CITY of OAKLEY
CALIFORNIA
A PLACE for FAMILIES in the HEART of the DELTA

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STAFF REPORT

Approved and Forwarded to City Council:

Bryan H. Montgomery, City Manager

Date: Tuesday, March 10, 2015

To: Bryan H. Montgomery, City Manager

From: Kevin Rohani, P.E. Public Works Director/ City Engineer

SUBJECT: TRANSPORTATION ENGINEERING FUNDAMENTALS

Background and Analysis

The City of Oakley is a growing and vibrant community and home for many young families who are moving here to enjoy all the amenities that the City provides, and the quality of life in Oakley makes it a very attractive place to live. An efficient traffic circulation plan is a key component of a growing community and has significant impact to the daily lives of the residents.

This report is intended to offer background and context in the field of Transportation Engineering as it relates to the City of Oakley, Private Development Project processing, and the Oakley 2020 General Plan.

Transportation Engineering is a component of private development projects in the City of Oakley. These provisions help ensure that all projects (Residential, Commercial, and Industrial) are processed and approved in compliance with the City's General Plan, ordinances, and laws. These provisions help ensure that the traffic impacts identified as a result of such projects are mitigated. Understanding the demands placed on the community's transportation network by development is an important dimension of assessing the overall impacts of development.

TRIP GENERATION RATE

The Institute of Transportation Engineers (ITE) publishes the Trip Generation Manual which is the industry standard throughout the country and is used by all municipalities in the Bay Area; it is adopted as the guideline for preparation of traffic studies in Contra Costa County by Transportation Authority. The Manual is the most accurate and reliable source of trip generations in the traffic engineering field since 1960's. The trip generation rates for private development projects are derived from hundreds of actual data collected by traffic engineers who count cars coming to and leaving various sites (i.e. office parks, subdivisions, banks, restaurants, etc.)

Any private development project expected to result in more than 100 Peak Hour vehicle trips A.M. or P.M. are required to prepare and submit a traffic study as part of

their planning development application. (Peak Hour is the period during the day which traffic volume is at its highest). This is the guideline established by Contra Costa County Transportation Authority and adopted by all municipalities.

The traffic studies submitted by developers provide data and analysis for each type of development project. The reports are reviewed by City staff and/or consultants to ensure compliance with the City General Plan. Generally, a development that has 150 single family homes, 55,000 square feet of office space, 5,200 square feet of fast food restaurant, or 15,500 square feet of shopping center is expected to generate this level of traffic and is required to complete a traffic study and analysis. For example, the Magnolia Park and Emerson Ranch residential projects required the preparation of traffic studies.

A single private development project may not have any significant traffic impacts to the City's roadway network and, for this reason the City takes the long-term view and cumulative effect of all projects in the area are considered during the project review and processing.

A cumulative traffic analysis identifies impacts of existing, proposed, and projected development projects and determines the necessary mitigation measures to be implemented to reduce any impacts. The City Transportation Consultant uses a traffic forecasting program to help determine the general adequacy of the planned transportation system and identify constraints. This traffic program is utilized by the City staff to evaluate the capacity of the entire transportation network as new development projects are processed to determine in real time if the proposed development project has impacts to the transportation network.

The cumulative traffic analysis evaluates the traffic Volume to Capacity (V/C) ratio of roadway segments. The capacity of a roadway is considered as the maximum number of vehicles which can be accommodated under given conditions. A roadway capacity is independent of the demand, it is the physical amount of vehicles a roadway can handle, not the total number of vehicles demanding service. On the other hand, it depends on traffic conditions, geometric design of the road, environmental conditions, traffic composition, etc. For example, a curved roadway has less capacity compared to a straight road. It is not always possible to analytically obtain the capacity of a roadway and; in many cases actual field observation is used to determine roadway capacity. The value of a V/C ratio can vary between 0 and 1. Typically, when V/C ratio is less than 0.5, there is no congestion on a roadway and when V/C is 1, there is high congestion. The City of Oakley General Plan considers V/C 0.9 as the threshold of acceptability for signalized intersections.

LEVEL OF SERVICE (LOS)

LOS is a quality measure describing operational conditions within a traffic system; generally, it measures speed, travel time, traffic interruptions, and comfort and convenience. There are Six (6) levels of service defined for street intersections.

Letters designate each level, from "A" to "F", with LOS "A" representing the best operating conditions and LOS "F" the worst. Each level of service represents a range of operating conditions and driver's perception of those conditions and is the industry standard for describing traffic flow. The LOS criteria are listed in the following table:

Level of Service Criteria for Signalized Intersections	
Level of Service	**Control Delay per Vehicle (Sec/Veh)**
A	Conditions of free flow **≤10**
B	Conditions of stable flow; operating speeds beginning to be restricted **>10 - 20**
C	Conditions of stable flow; speeds and maneuverability more closely restricted; occasional backups **>20 - 35**
D	Conditions approach unstable flow, tolerable speeds can be maintained but with delays; little freedom to maneuver; at intersections, vehicles may wait through one or more signal changes **>35 - 55**
E	Condition approach capacity; unstable flow with stoppages of momentary duration; maneuverability severely limited **>55 - 80**
F	Forced flow conditions; stoppages for long periods; low operating speeds **>80**

All Contra Costa jurisdictions, including Oakley, participate in the County Growth Management Program. This program requires that each jurisdiction adopt a LOS standard. The City of Oakley General Plan also designates LOS "D" as the threshold of an acceptable operating condition at signalized intersections. Any signalized intersection operating worse than LOS "D" would be considered inconsistent with this standard, and mitigation would be required to bring it into compliance.

Arguments can be made that LOS should be "B" or "C", but such LOS would create longer pedestrian and bicyclist crossing distances, because intersections and roadways have to be widened which could have other unintended consequences. This is the main reason municipalities and regional transportation agencies have adopted LOS "D" as their minimum acceptable traffic standard, as this is a balance approach amongst many factors.

By definition, LOS "D" is when there is an occasional wait at an intersection through more than one signal cycle before proceeding. It is important to point out that LOS is calculated for the busiest 60 minutes (4 - 15 minutes) of traffic during peak periods. For example, the LOS at West Cypress Road/O'Hara Avenue is "C". This is near

O'Hara Park Middle School and even though the overall LOS is "C", there is a 15 minute segment where the LOS is "E" during morning and afternoon student drop-off and pick-up.

The following is a sample of street intersections in Oakley and their LOS:

Existing Intersection Levels of Service (LOS)		
Intersection	**AM**	**PM**
Carpenter Road/Empire Avenue	B	B
Laurel Road/ Empire Ave	C	B
West Cypress Road/ O'Hara Ave	C	C
Main Street/ Bridgehead Road	A	D

There are a number of tools to manage traffic issues and there is no one size that fits all. Staff works diligently on working with the residents in identifying traffic issues and implementing measures to address them according to City codes and guidelines. There can be unintended consequences from measures that are taken without the review process. It is very important that the selection and use of traffic control measures be preceded by a thorough study of traffic and roadway conditions and that the determination of the type of control and method of operation is based on the resulting data and analysis.

It is a fact that no municipality wants to have traffic congestion in the community that would adversely affect their residents and businesses. As much as traffic issues sometimes become emotional and personal to individuals, engineering standards and guidelines are established and adopted by municipalities to manage the traffic and, as stated in this report, the City of Oakley has adopted similar codes and guidelines. City staff works each day on managing various traffic related issues in the community with the goal of keeping the growth and vibrancy of the Oakley community a top priority.

Fiscal Impact

This report is for information only and there is no direct fiscal impact.

Staff Recommendation

The City Council accept and discuss the staff report and provide input and direction.