0000	0.0000			0.0000	0.0000
		Total	**3.2204**	**2.7653**	**3.4133**	**4.6378**	**3.1229**	**2.3487**	**7.7420**	**7.8725**

Total Required Off-Site Reductions (tons)

ISR Phase	NOx	PM10
1	0.0000	0.0000
2	0.0000	0.0000
3	0.0000	0.0000
4	0.0000	0.0000
5	2.4458	3.9620
6	0.0000	0.0000
7	0.0000	0.0000
8	2.1920	3.9105
9	0.0000	0.0000
10	0.0000	0.0000
Total	**4.6378**	**7.8725**

Note: TPY = Tons Per Year

Fee Estimator Worksheet

Applicant/Business Name:	Lennar Central Valley
Project Name:	Tract 6249
Project Location:	E Copper Avenue and N. Willow Avenue
District Project ID No.:	20180513

NOTES:

(1) The start date for each ISR phase is shown in TABLE 1.

(2) If you have chosen a **ONE-TIME** payment for the project, then the total amount due for ALL PHASES is shown under TABLE 2.

(3) If you have chosen a **DEFERRED** payment schedule or would like to propose a **DEFERRED** payment schedule for the project, the total amount due for a specific year is shown in TABLE 3 according to the schedule in TABLE 1.

* If you have not provided a proposed payment date, the District sets a default invoice date of 60 days prior to start of the ISR phase.

If applicant selected Fee Deferral Schedule - Please select "Yes" from dropdown menu	Yes ▼

TABLE 1 - PROJECT INFORMATION

Project Phase Name	ISR Phase	Start Date per Phase	Scheduled Payment Date*
onstruction (Site Prep, Grading, Paving Entire Sit	1	8/13/19	Clean Fleet
onstruction (Site Prep, Grading, Paving Entire Sit	2	1/1/20	Clean Fleet
Construction (120 DU)	3	3/24/20	Clean Fleet
Construction (120 DU)	4	1/1/21	Clean Fleet
Operation (120 DU)	5	2/1/21	01/31/2021
Construction (119 DU)	6	6/1/21	Clean Fleet
Construction (119 DU)	7	1/1/22	Clean Fleet
Operation (119 DU)	8	1/1/22	12/31/2021
	9		
	10		
TOTAL (tons)			

TABLE 2 - No Fee Deferral Schedule (FDS)

Pollutant	Required Offsite Reductions (tons)
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	2.4458
PM10	3.9620
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	2.1920
PM10	3.9105
NOx	0.0000
PM10	0.0000
NOx	0.0000
PM10	0.0000
NOx	4.6378
PM10	7.8725

TABLE 3 - APPROVED FEE DEFERRAL SCHEDULE (FDS) BY PAYMENT YEAR

2018	2019	2020	2021	2022	2023	2024	2025	2026
			2.4458					
			3.9620					
			2.1920					
			3.9105					
0.0000	0.0000	0.0000	4.6378	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	7.8725	0.0000	0.0000	0.0000	0.0000	0.0000

Offsite Fee by Pollutant ($)	NOx	$43,363
	PM10	$70,938
Administrative Fee ($)		$4,572.04
Offsite Fee ($)		$114,301.00
Total Project Offsite Fee ($)		$118,873.04

2018	2019	2020	2021	2022	2023	2024	2025	2026
$0	$0	$0	$43,363	$0	$0	$0	$0	$0
$0	$0	$0	$70,938	$0	$0	$0	$0	$0
$0.00	$0.00	$0.00	$4,572.04	$0.00	$0.00	$0.00	$0.00	$0.00
$0.00	$0.00	$0.00	$118,873.04	$0.00	$0.00	$0.00	$0.00	$0.00
			$118,873.04					

Rule 9510 Fee Schedule ($/ton)		
Year	Nox	PM10
2018 and Beyond	$9,350	$9,011

San Joaquin Valley Air Pollution Control District

Indirect Source Review (ISR) - Air Impact Assessment (AIA)
Residential/Non-Residential/Mixed-Use Application Form

HEALTHY AIR LIVING

A. Applicant Information

Applicant/Business Name: **Lennar Central Valley**

Mailing Address: **8080 N. Palm Avenue, Suite 110** | City: **Fresno** | State: **CA** | Zip: **93711**

Contact: **Alison Baker** | Title: **Entitlement Coordinator/Land Administrator**

Is the Applicant a licensed state contractor? ☒ No ☐ Yes, please provide State License number:

Phone: **559.437.4237** | Fax: **559.447.3404** | Email: **Alison.Baker@lennar.com**

B. Agent Information (if applicable):
If an Agent is signing the Air Impact Assessment Application on behalf of the Applicant, a signed letter from the Applicant giving the Agent authorization is required.

Agent/Business Name: **Mitchell Air Quality Consulting**

Mailing Address: **1164 E. Decatur Ave.** | City: **Fresno** | State: **CA** | Zip: **93720**

Contact: **Dave Mitchell** | Title: **Owner/Senior Air Quality Scientist**

Phone: **559.246.3732** | Fax: | Email: dmitchell@mitchellaq.com

C. Project Information

Project Name: **Tract 6249** | Tract Number(s) (if known): **Tract 6249**

Project Location | Street: **2711 E. Copper Avenue** | City: **Fresno** | Zip: **93720**

Cross Streets: **E Copper Ave west of N. Willow Ave.** | County: **Fresno**

Permitting Agency: **City of Fresno** | Planner: **Israel Trejo, Planner**

Mailing Address: **2600 Fresno Street, 3rd Floor** | City: Fresno | State: **CA** | Zip: **93721**

Permit Type and Number (if known): **Tentative Tract Map 6249**

Subject to Project-Level Discretionary Approval? ☒ Yes ☐ No

Last Project-Level Discretionary Approval Date: TBD

Last Project-Level Ministerial Approval Date: _____

D. Project Description

Please briefly describe the project (e.g.: 300 multi family residential units apartments and 35,000 square feet of commercial uses): The project includes the development of 239 single-family residential dwelling units on approximately 18.85 acres.

Please check the box next to each applicable land use below:

☐ Commercial / Retail
☒ Residential
☐ Recreational (e.g. park)
☐ Educational
☐ Government
☐ Medical
☐ Office
☐ Industrial
☐ Manufacturing
☐ Warehouse
☐ Distribution Center
☐ Other: _____

Select land use setting below:

☒ Urban ☐ Rural

E. Notice of Violation

Is this application being submitted as a result of receiving a Notice of Violation (NOV) from the District?

☒ No ☐ Yes, NOV # _____

F. Voluntary Emission Reduction Agreement

Is this project part of a larger project for which there is a Voluntary Emission Reduction Agreement (VERA) with the District?

☒ No ☐ Yes, VERA # _____

G. Optional Section

Do you want to receive information about the Healthy Air Living Business Partners Program? ☐ Yes ☒ No

FOR APCD USE ONLY

Filing Fee Received: $537.00 Date Paid: Applicant #: C-302868	Check #: 1142 Project #: C-20180513	**Date Stam** [illegible] **ice**	**Date Stamp: Permit** RECEIVED DEC 06 2018 Permits Services SJVAPCD

H. Parcel and Land Owner Information

	APN (000-000-00 Format)	Gross Acres	Land Owner
1.	**578-01-23**	**2.86**	**Tarlton Fresno, LLC**
2.	**578-01-24**	**11.46**	**Patrick Vincent Ricchiuti Family Trust**
3.	**578-01-35**	**3.50**	**Patrick Vincent Ricchiuti Family Trust**
4.			

Additional sheets for listing APN numbers can be found on the District's website at www.valleyair.org.

I. Project Development and Operation

Will the project require demolition of existing structures? ☒ Yes, *complete I-1* ☒ No, *complete I-2*

I-1. Demolition

Total square feet of building(s) footprint to be demolished: **2,752**	Number of Building Stories: **1**
Demolition Start Date (Month/Year): **4/2019**	Number of Days for Demolition: **5**

I-2. Timing

Expected number of work days per week during construction?
☒ 5 days ☐ 6 days ☐ 7 days

Will the project be developed in multiple phases?
☒ Yes, *complete I-3* ☐ No, *complete I-4*

I-3. Phased Site Development and Building Construction

In addition to the information below the applicant may submit a phase specific activity timeline. The phase specific activity timeline form can be found on the District's website at www.valleyair.org.

1	Start of Construction (Month/Year): **8/2019**	Gross Acres: **18.85**
	End of Construction (Month/Year): **3/2020**	Net Acres (area devoted to buildings/structures): **0**
	First Date of Occupation (Month/Year): **NA**	Paved Parking Area (# of Spaces): **NA**
	Building Square Footage: **0**	Number of Dwelling Units:**0**
2	Start of Construction (Month/Year): **3/2020**	Gross Acres: **9.46**
	End of Construction (Month/Year): **5/2021**	Net Acres (area devoted to buildings/structures): **4.96**
	First Date of Occupation (Month/Year): **2/2021**	Paved Parking Area (# of Spaces): **NA**
	Building Square Footage: **216,000**	Number of Dwelling Units: **120**
3	Start of Construction (Month/Year): **6/2021**	Gross Acres: **9.39**
	End of Construction (Month/Year): **8/2022**	Net Acres (area devoted to buildings/structures): **4.92**
	First Date of Occupation (Month/Year): **1/2022**	Paved Parking Area (# of Spaces): **NA**
	Building Square Footage: **214,200**	Number of Dwelling Units: **119**
4	Start of Construction (Month/Year):	Gross Acres:
	End of Construction (Month/Year):	Net Acres (area devoted to buildings/structures):
	First Date of Occupation (Month/Year):	Paved Parking Area (# of Spaces):
	Building Square Footage:	Number of Dwelling Units:

Additional sheets for phasing information can be found on the District's website at www.valleyair.org.

I-4. Single Phase Development

Start of Construction (Month/Year):	Gross Acres:
End of Construction (Month/Year):	Net Acres (area devoted to buildings/structures):
First Date of Occupation (Month/Year):	Paved Parking Area (# of Spaces):
Building Square Footage:	Number of Dwelling Units:

J. On-Site Air Pollution Reductions (Mitigation Measures)

Listed below are categories of possible mitigation measures that will reduce a project's impact on air quality. If a category is applicable to the project, check "Yes", and please complete the corresponding page to identify specific mitigation measures within that category. If a category is not applicable to the project, check "No".

1. Construction Clean Fleet (making a commitment to using a construction fleet that will achieve the emission reductions required by District Rule 9510)

☒ Yes, *please complete mitigation measure 1*
☐ No

2. Land Use/Location (e.g. increased density, improve walkability design, increase transit, etc.)

☒ Yes, *please complete applicable mitigation measures 2a through 2f*
☐ No

3. Neighborhood/Site Enhancements (e.g. improve pedestrial network, traffic calming measures, NEV network, etc.)

☒ Yes, *please complete applicable mitigation measures 3a through 3c*
☐ No

4. Parking Policy/Pricing (e.g. parking cost, on-street market pricing, limit parking supply, etc.)

☐ Yes, *please complete applicable mitigation measure 4a through 4e*
☒ No

5. Commute Trip Reduction Programs (e.g. workplace parking charge, employee vanpool/shuttle, ride sharing program, etc.)

☐ Yes, *please complete applicable mitigation measures 5a through 5f*
☒ No

6. Building Design (e.g. woodstoves or fireplaces)

☒ Yes, *please complete mitigation measure 6*
☐ No

7. Building Energy (e.g. exceed title 24, electrical maintenance equipment)

☐ Yes, *please complete applicable mitigation measures 7a through 7b*
☒ No

8. Solar Panels (e.g. incorporate solar panels in the project)

☒ Yes, *please complete applicable mitigation measure 8*
☐ No

9. Electric Vehicle (EV) Charger (e.g. incorporate EV charger(s) in the project)

☐ Yes, *please complete applicable mitigation measure 9*
☒ No

K. Review Period

You may request a five (5) day period to review a draft of the District's analysis of your project before it is finalized. However, if you choose this option, it will delay the project's finalization by five (5) business days.

☒ **I request to review a draft of the District's analysis.**

L. Fee Deferral Schedule

If the project's on-site air pollution reductions (mitigation measure) insufficiently reduced air pollution as outlined in Rule 9510, an off-site fee is assessed based on the excess air pollution. The money collected from this fee will be used by the District to reduce air pollution emissions 'off-site' on behalf of the project.

An Applicant may request a deferral of all or part of the 'off-site' fees up to, but not to exceed, the start date of construction. The start of construction is any of the following, whichever occcurs first: start of grading, start of demolition, or any other site development activities not mentioned above.

☒ **I request a Fee Deferral Schedule, and have enclosed the Fee Deferral Schedule Application.**

The Fee Deferral Schedule Application, can be found on the District's website at www.valleyair.org.

M. Change of Project Developer

The Applicant assumes all responsibility for ISR compliance for this project. If the project developer changes, the Applicant must notify the Buyer, and both Buyer and Applicant must file a 'Change of Project Developer' form with the District. If there is a change of project developer, and a 'Change of Project Developer' form is not filed with the District, the Applicant will remain liable for ISR compliance.

The Change of Project Developer form can be found on the District's website at www.valleyair.org.

N. Attachments

Required:	*If applicable:*
☒ Tract Map or Project Design Map	☒ Letter from Applicant granting Agent authorization
☒ Vicinity Map	☒ Fee Deferral Schedule Application
☒ Application Filing Fee $804.00 for mixed use and non-residential projects **OR** $537.00 for residential projects only	☐ Monitoring & Reporting Schedule
	☒ Supporting documentation for selected Mitigation Measures

O. Certification Statement

I certify that I have reviewed and completed the entire application and hereby attest that the information relayed within is true and correct to the best of my knowledge. I commit to implementation of those on-site mitigation measures that I have selected above. I am responsible for notifying the District if I will be unable to implement these mitigation measures. If a committed mitigation measure is not implemented, the project may be re-assessed for air quality impacts.

(An authorized Agent may sign the form in lieu of the Applicant if an authorization letter **signed by the Applicant** is provided).

Name (printed): David M. Mitchell

Title: Owner/Senior Air Quality Scientist

Signature: David M. Mitchell

Date: December 5, 2018

SJVUAPCD

Indirect Source Review
Complete Project Summary Sheet & Monitoring and Reporting Schedule

1/9/19
3:11 pm

Project Name:	**TRACT 6249**
Applicant Name:	**LENNAR CENTRAL VALLEY**
Project Location:	**2711 E. COPPER AVE** **E COPPER AVE WEST OF N WILLOW AVE** **APN(s): 578-01-23, 578-01-24, 578-01-35**
Project Description:	**LAND USE:** **Residential - 19 Acres - Single Family Housing** **Residential - 19 Acres - Single Family Housing** **Residential - 120 Dwelling Unit - Single Family Housing** **Residential - 120 Dwelling Unit - Single Family Housing** **Residential - 120 Dwelling Unit - Single Family Housing** **Residential - 119 Dwelling Unit - Single Family Housing** **Residential - 119 Dwelling Unit - Single Family Housing** **Residential - 119 Dwelling Unit - Single Family Housing** **ACREAGE: 17.82**
ISR Project ID Number:	**C-20180513**
Applicant ID Number:	**C-302868**
Permitting Public Agency:	**CITY OF FRESNO**
Public Agency Permit No.	**TENTATIVE TRACT MAP 6249**

Existing Emission Reduction Measures

Enforcing Agency	Measure	Quantification	Notes

There are no Existing Measures for this project.

Non-District Enforced Emission Reduction Measures

Enforcing Agency	Measure	Specific Implementation	Source Of Requirements
CITY OF FRESNO	Improve Walkability Design	154.43 intersections/square mile	
CITY OF FRESNO	Improve Destination Accessibility	4.9 miles (distance to downtown or job center)	
CITY OF FRESNO	Improve Pedestrial Network	Within Project Site and Connecting Off-Site	
CITY OF FRESNO	Hearth	only natural gas hearth	
CITY OF FRESNO	Install Solar Panel	Install solar panels with a total power output of 956 kW	

Number of Non-District Enforced Measures: 5

District Enforced Emission Reduction Measures

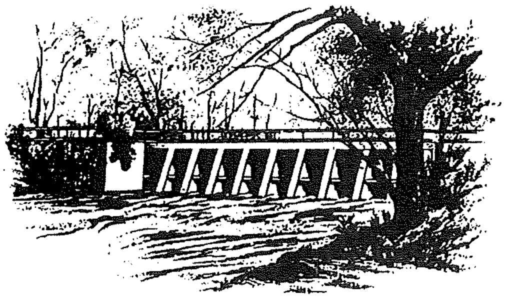
Enforcing Agency	Measure	Specific Implementation	Measure For Compliance	District Review

Indirect Source Review Complete Project Summary Sheet & Monitoring and Reporting Schedule

(District Enforced Emission Reduction Measures Continued)

Enforcing Agency	Measure	Specific Implementation	Measure For Compliance	District Review
SJVAPCD	Construction Clean Fleet	For each project phase, maintain records of total hours of operation for all construction equipment, greater than 50 horsepower, operated on site. Within 30-days of completing construction of each project phase, submit to the District a summary report of total hours of operation, by equipment type, equipment model year and horsepower.	(Compliance Dept. Review)	Within 30-days of completing construction for each phase
SJVAPCD	Construction and Operation - Recordkeeping	For each project phase, all records shall be maintained on site during construction and for a period of ten years following either the end of construction or the issuance of the first certificate of occupancy, whichever is later. Records shall be made available for District inspection upon request.	(Compliance Dept. Review)	Ongoing
SJVAPCD	Construction and Operational Dates	For each project phase, maintain records of (1) the construction start and end dates and (2) the date of issuance of the first certificate of occupancy, if applicable.	(Compliance Dept. Review)	Ongoing

Number of District Enforced Measures: 3



YOUR MOST VALUABLE RESOURCE - WATER

OFFICE OF

FRESNO IRRIGATION DISTRICT

TELEPHONE (559) 233-7161
FAX (559) 233-8227
2907 S. MAPLE AVENUE
FRESNO, CALIFORNIA 93725-2208

May 23, 2019

Jose Valenzuela
Development & Resource Management
City of Fresno
2600 Fresno Street, Third Floor
Fresno, CA 93721

RE: Vesting Tentative Tract Map No. 6249, Accela Planning Application No. P19-01469
S/W Copper and Willow avenues

Dear Mr. Valenzuela:

The Fresno Irrigation District (FID) has reviewed the Vesting Tentative Tract Map No. 6249, Accela Planning Application No. P19-01469 for which the applicant proposes the construction of a 239-lot single family residential development, APN: 578-010-23S, 24S, and 35. FID has the following comments:

1. FID does not own, operate or maintain any facility located on the subject property as shown on the attached FID exhibit map.

2. For informational purposes, FID's Enterprise No. 109 runs westerly along the south side of International Avenue, crosses Willow Avenue approximately 2,300 feet southeast of the subject property, as shown on the attached FID exhibit map. Should this project include any street and/or utility improvements along Willow Avenue, International Avenue, or in the vicinity of this crossing, FID requires it review and approve all plans.

3. For informational purposes, a privately owned pipeline known as the Phillips No 158 runs northwesterly and crosses International Avenue approximately 2,100 feet southwest of the subject property, crosses Chestnut Avenue approximately 2,000 feet southwest of the subject property, and crosses Copper Avenue approximately 2,300 feet west of the subject property, as shown on the attached FID exhibit map. FID does not own, operate or maintain this private pipeline. FID's records indicate that this line is active and will need to be treated as such. FID can supply a list of known users to the City upon request.

4. The proposed development appears to be within the City of Fresno but lies outside of FID's boundary line.

5. FID is concerned that the proposed development may negatively impact local groundwater supplies including those areas adjacent to or neighboring the proposed

development area. The area was historically native or rural residential with minimal to no water use. Under current circumstances the project area is experiencing a modest but continuing groundwater overdraft. Should the proposed development result in a significant increase in dependence on groundwater, this deficit will increase. FID recommends the City of Fresno require the proposed development balance anticipated groundwater use with sufficient recharge of imported surface water in order to preclude increasing the area's existing groundwater overdraft problem or require the use of reclaimed water, if available.

6. It should be noted that without the use of surface water, continued dependence on solely a groundwater supply will do nothing to reverse or correct the existing overdraft of the groundwater supply beneath the City of Fresno. As this project will "harden" or make firmer the need for water, the long-term correction of the groundwater overdraft should be considered as a requirement of the project.

7. California enacted landmark legislation in 2014 known as the Sustainable Groundwater Management Act (SGMA). The act requires the formation of local groundwater sustainability agencies (GSAs) that must assess conditions in their local water basins and adopt locally-based management plans. FID and the City of Fresno are members of the North Kings Groundwater Sustainability Agency which will manage the groundwater basin within the FID service area. This area is completely reliant on groundwater pumping and SGMA will impact all users of groundwater and those who rely on it. The City of Fresno should consider the impacts of the development on the City's ability to comply with requirements of SGMA.

Thank you for submitting this for our review. We appreciate the opportunity to review and comment on the subject documents for the proposed project. If you have any questions please feel free to contact Jeremy Landrith at (559) 233-7161 extension 7407 or JLandrith@fresnoirrigation.com.

Sincerely,

Laurence Kimura, P.E.
Chief Engineer

Attachment

G:\Agencies\FresnoCity\Tract Map\TM 6249, P19-01469.doc

This map was produced by the Fresno Irrigation District and is provided for reference and informational purposes only and is not intended to show map scale accuracy or all inclusive map features, nor for legal purposes. FID makes no statements regarding the accuracy of this map as the features shown are in their approximate location. Please contact the FID Engineering Dept. at (559) 233-7161 for further information on FID facilities.

Legend

- FID Canal
- Private Canal
- Abandoned Canal
- FID Pipeline
- Private Pipeline
- Abandoned Pipeline
- Stream Group
- Other-Creek\River
- Other-Pipeline
- FID Boundary
- Railroad
- Streets & Hwys
- Parcel
- FMFCD Acquired Basins
- FMFCD Proposed Basins

0 350 700 Feet

1 inch = 701.54 feet

Date Saved: 04/26/2019 9:24:57 AM
Path: G:\Fidgis\20190426 Master.mxd

File No. 210.45

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT
NOTICE OF REQUIREMENTS

FR TRACT No. 6249

PUBLIC AGENCY
JOSE VALENZUELA
DEVELOPMENT SERVICES/PLANNING
CITY OF FRESNO
2600 FRESNO ST., THIRD FLOOR
FRESNO, CA 93721

DEVELOPER
ARA CHEKERDEMIAN, LENNAR HOMES
8080 N. PALM AVE., SUITE110
FRESNO, CA 93711

PROJECT NO: **6249**

ADDRESS: **SWC WILLOW AND COPPER AVE.**

APN: **578-010-23S, 24S, 35, 578-010-47S**

SENT: 5/20/19

Drainage Area(s)	Preliminary Fee(s)	Development Review Service Charge(s)	Fee(s)	
DN	$254,629.00	NOR Review	$812.00	To be paid prior to release of District comments to Public Agency and Developer.
		Grading Plan Review	$2,266.00	Amount to be submitted with first grading plan submittal.
		Storm Drain Plan Review	For amount of fee, refer to www.fresnofloodcontrol.org for form to fill out and submit with first storm drain plan submittal (blank copy attached).	
	Total Drainage Fee: $254,629.00	**Total Service Charge:**	**$3,078.00**	

The proposed development will generate storm runoff which produces potentially significant environmental impacts and which must be properly discharged and mitigated pursuant to the California Environmental Quality Act and the National Environmental Policy Act. The District in cooperation with the City and County has developed and adopted the Storm Drainage and Flood Control Master Plan. Compliance with and implementation of this Master Plan by this development project will satisfy the drainage related CEQA/NEPA impact of the project mitigation requirements.

Pursuant to the District's Development Review Fee Policy, the subject project shall pay review fees for issuance of this Notice of Requirements (NOR) and any plan submittals requiring the District's reviews. The NOR fee shall be paid to the District by Developer before the Notice of Requirement will be submitted to the City. The Grading Plan fee shall be paid upon first submittal. The Storm Drain Plan fee shall be paid prior to return/pick up of first submittal.

The proposed development shall pay drainage fees pursuant to the Drainage Fee Ordinance prior to issuance of a building permit at the rates in effect at the time of such issuance. The fee indicated above is valid through 2/29/20 based on the site plan submitted to the District on 4/26/19 Contact FMFCD for a revised fee in cases where changes are made in the proposed site plan which materially alter the proposed impervious area.

Considerations which may affect the fee obligation(s) or the timing or form of fee payment:

a.) Fees related to undeveloped or phased portions of the project may be deferrable.

b.) Fees may be calculated based on the actual percentage of runoff if different than that typical for the zone district under which the development is being undertaken and if permanent provisions are made to assure that the site remains in that configuration.

c.) Master Plan storm drainage facilities may be constructed, or required to be constructed in lieu of paying fees.

d.) The actual cost incurred in constructing Master Plan drainage system facilities is credited against the drainage fee obligation.

e.) When the actual costs incurred in constructing Master Plan facilities exceeds the drainage fee obligation, reimbursement will be made for the excess costs from future fees collected by the District from other development.

f.) Any request for a drainage fee refund requires the entitlement cancellation and a written request addressed to the General Manager of the District within 60 days from payment of the fee. A non refundable $300 Administration fee or 5% of the refund whichever is less will be retained without fee credit.

FR TRACT No. 6249

Approval of this development shall be conditioned upon compliance with these District Requirements.

1\. ____ a. Drainage from the site shall

X b. Grading and drainage patterns shall be as identified on Exhibit No. 1

____ c. The grading and drainage patterns shown on the site plan conform to the adopted Storm Drainage and Flood Control Master Plan.

2\. The proposed development shall construct and/or dedicate Storm Drainage and Flood Control Master Plan facilities located within the development or necessitated by any off-site improvements required by the approving agency:

X Developer shall construct facilities as shown on Exhibit No. 1 as MASTER PLAN FACILITIES TO BE CONSTRUCTED BY DEVELOPER.

____ None required.

3\. The following final improvement plans and information shall be submitted to the District for review prior to final development approval:

X Grading Plan

X Street Plan

X Storm Drain Plan

X Water & Sewer Plan

X Final Map

X Drainage Report (to be submitted with tentative map)

____ Other

____ None Required

4\. Availability of drainage facilities:

____ a. Permanent drainage service is available provided the developer can verify to the satisfaction of the City that runoff can be safely conveyed to the Master Plan inlet(s).

____ b. The construction of facilities required by Paragraph No. 2 hereof will provide permanent drainage service.

____ c. Permanent drainage service will not be available. The District recommends temporary facilities until permanent service is available.

X d. See Exhibit No. 2.

5\. The proposed development:

____ Appears to be located within a 100 year flood prone area as designated on the latest Flood Insurance Rate Maps available to the District, necessitating appropriate floodplain management action. (See attached Floodplain Policy.)

X Does not appear to be located within a flood prone area.

6\. ____ The subject site contains a portion of a canal or pipeline that is used to manage recharge, storm water, and/or flood flows. The existing capacity must be preserved as part of site development. Additionally, site development may not interfere with the ability to operate and maintain the canal or pipeline.

7. The Federal Clean Water Act and the State General Permits for Storm Water Discharges Associated with Construction and Industrial Activities (State General Permits) require developers of construction projects disturbing one or more acres, and discharges associated with industrial activity not otherwise exempt from National Pollutant Discharge Elimination System (NPDES) permitting, to implement controls to reduce pollutants, prohibit the discharge of waters other than storm water to the municipal storm drain system, and meet water quality standards. These requirements apply both to pollutants generated during construction, and to those which may be generated by operations at the development after construction.

- **a.** State General Permit for Storm Water Discharges Associated with Construction Activities, effective July 1, 2010, as amended. A State General Construction Permit is required for all clearing, grading, and disturbances to the ground that result in soil disturbance of at least one acre (or less than one acre) if part of a larger common plan of development or sale). Permittees are required to: submit a Notice of Intent and Permit Registration Documents to be covered and must pay a permit fee to the State Water Resources Control Board (State Board), develop and implement a storm water pollution prevention plan, eliminate non-storm water discharges, conduct routine site inspections, train employees in permit compliance, and complete an annual certification of compliance.
- **b.** State General Permit for Storm Water Discharges Associated with Industrial Activities, April, 2014 (available at the District Office). A State General Industrial Permit is required for specific types of industries described in the NPDES regulations or by Standard Industrial Classification (SIC) code. The following categories of industries are generally required to secure an industrial permit: manufacturing; trucking; recycling; and waste and hazardous waste management. Specific exemptions exist for manufacturing activities which occur entirely indoors. Permittees are required to: submit a Notice of Intent to be covered and must pay a permit fee to the State Water Resources Control Board, develop and implement a storm water pollution prevention plan, eliminate non-storm water discharges, conduct routine site inspections, train employees in permit compliance, sample storm water runoff and test it for pollutant indicators, and annually submit a report to the State Board.
- **c.** The proposed development is encouraged to select and implement storm water quality controls recommended in the Fresno-Clovis Storm Water Quality Management Construction and Post-Construction Guidelines (available at the District Office) to meet the requirements of the State General Permits, eliminate the potential for non-storm water to enter the municipal storm drain system, and where possible minimize contact with materials which may contaminate storm water runoff.

8. A requirement of the District may be appealed by filing a written notice of appeal with the Secretary of the District within ten days of the date of this Notice of Requirements.

9. The District reserves the right to modify, reduce or add to these requirements, or revise fees, as necessary to accommodate changes made in the proposed development by the developer or requirements made by other agencies.

10. X See Exhibit No. 2 for additional comments, recommendations and requirements.

Peter Sanchez
District Engineer

Mikel Meneses
Project Engineer

CC:

KEITH JOLLY, MORTON & PITALO
7643 N. INGRAM AVE., SUITE 105
FRESNO, CA 93711

FR TRACT No. 6249

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT
NOTICE OF REQUIREMENTS

FR TRACT No. 6249

Pursuant to the District's Development Review Fee Policy, the subject project shall pay review fees in the amount identified below for Storm Drain Review. The fee shall be paid to the District by Developer with first plan submittal. Checks shall be made out to Fresno Metropolitan Flood Control District.

Application No. FR TRACT 6249

Name / Business ARA CHEKERDEMIAN, LENNAR HOMES

Project Address SWC WILLOW AND COPPER AVE.

Project APN(s) 578-010-23S, 24S, 35, 578-010-47S

Project Acres (gross) 18.88

Please fill in the table below of proposed storm drain facilities to be constructed with this development and return completed form with first plan submittal. If you have any questions or concerns regarding the construction of facilities list, you can contact the Fresno Metropolitan Flood Control District at 559-456-3292.

Description	Qty	Unit	Price	Amount

Estimated Construction Cost ______________

Fee equals lesser of

$375.00 plus 3% of the estimated construction costs ______________ Total ($300.00 gross per acre) $5,664.00

Amount Due ______________

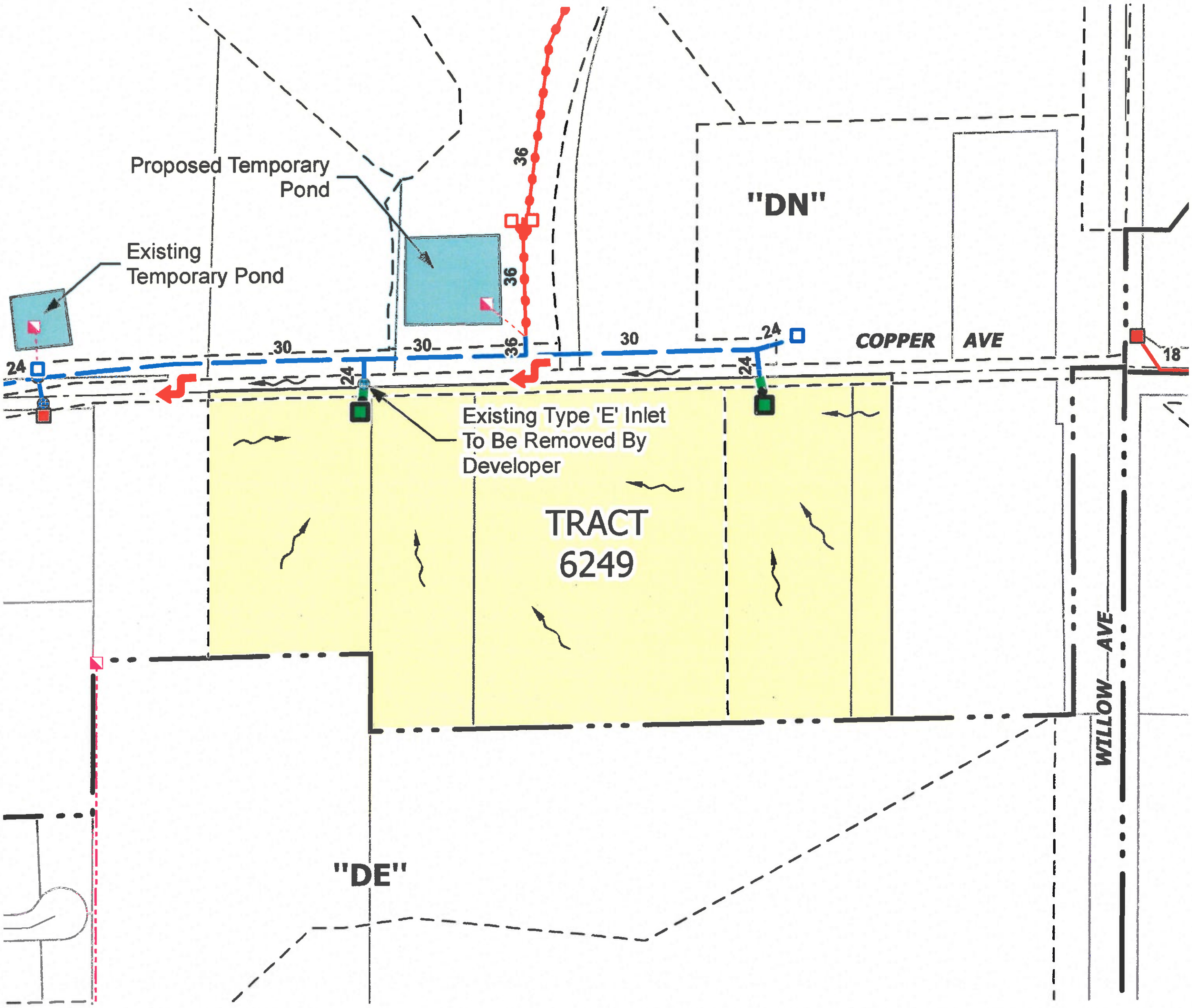
Storm Drain Facilities Cost Sheet

15" Concrete Pipes $79.00 LF
18" Concrete Pipes $83.00 LF
24" Concrete Pipes $94.00 LF
30" Concrete Pipes $111.00 LF
36" Concrete Pipes $131.00 LF
42" Concrete Pipes $152.00 LF
48" Concrete Pipes $178.00 LF
54" Concrete Pipes $217.00 LF
60" Concrete Pipes $255.00 LF
66" Concrete Pipes $301.00 LF
72" Concrete Pipes $347.00 LF
84" Concrete Pipes $388.00 LF
96" Concrete Pipes $420.00 LF
15" Jacked Pipes $555.00 LF
18" Jacked Pipes $608.00 LF
24" Jacked Pipes $687.00 LF
30" Jacked Pipes $766.00 LF
36" Jacked Pipes $846.00 LF
42" Jacked Pipes $898.00 LF
48" Jacked Pipes $951.00 LF
54" Jacked Pipes $1,031.00 LF
60" Jacked Pipes $1,110.00 LF
66" Jacked Pipes $1,216.00 LF
72" Jacked Pipes $1,374.00 LF
84" Jacked Pipes $1,533.00 LF
Manholes $4,600.00 EA
Inlets & Laterals $4,450.00 EA
Outfalls $11,500.00 EA
Canal Outfalls $15,000.00 EA
Basin Excavation $0.75 CY

IMPROVEMENTS ADJACENT TO BASIN

Fence, Pad, and Gate $20.00 LF
Mowstrip $20.00 LF
Arterial Paving $82.00 LF
Local Paving $53.00 LF
Curb and Gutter $30.00 LF
Sidewalk $60.00 LF
Sewer Line $30.00 LF
Water Line $31.00 LF
Street Lights $65.00 LF
Pump Station/Intake $500,000.00 EA

NOTE: THIS MAP IS SCHEMATIC. DISTANCES, AMOUNT OF CREDITABLE FACILITIES, AND LOCATION OF INLET BOUNDARIES ARE APPROXIMATE.



LEGEND

- 🟩 Creditable Facilities (Master Plan Facilities To Be Constructed By Developer) - Pipeline (Size Shown) & Inlet
- 🟥 Future Creditable Surcharge Facilities
- 🟥 Future Master Plan Facilities
- 🟦 Existing Master Plan Facilities
- Private Facilities
- Inlet Boundary
- Drainage Area Boundary
- Direction Of Drainage
- Major Storm Breakover

N

1 " = 300 '

TRACT 6249

DRAINAGE AREA "DN"

EXHIBIT NO. 1

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

Prepared by: danielg
Date: 5/14/2019
Path: K:\Autocad\DWGS\0EXHIBIT\TRACTS\6249.mxd

OTHER REQUIREMENTS
EXHIBIT NO. 2

The cost of construction of Master Plan facilities, excluding dedication of storm drainage easements, is eligible for credit against the drainage fee of the drainage area served by the facilities. A Development Agreement shall be executed with the District to effect such credit. Reimbursement provisions, in accordance with the Drainage Fee Ordinance, will be included to the extent that developer's Master Plan costs for an individual drainage area exceed the fee of said area. Should the facilities cost for such individual area total less than the fee of said area, the difference shall be paid upon demand to the City/County or District.

The Master Plan system has been designed such that during a two-year event flow will not exceed the height of the 6-inch curb. Should wedge curb (4.5 inches height) be used the same criteria shall apply whereby flow remains below the top of curb. Any extensions or pipe size increases due to meeting the requirement listed above shall be at the developer's expense.

Lot coverage must be provided to the District prior to submittal of improvement plans. The final drainage fee will be calculated commensurate with the lot coverage provided by the developer. If the lot coverage indicates a density higher than Master Planned, mitigation may be required. The lot coverage calculated by the District includes the front yard walkway, sidewalk walkway and the rear yard patio equaling an additional 6% of impervious area in addition to the City's typical lot coverage calculation.

Copper River Ranch LLC and Copper River Development Co., Inc. have been required to provide temporary service on their property for an area that includes Tract 6249 until permanent service is available. The developer of Tract 6249 shall contact the District to coordinate the project design and the need for off-site Master Plan facilities to facilitate the transfer of storm water to the temporary service location. The developer must provide sufficient notice of when temporary drainage service will be required to insure adequate design of the facilities.

Development No. Tract 6249

TENTATIVE TRACT MAP NO. 6249

GOVERNMENT CODE §66020(d)(1)
A protest filed pursuant to subdivision (a) shall be filed at the time of approval or conditional approval of the development or within 90 days after the date of the imposition of the fees, dedications, reservations, or other exactions to be imposed on a development project. Each local agency shall provide to the project applicant a notice in writing at the time of the approval of the project or at the time of the imposition of the fees, dedications, reservations, or other exactions, a statement of the amount of the fees or a description of the dedications, reservations, or other exactions, and notification that the 90-day approval period in which the applicant may protest has begun.

Improvements and payments shall not be required on or in front of any undeveloped portion of a net acreage of ten acres or more which exists after the division of land. All improvements and payments to be completed with development.

SEWER CONNECTION CHARGES	FEE RATE
b. Lateral Sewer Charge [1]	$0.10/sq. ft. (to 100' depth)
c. Oversize Charge [1]	$0.05/sq. ft. (to 100' depth)
d. Trunk Sewer Charge [2] Service Area: Herndon	$496/living unit
e. Wastewater Facilities Charge [3]	$2,119/living unit
f. Sewer Capacity Enhancement Charge [2] Trunk Sewer Service Area: Herndon	$893/living unit
g. House Branch Sewer Charge [2]	N/A

WATER CONNECTION CHARGES	FEE RATE
h. Service Connection Charge	Fee based on service(s) and meter(s) sizes specified by owner; fee for service(s) and meter(s) established by the Master Fee Schedule.
i. Frontage Charge [1]	$6.50/lineal foot
j. Water Capacity Fee [1]	Fee based on service(s) and meter(s) sizes specified by owner; fee for Water Capacity established by the Master Fee Schedule.

CITYWIDE DEVELOPMENT IMPACT FEES	FEE RATE
k. Fire Facilities Impact Fee – Citywide [4]	$779/living unit
l. Park Facility Impact Fee – Citywide [4]	$2738/living unit
m. Quimby Parkland Dedication Fee [2]	$1185/living unit

n.	Citywide Regional Street Impact Fee [3]	$7,830/adj. acre
o.	New Growth Area Major Street Fee [3]	$21,555/adj. acre
p.	Police Facilities Impact Fee – Citywide [4]	$602/living unit
q.	Traffic Signal Charge [1]	$488/living unit
r.	UGM Right of Way Acquisition Charge [2]	N/A

Notes:

On July 22, 2008, the Fresno County Board of Supervisors passed Ordinance No. 2008 – 023 requiring the payment of County Public Impact Facilities Impact Fees. The effective date of this ordinance is September 20, 2008. Contact the County of Fresno, Public Works and Planning Department to determine payment of this fee obligation. Confirmation by the County of Fresno is required before the City of Fresno can issue building permits.

The Board of Directors of the Fresno County Regional Transportation Mitigation Fee Agency approved Resolution No. 2009 – 01 requiring the payment of Regional Transportation Mitigation Fee. The effective date of this resolution is January 1, 2010. Contact the Council of Fresno County Governments (FCOG) to determine this fee obligation. Confirmation by the FCOG is required before the City of Fresno can issue building permits.

[1] Deferrable through Fee Deferral Covenant.

[2] Due at Final Map.

[3] Due at Building Permit.

[4] Due at Certificate of Occupancy.

[5] Determined by Public Works.

3. The project shall pay the Regional Transportation Mitigation Fee (RTMF). Pay the RTMF fee to the Joint Powers Agency located at 2035 Tulare Street, Suite 201, Fresno, CA 93721; (559) 233-4148, ext. 200; www.fresnocog.org. Provide proof of payment or exemption, based on vesting rights, prior to final inspection or issuance of certificate of occupancy.

4. The proposed project shall pay the $288 Traffic Impact Study review fee for review of the document. Proof of payment shall be provided to the Traffic Operations & Planning Division.

5. The proposed project shall install a traffic signal with protected left-turn phasing per City of Fresno standards at the intersection of Copper Avenue at Chestnut Avenue. The traffic signal shall be installed at the ultimate and may require the acquisition of right-of-way.

6. The proposed project shall install a traffic signal with protected left-turn phasing per City of Fresno standards at the intersection of Copper Avenue at Willow Avenue. The traffic signal shall be installed at the ultimate and may require the acquisition of right-of-way.

7. Copper Avenue is classified as a super arterial. Access points along super arterial roadways are limited to one three-quarter opening in each direction per one-half mile segment. Left-turn movements onto the super arterial are prohibited at these openings. The project should coordinate any proposed access points along Copper Avenue with the development on the north side.

8. The proposed project shall make necessary improvements and right-of-way and public easement dedications along adjacent public street(s) and within the site boundaries per City of Fresno standards/requirements.

9. The proposed site plan shall be reviewed and approved by the City of Fresno Traffic Operations & Planning Division, Traffic Planning Section.

If you have any further questions regarding this matter, please contact me at (559) 621-8792 or jill.gormley@fresno.gov .

Sincerely,

Jill Gormley

Jill Gormley, TE
City Traffic Engineer / Traffic Operations & Planning Manager
Public Works Department, Traffic Operations & Planning Services

C: Copy filed with Traffic Impact Study
Louise Gilio, Public Works, Traffic Planning Supervisor
Harmanjit Dhaliwal, Public Works, Professional Engineer
Andrew Benelli, Public Works, Assistant Director

CLOVIS
UNIFIED
SCHOOL DISTRICT

April 29, 2019

Alondra Williams
DARM – Development Services Division
2600 Fresno Street
Fresno, CA 93721

SUBJECT: P19-01469
TM 6249
APN 578-010-47S

Dear Ms. Williams:

The purpose of this letter is to provide school district information relative to the above-referenced development and to comply with Business and Professions Code section 11010, subdivision (b)(11)(A) regarding the provision of school-related information to the developer/owner and the State Department of Real Estate.

1. Elementary School Information:

   (a) The subject land is presently within the attendance area of the elementary school (grades K-6) listed below:

   School Name: *Fugman Elementary*
   Address: *10825 N Cedar Ave Fresno CA 93730-3586*
   Telephone: (559) 327-8700
   Capacity: *875*
   Enrollment: 837 (CBEDS enrollment *2018-19* school year)

   (b) Because of projected growth in the District and the District's plans for construction of new school facilities, it is possible that (1) adjustment of school attendance areas could occur in the future such that students residing in the project area may be required to attend an elementary school other than the school listed above, and (2) students residing in the project area may attend more than one elementary school within the District during their elementary school years.

2. Intermediate School Information:

School Name: *Granite Ridge Intermediate*
Address: *2770 E International Ave Fresno CA 93730-5400*
Telephone: (559) 327-5000
Capacity: *1600*
Enrollment: 1284 (CBEDS enrollment *2018-19* school year)

3. High School Information:

School Name: *Clovis North High School*
Address: *2770 E International Ave Fresno CA 93730-5400*
Telephone: (559) 327-5000
Capacity: *3100*
Enrollment: 2549 (CBEDS enrollment *2018-19* school year)

4. Bus transportation is currently provided for grades K-6 students residing further than one mile from school and for grades 7-12 students residing further than two and one-half miles from school. Transportation will be available for students attending the above-identified elementary, intermediate and high schools in accordance with District standards in effect at the time of enrollment.

5. The District currently levies a school facilities fee of $4.87 per square foot (as of July 1, 2018) for residential development. The fee is adjusted periodically in accordance with law. New development on the subject property will be subject to the fee in place at the time fee certificates are obtained.

The District hereby requests that the information in this letter be provided by the owner/subdivider to all prospective purchasers of property within the project.

Thank you for the opportunity to comment on the project. Please contact me if you have any questions regarding this letter.

Sincerely,

Michael Johnston
Associate Superintendent
Administrative Services

City of
FRESNO

COUNCIL DISTRICT 6 PROJECT REVIEW COMMITTEE
PROJECT REVIEW

May 20, 2019
Project Record

ITEM 4c

PROJECT INFORMATION

Plan Amendment and Rezone Application No. P19-01470, Vesting Tentative Tract Map No. 6249 (P19-01469) and Planned Development Application No. P19-01259 requests the following entitlements at the southwest corner of North Willow and East Copper Avenues:

1. Redesignate and rezone ±5.18 acres from Business Park (BP) to Corridor/Center Mixed-Use (CMX);
2. Redesignate and rezone ±3.03 acres of Business Park (BP) and ±8.43 acres of Medium Density Residential (RS-5) to the Medium High Density Residential (RM-1);
3. Subdivide approximately 18.85 acres for a 239 lot subdivision.
4. Request to modify property development standards to allow for private streets, reduced setbacks and lot sizes, and increased lot coverage.

ADDRESS: 7221 North Howard Avenue

COMMITTEE RECOMMENDATION

[✓ APPROVE] APPROVE WITH CONDITION(S) DENY NO ACTION

	Rexroat (Chair)	Rice (Co-Chair)	Katich	Petty	Mikkelson	Wong
Approve	KR	DR		JCP		
Deny						
Abstain						
Absent						

COMMITTEE CONDITIONS / COMMENTS

Staff Facilitator: JARRED OLSEN ____________ Date: 05/20/2019