304 TODD ROAD PROJECT AIR QUALITY AND GREENHOUSE GAS EMISSIONS ASSESSMENT

Sonoma County, California

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January 2018 Revision

This report was revised in January 2018 to increase the amount of material processed through crushing operations to 50,000 cubic yards per year. The 2016 analysis addressed crushing air quality impacts as "The processing of base rock materials would be in the range of 25,000 tons annually." However, the analysis of crushing operations assumed 44 days for 8 hours per day that processed 100 tons per hour. This equates to 37,500 tons per year. In order to address a scenario that crushes 50,000 tons per year, crushing operations were increased to 63 days per year and truck trips were adjusted upward as well. Changes to the report with this revision are made in ~~strikethrough where sections are deleted~~ and underline where additions are made.

Introduction

Ghilotti Construction Company, Inc. currently uses the property located at 304 Todd Road, in unincorporated Sonoma County, as a temporary contractor's equipment storage site, stockpile location for rock rip-rap material, and processing site for broken asphalt and concrete materials for recycling and reuse purposes as base rock. There are large stockpiles of soil on the southern half of the property. Ghilotti Construction Company, Inc. has submitted an application to bring the current use into compliance, pursuant to the Notice of Violation received from the County PRMD dated August 9, 2011.

The purpose of this study is to evaluate air quality impacts and greenhouse gas (GHG) emissions attributable to project operations with regard to criteria established by the Sonoma County General Plan and guidance recommended in the Bay Area Air Quality Management District's 2011 CEQA Air Quality Guidelines. The project does not require any construction activities to begin operation; therefore, this analysis addresses operational impacts. These impacts include air pollutant and GHG emissions from on-site equipment operation and vehicles using the project site. Localized impacts from emissions of toxic air contaminants (i.e., diesel particulate matter) and fine particulate matter or $PM_{2.5}$, are assessed at nearby sensitive receptors.

Project Description

Currently, the project site is used in the following ways:

1. Temporary contractor's equipment storage site
2. Stockpile location for rock rip-rap material and
3. Processing site for broken asphalt and concrete materials to recycle and reuse as base rock.

The project proposes to obtain a use permit, per the allowed zoning uses of MI Limited Rural Industrial District, for which the project site is zoned. This application is to bring the current use into compliance pursuant to the Notice of Violation received from the County PRMD dated August 9, 2011.

Equipment Storage

The use for equipment storage is intermittent as there is an existing equipment storage yard across the access road to the east that primarily stores equipment. Equipment storage at the project site would be temporary for equipment that will be transported from projects nearby until they can be transported to the next project location. Minor equipment repairs may take place at the project site.

Material Processing and Stockpiling

Material processing at the project site would be multi-functional. Storage of rock rip-rap for reuse on projects will take place from time to time as will the off-haul of the rock rip-rap to project sites. Stockpiling and processing of asphalt grindings, concrete and base rock materials would occur occasionally. Processing of these materials will be for trucking to and re-use in on-going countywide projects. Both stockpiling and processing of materials is on an as needed basis. Stockpiling of the materials on site will occur during the week and on Saturdays between the hours of 7:00 AM to 6:00 PM.

Processing of the materials would involve the use of a portable crushing plant powered by a diesel engine and a diesel powered front end loader. The processing of base rock materials would be in the range of ~~25,000~~ 50,000 tons annually. Diesel-powered heavy-duty trucks (e.g., semi-end dumps, semi-bottom dumps and transfer trailers) would be used to truck the material to and from the project site. The number of trips per day will vary based the time of year and on import and export of the materials. The estimated range of trips would be from 0 to 50 per day. There would be no trips when processing/crushing, about 10-15 trips per day when hauling in material to process, and 20-30 trips per day to haul material from the project site.

Site appearance will change from time to time as materials are stockpiled, processed and hauled off site. There are large stockpiles of material on the southern half of the property. These stockpiles are currently slated for the fill required on the adjacent Shamrock Property. The stockpiles would be protected from erosion using the erosion and sediment controls as described in the storm water management plan. The largest stockpile at the southerly portion of the project site consists of processed material that is weathered and covered with vegetation. Unprocessed material is typically course material in the form of broken asphalt or concrete.

Air Quality Setting

The project is located in the Bay Area portion of Sonoma County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards with the exception of ground-level ozone, respirable particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$).

High ozone levels are caused by the cumulative emissions of reactive organic gases (ROG) and nitrogen oxides (NO_x). These precursor pollutants react under certain meteorological conditions to form high ozone levels. Controlling the emissions of these precursor pollutants is the focus of the Bay Area's attempts to reduce ozone levels. The highest ozone levels in the Bay Area occur

in the eastern and southern inland valleys that are downwind of air pollutant sources. High ozone levels aggravate respiratory and cardiovascular diseases, reduced lung function, and increase coughing and chest discomfort.

Particulate matter is another problematic air pollutant of the Bay Area. Particulate matter is assessed and measured in terms of respirable particulate matter or particles that have a diameter of 10 micrometers or less (PM_{10}) and fine particulate matter where particles have a diameter of 2.5 micrometers or less ($PM_{2.5}$). Elevated concentrations of PM_{10} and $PM_{2.5}$ are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter levels aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

Toxic air contaminants (TAC) are a broad class of compounds known to cause morbidity or mortality (usually because they cause cancer) and include, but are not limited to, the criteria air pollutants. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter (DPM) near a freeway). Because chronic exposure can result in adverse health effects, TACs are regulated at the regional, State, and federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects of diesel exhaust a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the state's Proposition 65 or under the Federal Hazardous Air Pollutants programs.

Regulatory Setting

The U.S. Environmental Protection Agency (U.S. EPA) is responsible for enforcing the federal Clean Air Act and the 1990 amendments to it, as well as the national ambient air quality standards (federal standards) that the U.S. EPA establishes. These standards identify levels of air quality for six criteria pollutants, which are considered the maximum levels of ambient air pollutants considered safe, with an adequate margin of safety, to protect public health and welfare. The six criteria pollutants are ozone (O_3), carbon dioxide (CO_2), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter with an aerodynamic diameter of 10 micrometers (PM_{10}), fine particulate matter with an aerodynamic diameter of 2.5 micrometers ($PM_{2.5}$), and lead (Pb). The U.S. EPA also has regulatory and enforcement jurisdiction over emission sources beyond State waters (outer continental shelf) and sources that are under the exclusive authority of the federal government, such as aircraft, train locomotives, and interstate trucking. As part of its enforcement responsibilities, the U.S. EPA requires each State with nonattainment areas (i.e., areas that do not meet national ambient air quality standards) to prepare and submit a State Implementation Plan (SIP) that demonstrates the means to attain the federal standards. The SIP must integrate federal,

State, and local plan components and regulations to identify specific measures to reduce pollution in nonattainment areas, using a combination of performance standards and market-based programs.

The CARB, a department of the California EPA, oversees air quality planning and control throughout California. It is primarily responsible for ensuring implementation of the 1989 amendments to the California Clean Air Act (CCAA), responding to the federal Clean Air Act Amendment requirements, and regulating emissions from motor vehicles and consumer products within the state. CARB has established emission standards for vehicles sold in California and for various types of equipment available commercially. It also sets fuel specifications to further reduce vehicular emissions and develops airborne toxic control measures to reduce TACs identified under CARB regulations.

Both the U.S. EPA and CARB established ambient air quality standards for common air pollutants. These ambient air quality standards are prescribed levels of pollutants that represent safe levels that avoid specific adverse health effects associated with each pollutant. The ambient air quality standards cover what are called "criteria" pollutants because the health and other effects of each pollutant are described in criteria documents. The federal and State ambient standards were developed independently with differing purposes and methods, although both processes attempted to avoid health-related effects. As a result, federal and State standards differ in some cases. In general, California standards are more stringent. This is particularly true for ozone and PM_{10}. The BAAQMD is the regional agency tasked with managing air quality in the region. At the State level, the CARB oversees regional air district activities and regulates air quality at the State level. The BAAQMD has published the California Environmental Quality Act (CEQA) Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects.[1]

Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 16, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks. The closest sensitive receptors are as follows:

- A single-family residence located immediately west of the equipment storage site (about 80 feet west);
- Six single-family residences located along Langner Avenue west, southwest, and south of the site (over 400 feet to the west and southwest); and
- Single family residences opposite Todd Road to the north of the site (approximately 300 feet or further to the north)

[1] Bay Area Air Quality Management District. 2011. BAAQMD CEQA Air Quality Guidelines. May.

Greenhouse Gases - Setting

Gases that trap heat in the atmosphere, GHGs, regulate the earth's temperature. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate. The most common GHGs are carbon dioxide and water vapor but there are also several others, most importantly methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). These are released into the earth's atmosphere through a variety of natural processes and human activities. Sources of GHGs are generally as follows:

- Carbon dioxide and nitrous oxide are byproducts of fossil fuel combustion.
- Nitrous oxide is primarily associated with agricultural operations such as fertilization of crops.
- Methane is commonly created by off-gassing from agricultural practices (e.g., keeping livestock) and landfill operations.
- Chlorofluorocarbons were widely used as refrigerants, propellants, and cleaning solvents but their production has been reduced by international treaty.
- Hydrofluorocarbons are now used as a substitute for chlorofluorocarbons in refrigeration and cooling.
- Perfluorocarbons and sulfur hexafluoride emissions are commonly created by industries such as aluminum production and semi-conductor manufacturing.

Each GHG has its own potency and effect upon the earth's energy balance. This is expressed in terms of a global warming potential (GWP), with carbon dioxide being assigned a value of 1 and sulfur hexafluoride being several orders of magnitude stronger with a GWP of 23,900. In GHG emission inventories, the weight of each gas is multiplied by its GWP and is measured in units of carbon dioxide equivalents (CO_2e).

An expanding body of scientific research supports the theory that global warming is currently affecting changes in weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, and that it will increasingly do so in the future. The climate and several naturally occurring resources within California could be adversely affected by the global warming trend. Increased precipitation and sea level rise could increase coastal flooding, saltwater intrusion, and degradation of wetlands. Mass migration and/or loss of plant and animal species could also occur. Potential effects of global climate change that could adversely affect human health include more extreme heat waves and heat-related stress; an increase in climate-sensitive diseases; more frequent and intense natural disasters such as flooding, hurricanes, and drought; and increased levels of air pollution.

Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These Thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in the Air District's updated CEQA Guidelines (updated May 2011). The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 1.

BAAQMD's adoption of significance thresholds contained in the 2011 CEQA Air Quality Guidelines was called into question by an order issued March 5, 2012, in California Building Industry Association (CBIA) v. BAAQMD (Alameda Superior Court Case No. RGI0548693). The order requires BAAQMD to set aside its approval of the thresholds until it has conducted environmental review under CEQA. The ruling made in the case concerned the environmental impacts of adopting the thresholds and how the thresholds would indirectly affect land use development patterns. In August 2013, the Appellate Court struck down the lower court's order to set aside the thresholds. However, the California Supreme Court accepted a portion of CBIA's petition to review the appellate court's decision to uphold BAAQMD's adoption of the thresholds. The specific portion of the argument considered was whether CEQA requires consideration of the effects of the environment on a project (as contrasted to the effects of a proposed project on the environment). On December 17, 2015, the California Supreme Court ruled that CEQA generally does not require an analysis of the effects of existing environmental conditions (e.g., air quality) on a project unless the project would exacerbate those conditions somehow through its construction and/or operation. The effects of the existing environment upon the project are not addressed in this analysis.

Table 1. Air Quality Significance Thresholds

Criteria Air Pollutant	**Average Daily Emissions (lbs./day)**	**Average Daily Emissions (lbs./day)**	**Annual Average Emissions (tons/year)**
ROG	54	54	10
NO_x	54	54	10
PM_{10}	82 (Exhaust)	82	15
$PM_{2.5}$	54 (Exhaust)	54	10
CO	Not Applicable	9.0 ppm (8-hr avg) or 20.0 ppm (1-hr avg)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards	**Single Sources Within 1,000-foot Zone of Influence**	**Combined Sources (Cumulative from all sources within 1,000-foot zone of influence)**	
Excess Cancer Risk	>10 per one million	>100 per one million	
Hazard Index	>1.0	>10.0	
Incremental annual $PM_{2.5}$	>0.3 µg/m^3	>0.8 µg/m^3	
Greenhouse Gas Emissions			
Land use Projects	Compliance with a Qualified GHG Reduction Strategy OR 1,100 metric tons OR 4.6 metric tons/capita annually		
Permitted Sources (e.g., stacks)	10,000 metric tons annually		

Impact 1: Conflict with or obstruct implementation of the applicable air quality plan? *Less-than-significant.*

The Bay Area Air Quality Management District (BAAQMD) is the regional agency responsible for overseeing compliance with State and Federal laws, regulations, and programs within the San Francisco Bay Area Air Basin. The BAAQMD, with assistance from the Association of Bay Area Governments and the Metropolitan Transportation Commission has prepared and implements specific plans to meet the applicable laws, regulations, and programs. Among them are the *Carbon Monoxide Maintenance Plan* (1994), the 2001 Ozone Attainment Plan, and the Bay Area 2010 Clean Air Plan. The BAAQMD has also developed CEQA guidelines to assist lead agencies in evaluating the significance of air quality impacts. In formulating compliance strategies, BAAQMD relies on planned land uses established by local general plans. When a project proposes to change planned uses, by requesting a general plan amendment for example, the project may depart from the assumptions used to formulate plans and compliance strategies in such a way that the cumulative result of incremental changes may hamper or prevent BAAQMD from achieving its goals. This is because land use patterns influence transportation needs, and motor vehicles are the primary source of air pollution. The most recent Clean Air Plan is the *Bay Area 2010 Clean Air Plan* that was adopted by BAAQMD in September 2010. The proposed project would not conflict with the latest Clean Air planning efforts since; 1) the project is consistent with the zoning and development intensity considered in the County's General Plan, 2) the project would have emissions below the BAAQMD criteria pollutant thresholds (see Impact 2), and 3) The proposed project would not cause changes to local population projections or regional changes in vehicle use. The project does not conduct any operations on-site that are subject to BAAQMD regulations, since the crushing operations are conducted on only 44 days per year or less and the equipment is considered portable. The project employs measures to reduce dust emissions from ground disturbances, crushing operations and management of soil/aggregate material.

Impact 2: Violate any air quality standard or contribute substantially to an existing or projected air quality violation? *Less than Significant*

The Bay Area is considered a non-attainment area for ground-level ozone and $PM_{2.5}$ under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for PM_{10} under the California Clean Air Act, but not the federal act. The area has attained both State and federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and PM_{10}, the BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NO_x), PM_{10}, and $PM_{2.5}$ and apply to both construction period and operational period impacts.

Ozone and particulate matter concentrations in the San Francisco Bay Area are the result of emissions (both inside and outside the air basin), meteorological conditions and complex chemical reactions that occur over time in the atmosphere. Recognizing that no single project is sufficient in size to, by itself, result in nonattainment of ambient air quality standards, BAAQMD has recommended emission-based thresholds that measure a project's contribution to cumulative emissions that could cause violations (or potential violations) of ambient air quality standards.

Ghilotti's operations at the project site result in emissions of air pollutants from the following operations:

- Fugitive dust from the handling, processing and transportation of material processed;
- Fugitive dust emissions from exposed stock piles
- Emissions from combustion equipment used on-site and to process recycled concrete and asphalt (e.g., crusher, loaders, bulldozers, excavators, grader, and forklift);
- Emissions from truck traffic generated by the site on a daily basis and trucks used to transport recyclable materials associated with crushing operations; and
- Worker traffic.

Fugitive Dust Emissions

Average daily and maximum annual fugitive emissions of PM_{10} and $PM_{2.5}$ from the project were computed based on the following assumptions:

1. Crushing Day – assuming a maximum processing rate of 100 tons of material per hour, for 8 hours or 800 tons of material processed per crushing day. Other off-road equipment operating during this period includes two loaders, two bulldozers, two excavators, and one grader.

2. Non-Crushing Day – the only fugitive dust sources during non-crushing days are from vehicle travel, assumed to occur 266 days per year, and wind erosion, assumed to occur 365 days per year.

3. Annual Emissions – based on ~~44~~ 63 days of crushing and 222 days of no crushing, but ground disturbances.

Emissions were computed using emissions factors published by U.S. EPA in Chapter 11.19.2, Crushed Stone Processing and Pulverized Mineral Processing, Chapter 13.2.4, Aggregate Handling and Storage Piles. Chapter 11.9, Western Surface Coal Mining, and in Chapter 13.2.2, Unpaved Roads for vehicles traveling on unpaved surfaces at industrial sites of AP-42 (Fifth Edition, Volume I). These are the same factors BAAQMD Permit Handbook for Crushing and Grinding sources under Miscellaneous Sources[2]. The emissions factors included the effect of emissions control, based on facility actions and data by U.S. EPA (in AP-42, Volume I). These primarily include the effect of use of dust palliatives, watering, and reduced vehicle speeds.

The project would incorporate measures to minimize dust emissions that include routine application of a dust palliative to the general site as well as using water trucks during crushing and stockpile management operations. The crushing unit includes water spray bars that operate during crushing operations.
Sources of emissions computed from the crushing activity included a front loader feeding, crushing, screening, conveyor transfer points, loading or stockpiling, wind erosion of storage piles and disturbance from the front loaders and haul trucks. Other equipment used for crushing

[2] BAAQMD's Permit Handbook source specific guidance is available online at http://hank.baaqmd.gov/pmt/handbook/rev02/PH_00_05_11_07.pdf.

activities and storage pile maintenance include bulldozers, excavators, and a grader. Daily and annual computed emissions along with emission factors and assumptions are provided in *Attachment 1* of this letter.

Exhaust Emissions

Exhaust emissions from the project were computed using the California Emissions Estimator Model (CalEEMod, Version 2016.3.1). This model was developed in collaboration with California air districts, including BAAQMD. This construction portion of this model was used to predict both on-site and combined on- and off-site emissions of ROG, NOx, PM10, PM2.5, and GHGs on an annual basis. Average daily emissions were computed by dividing the modeled annual emissions by the number of operational days, which is 266 days.

The land use category "Industrial Park" was selected in CalEEMod. Since CalEEMod requires a building size in units of 1,000 square feet, a size of "1" was entered. The project does not include any buildings. Since the construction portion of CalEEMod was used with project-specific inputs of equipment types and usage, the building size does not affect the results. The applicant provided a list of activity that generates air pollutant and GHG emissions in terms of on-site equipment usage and vehicle travel.

The construction phase "Site Preparation" was selected for construction modeling in CalEEMod. Two separate model runs were developed, one to represent daily activities over a 266-day period (one year) and one to represent on-site crushing activities that occur ~~44~~ 63 days per year. On-site equipment usage assumptions, shown in Table 2, were input to the model.

The traffic report indicates that a maximum of 50 daily truck trips could occur. Based on information received from the applicant, an average of 15 trucks per day would use the site, resulting in 30 one-way trips. For on-site travel, these trips were assumed to have a distance of 0.25 miles. For off-site travel, the origin/destinations vary; therefore, the CalEEMod default distance of 20 miles for haul trips was used.

The computed annual and average daily emissions are reported in Table 3. These emissions are broken down by typical operations and crushing operations for both on- and off-site activities. Overall average daily emissions are the total emissions divided by the number of operating days (i.e., 266 days). Project annual and average daily emissions would be below the significance thresholds. *Attachment 1* also includes the equipment usage assumptions and CalEEMod model output for the project.

Table 2 Equipment Usage Assumptions

Qty	Description	Horse-power	Load Factor	Engine Tier Level	Average Hrs/day	Total Work Days/yr	~~Avg. Hrs per day based on 260 days of operation~~
Daily Activity							
4	Air Compressors	78	0.48	3	1	12	~~0.05~~
2	Crawler Tractors	208	0.43	3	1	52	~~0.20~~
2	Excavators	162	0.38	3	1	52	~~0.20~~
1	Forklifts	89	0.20	2	1	266	~~1.02~~
1	Generator Sets	84	0.74	3	4	22	~~0.34~~
1	Other Material Handling Equipment	167	0.40	n/a	1	52	~~0.20~~
Crushing Activities							
2	Rubber Tired Loaders	199	0.36	3	8	~~44~~ 63	~~1.35~~
2	Crawler Tractors	208	0.43	3	8	~~44~~ 63	~~1.35~~
1	Crushing/Proc. Equipment	309	0.78	3	8	~~44~~ 63	~~1.35~~
2	Excavators	162	0.38	3	8	~~44~~ 63	~~1.35~~
1	Graders	174	0.41	3	4	~~44~~ 63	~~0.68~~

Table 3 Annual and Average Daily Project Emissions (on and off site)

Description	Exhaust Emissions				
	ROG	NOx	PM10	PM2.5	GHG
Daily Operations (tons)	0.0645	1.6307	0.0166	0.0160	345 MT
Crushing Operations (tons)	~~0.0612~~ 0.0897	~~1.3517~~ 2.0010	~~0.0349~~ 0.0505	~~0.0347~~ 0.0502	~~284 MT~~ 420 MT
Fugitive Dust Emissions (tons)	--	--	~~1.5521~~ 1.7568	~~0.2471~~ 0.2859	--
Total Annual Emissions (tons)	~~0.1257~~ 0.1542	~~2.9824~~ 3.6317	~~1.6036~~ 1.8073	~~0.2978~~ 0.3361	~~629 MT~~ 765 MT
Significance Threshold (tons/year)	*10*	*10*	*15*	*10*	*1,100 MT*
Average Daily Emissions (lbs/day)	~~0.9~~ 1.2	~~22.4~~ 27.9	~~12.1~~ 13.6	~~2.2~~ 2.5	--
Significance Threshold	*54*	*54*	*54*	*54*	--
Significant?	**No**	**No**	**No**	**No**	**No**

Air Quality Standards for Local Air Pollutants (Carbon Monoxide from Project Traffic)

Increased intersection congestion can lead to increased localized carbon monoxide concentrations (hot spots) in the vicinity of the intersection. Typically there needs to be a substantial increase in the number of vehicles accessing an intersection and a decrease in the intersection level of service (LOS), and a very high volume of traffic in order for there to be elevated carbon monoxide concentrations of concern. The BAAQMD CEQA Air Quality Guidelines state that a proposed project would result in less than significant impacts to localized carbon monoxide concentrations if the following screening criteria are met:

1. Project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans.

2. The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
3. The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g. tunnel, parking garage, bridge underpass, natural or urban street canyon, below grade roadway).

The project would not generate more than 50 trips in one hour during the peak hours. The project would, therefore, meet the carbon monoxide screening criteria, and *less-than-significant* impacts would result.

Impact 3: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable national or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? *Less than Significant*

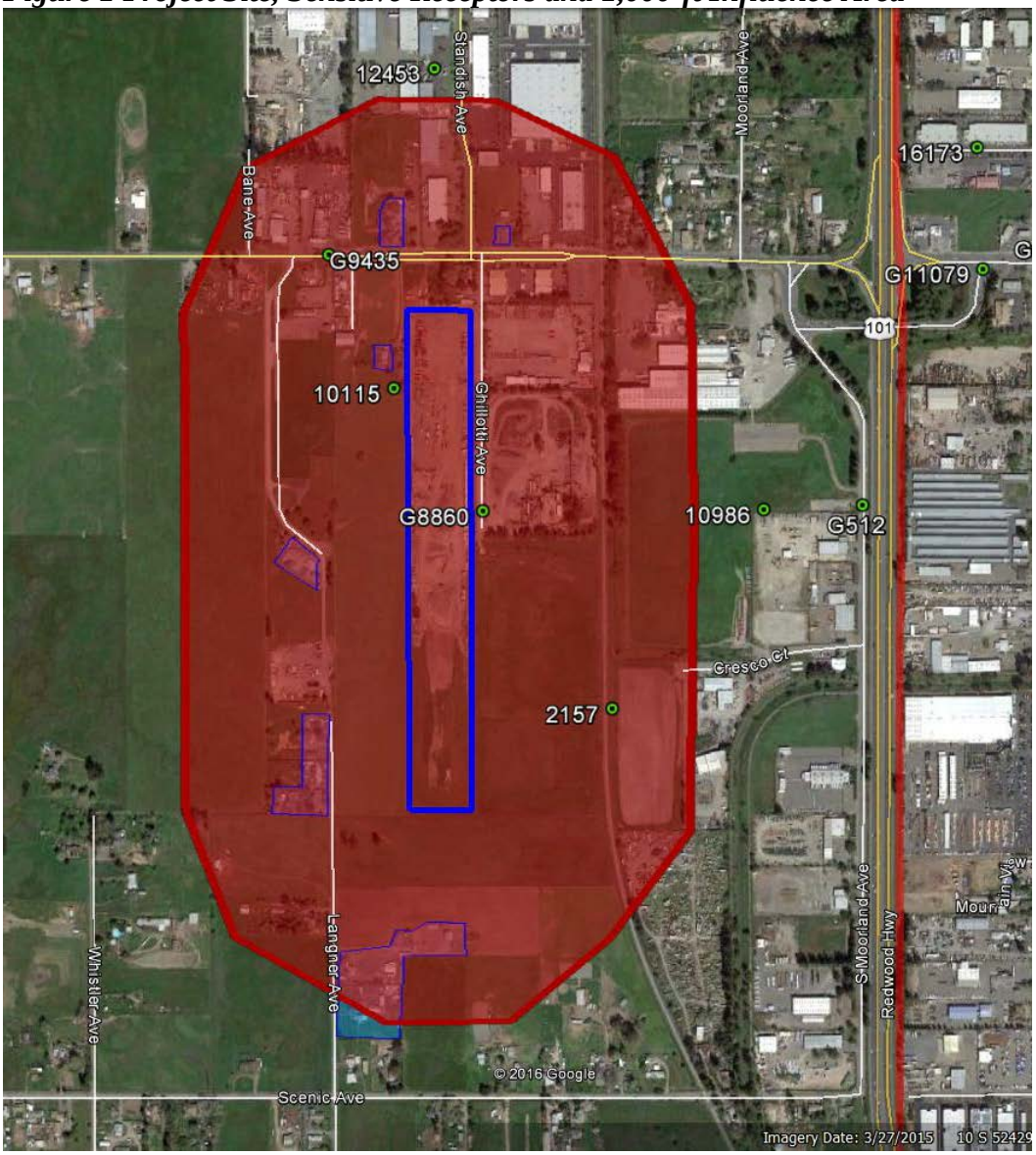
The Bay Area is considered a non-attainment area for ground-level ozone and $PM_{2.5}$ under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for PM_{10} under the California Clean Air Act, but not the Federal Act. The area has attained both State and Federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone, $PM_{2.5}$ and PM_{10}, BAAQMD has established thresholds of significance for air pollutants. These thresholds are for ozone precursor pollutants (reactive organic gases and nitrogen oxides), $PM_{2.5}$ and PM_{10}. Emissions from projects that are below these thresholds would not be cumulatively considerable. Since project emissions of ozone precursor pollutants and particulate matter (i.e., PM_{10} and $PM_{2.5}$) were found to be less than BAAQMD significance thresholds, they would be considered *less than significant.*

Impact 4: Expose sensitive receptors to substantial pollutant concentrations? *Less than significant*

As described above, the plant is a source of fugitive particulate matter emissions, on-site diesel exhaust emissions and off-site diesel exhaust emissions from truck traffic. The BAAQMD CEQA Air Quality Guidelines consider exposure of sensitive receptors to air pollutant levels that result in an unacceptable cancer risk or hazard to be significant. For cancer risk, BAAQMD considers an increased risk of contracting cancer that is 10 in one million chances or greater to be significant for a single source. For cumulative exposure to TACs from existing sources affecting a sensitive receptor, in addition to a proposed new source, the BAAQMD considers an increased risk of contracting cancer that is 100 in one million chances or greater to be significant. The BAAQMD CEQA Guidelines also consider exposure to annual $PM_{2.5}$ concentrations that exceed 0.3 micrograms per cubic meter ($\mu g/m^3$) from a single source to be significant and an annual $PM_{2.5}$ concentration that exceeds 0.8 $\mu g/m^3$ from cumulative sources to be significant. The BAAQMD CEQA Guidelines recommend analyzing sources that are within 1,000 feet of sensitive receptors. The project site and nearby sensitive receptors are shown in Figure 1. The shaded red area

indicates the approximate 1,000-foot influence area and the small blue outlined areas are sensitive receptors.

Figure 1 Project Site, Sensitive Receptors and 1,000-ft Influence Area



This assessment predicts concentrations of TACs and PM2.5 at sensitive receptors within 1,000 feet of the project site and computed the excess cancer risk, annual PM2.5 concentrations and non-cancer health hazard, expressed as a Hazard Index. The modeling included emissions modeling (conducted under Impact 2) that was input to a dispersion model that, using historical meteorological data, predicted annual concentrations of TACs and PM2.5. The methodology for computing these community risk impacts from modeled concentrations is described in Attachment 2.

Project Community Risk Impacts

On-site annual emissions from diesel equipment and truck operation on or near the site were computed using CalEEMod as described above under Impact 2. Since the community risk assessment that addresses cancer risk, annual $PM_{2.5}$ concentrations and non-cancer health hazards is localized, only the portion of truck travel on or near the site was included in the emissions modeling for this assessment. All equipment activity was assumed to occur on site.

TAC emissions are those from diesel exhaust, modeled as exhaust PM10. TAC and exhaust $PM_{2.5}$ emissions were modeled for three portions of the site that are shown in Figure 2: 1) truck and worker parking area (indicated in green), 2) equipment yard area (indicated in yellow), and 3) crushing area (indicated in red). Fugitive dust emissions that are $PM_{2.5,}$ modeled under Impact 2, were included in the dispersion modeling. These areas are depicted in Figure 2 as outlined in pink for storage piles and crushing activities and in yellow and green for daily ground disturbances.

The U.S. EPA AERMOD dispersion model was used to predict concentrations of diesel particulate matter (or DPM) and $PM_{2.5}$ concentrations at existing sensitive receptors in the vicinity of the project. The AERMOD dispersion model is a BAAQMD-recommended model for use in modeling analysis of these types of emission activities for CEQA projects.[3] The dispersion modeling utilized four area sources to represent the on-site emissions of DPM exhaust and fugitive $PM_{2.5}$ dust. For the exhaust emissions from construction equipment, an emission release height of six meters (19.7 feet) was used for those area sources. The elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. For modeling fugitive $PM_{2.5}$ emissions, a near-ground level release height of two meters (6.6 feet) was used for the area sources. Emissions from project activities were modeled as occurring daily between 6 a.m. and 5 p.m.

The modeling used a five-year data set (2009 - 2013) of hourly meteorological data from the Sonoma County Airport in Santa Rosa prepared by the California Air Resources Board (CARB) for use with the AERMOD model. DPM and $PM_{2.5}$ concentrations were modeled at nearby residential locations at a receptor height of 1.5 meters (4.9 feet) to represent the first floor building level. The maximum-modeled $PM_{2.5}$ and DPM concentration occurred at a residence immediately west of the northern portion of the project site, as shown in Figure 2.

Using the risk impact assessment methodology contained in *Attachment 2*, cancer risk, annual $PM_{2.5,}$ and HI were computed at the receptor that had the maximum impact. This assessment is conservative in that it assumes nearly continuous exposure and that an infant occupies the residence where the maximum impact occurs. These results are reported in Table 4 below.

[3] Bay Area Air Quality Management District (BAAQMD), 2012, *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May.

Table 4. Maximum Community Risk Impacts from Facility Operation

Source	Cancer Risk (per million)	Annual $PM_{2.5}$ ($\mu g/m^3$)	HI
Facility DPM and $PM_{2.5}$ Sources	~~7.2~~ 9.1	~~0.23~~ 0.24	<0.01
BAAQMD Single Source Threshold	*10.0*	*0.3*	*1.0*
Significant?	***No***	***No***	***No***

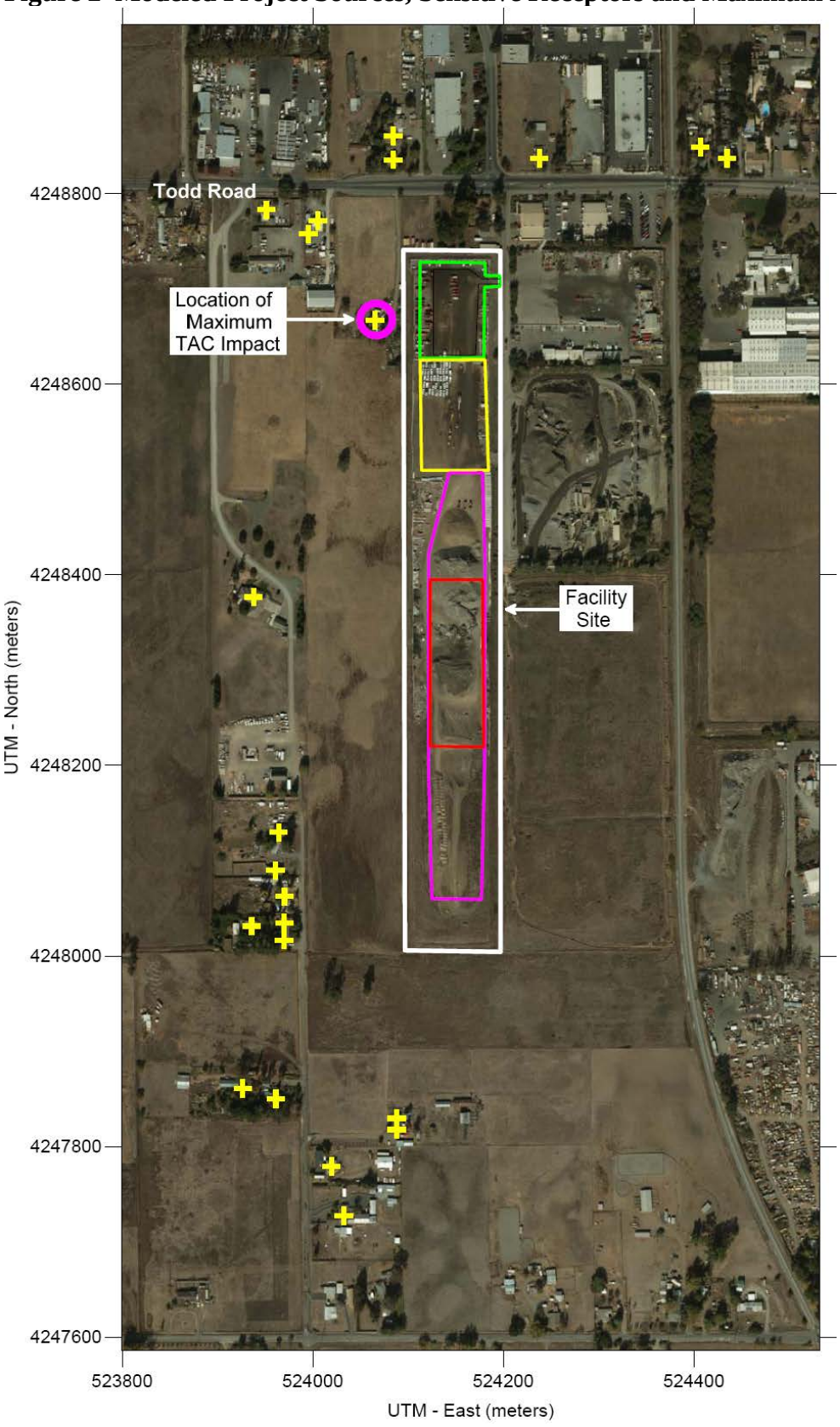
Cumulative Community Risk Impacts

The cumulative risk assessment includes the prediction of impacts from other substantial sources near the project site upon the receptor most affected by the proposed project. Cumulative sources near the project site were identified as 1) Syar Industries that operates an asphalt plant that receives used concrete and asphalt materials from contractors, which it reprocesses and sells as recycled aggregate base and other construction materials, 2) the Ghilotti construction yard that is across Ghilotti Avenue from the project site. This site is used mainly for parking or maintenance of construction vehicles, and 3) Todd Road traffic. There are two minor gas dispensing facilities but they have negligible emissions. Table 5 shows the community risks from the project and the combined risks from sources within 1,000 feet of the project site. The assessment of these cumulative sources is described below.

Table 5. Cumulative Community Risk from Combined Sources at Location of Maximum Project Impact

Source	Maximum Cancer Risk (per million)	$PM_{2.5}$ concentration ($\mu g/m^3$)	Hazard Index
Project TAC and fugitive sources combined	~~7.2~~ 9.1	~~0.23~~ 0.24	<0.01
Single-Source Threshold	10.0	0.3	1.0
Ghilotti Yard – TAC sources	0.5	0.0	0.0
Syar Industries – TAC and fugitive sources combined	32.8	0.54	0.01
Todd Road traffic – TAC and PM2.5	1.1	0.02	<0.01
Combined Sources	~~41.6~~ 43.5	~~0.79~~ 0.80	0.03
Combined Sources	***100***	***0.8***	***10.0***

Figure 2 Modeled Project Sources, Sensitive Receptors and Maximum Affected Receptor



Syar Industries

A stationary Source Information Form was submitted to BAAQMD to obtain information for nearby stationary sources. BAAQMD provided the emissions information for the Syar Industries Plant. This information indicated low emissions of TACs, but high emissions of particulate matter, which are assumed to be associated with fugitive dust emissions. The $PM_{2.5}$ fraction of fugitive dust is quite small. These emissions were used in dispersion modeling of this facility to predict cumulative impacts.

Not included in the BAAQMD-provided data are emissions from diesel equipment operating at that site. A review of an aerial of the site indicates there are about 6 pieces of construction equipment on site. This includes four loaders, a tractor crawler or tracked bulldozer and an excavator. This equipment was conservatively assumed to operate 8 hours per day for 260 days per year. A rough estimate of truck traffic was made that assumes 100 trucks use the site on average each day during the year. This equates to 200 trips per day. The trip length within the site and roadways within 1,000 feet of the project site were measured at 0.5 miles. The emissions from equipment usage and truck travel were modeled using CalEEMod.

Dispersion modeling of this source was conducted using the AERMOD model in a similar manner as for the proposed project. One area source was used for diesel sources operating in the general facility area. For fugitive $PM_{2.5}$ emissions one area source was used to model emissions from the general facility area and three volume sources were used to model the asphalt plant equipment and material storage and handling emissions.

Ghilotti Construction Yard

Ghilotti has a construction yard near Todd Road opposite Ghilotti Avenue from the project site. It appears that this site is used mainly for parking or maintenance of construction vehicles. This source was included in the cumulative modeling. Emissions were modeled using CalEEMod assuming 100 truck trips per average workday and use of a diesel powered forklift for 8 hours each workday. Dispersion modeling of the diesel sources was conducted in the same manner as for the project.

Todd Road

Traffic counts for Todd Road indicate that there are less than 10,000 average daily trips per day, as the peak-hour traffic counts indicate about 600 vehicles per hour. The BAAQMD Roadway Screening Analysis Calculator was used to predict cancer risk and annual $PM_{2.5}$ concentrations. This calculator requires the following inputs:

- County = Sonoma
- Roadway orientation = East-West
- Side of the roadway = South
- Distance to receptor = 390 feet
- Average daily traffic volume = 10,000 vehicles.

The computed cancer risk obtained from the calculator was adjusted upwards to account for the new BAAQMD/OEHHA guidance using a factor of 1.37.

Supporting Documentation

The calculations and modeling assumptions used to compute cancer risks, annual $PM_{2.5}$ concentrations and Hazard Index for the projected project are contained in *Attachment 3*. The information for cumulative sources is included in *Attachment 4*.

Impact 5: Create objectionable odors affecting a substantial number of people? *Less-than-significant*

The project generates localized emissions of diesel exhaust during equipment operation and truck activity. These emissions may be noticeable from time to time at the site boundary. The BAAQMD CEQA Air Quality Guidelines threshold is based on the number of confirmed complaints per year averaged over a three year period for land uses that are considered to be sources of odors. Construction yard facilities are not listed among the considered as sources of odors. There is no evidence of any sources of odors that would result in frequent odor complaints.

Impact 6: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? *Less than Significant*

The BAAQMD CEQA Air Quality Guidelines contain methodology and thresholds of significance for evaluating greenhouse gas (GHG) emissions from land use type projects. The BAAQMD thresholds were developed specifically for the Bay Area after considering the latest Bay Area GHG inventory and the effects of AB 32 scoping plan measures that would reduce regional emissions. BAAQMD intends to achieve GHG reductions from new land use developments to close the gap between projected regional emissions with AB 32 scoping plan measures and the AB 32 targets. The BAAQMD applies GHG efficiency thresholds to projects with emissions of 1,100 metric tons (MT) of CO2e (carbon dioxide equivalency) or greater. Projects that have emissions below 1,100 MT of CO2e per year are considered to have less than significant GHG emissions.

The potential sources of greenhouse gas emissions from the project would be from 1) use of on-site off-road diesel powered equipment to process material and 2) truck traffic associated with the facility. The GHG emissions from these sources were modeled using CalEEMod and reported in Table 3. Annual emissions from the project would be 629 metric tons (MT) per year.

The BAAQMD CEQA Air Quality Guidelines recommend a threshold of 1,100 metric tons per year that is used by the City to judge the significance of greenhouse gas emissions from projects. The project would, therefore, not generate greenhouse gas emissions that would have a significant impact on the environment, nor conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Attachment 1: Fugitive PM10 and $PM_{2.5}$ Emission Calculations and Project CalEEMod Modeling and Equipment Usage Assumptions

Table F1
Ghilotti - 304 Todd Road, Santa Rosa
PM10 and PM2.5 Emissions From Material Processing Equipment

Recycle Materail Processing and Facility Operation Information

Annual Raw Materail Process Rate (ton/yr) =	50,400
Hourly Process rate (ton/hr) =	100
Average Daily Process Rate (ton/day)	800
Days to Process Annual Amount =	63
Average Hours per day Processing (hrs) =	8
Annual Facility Operation (days) =	266

Facility Processing Equipment Emissions - Crushing Equipment

Equipment Type	Percent of Input	Process Rate (ton/hr)	Number of Transfers	Daily Operation (hours)	PM10 Emission Factor (lb/ton)	PM10 Hourly (lb/hr)	PM10 Average Daily (lb/day)	PM10 Annual (ton/yr)	PM2.5 Emission Factor (lb/ton)	PM2.5 Hourly (lb/hr)	PM2.5 Average Daily (lb/day)	PM2.5 Annual (ton/yr)
Crushing Equipment												
Feed Hopper	100%	100	1	8.0	0.000016	0.002	0.003	0.0004	0.000003	0.0003	0.0006	0.0001
Conveyor to Crusher	100%	100	1	8.0	0.00058	0.0582	0.110	0.0147	0.000240	0.024	0.045	0.0060
Crusher	100%	100	1	8.0	0.00054	0.054	0.102	0.0136	0.00010	0.010	0.019	0.0025
Crusher Conveyor to Loadout Pile	100%	100	2	8.0	0.00058	0.1163	0.220	0.0293	0.000240	0.048	0.091	0.0121
Total						***0.2***	***0.44***	***0.06***		***0.08***	***0.16***	***0.02***

Table F2
Ghilotti - 304 Todd Road, Santa Rosa
PM10 and PM2.5 From Facility Fugitive Emission Sources

Facility Operation and Processing Fugitive Emission Sources

	Operation						Emission Factors			PM10 Emissions			PM2.5 Emissions		
	Process Rate	Process Rate Units	No. of Equip.	Daily Hours (hours/day)	Days per Year	Total Annual Hours (hours/yr)	PM10 Emission Factor	PM2.5 Emission Factor	Emission Factor Units	Ave Hourly (lb/hr)	Ave Daily (lb/day)	Annual Average (ton/yr)	Ave Hourly (lb/hr)	Ave Daily (lb/day)	Annual Average (ton/yr)
Loaders - Loader Travel															
Processing - Crush & Screening Feed	4.7	mile/day	1	8	63	504	0.81	0.08	lb/VMT	0.48	0.90	0.12	0.05	0.09	0.01
Processing - Truck Loading Areas/Pile Maintenance	4.7	mile/day	1	8	63	504	0.81	0.08	lb/VMT	0.48	0.90	0.12	0.05	0.09	0.01
Subtotal - Loader Travel Emissions											*1.80*	*0.24*		*0.18*	*0.02*
Loaders - Truck Loading															
Processing Area - Haul Truck Loading (via loader)	100	ton/hr	2	8	63	1008	0.0011	0.00017	lb/ton	0.22	0.42	0.06	0.03	0.06	0.009
Other Off-Road Equipment															
Bulldozing	-	-	1	8	63	504	0.38	0.21	lb/hr	0.38	0.71	0.09	0.21	0.39	0.05
Grading	12	mile/day	1	4	63	252	0.124	0.009	lb/VMT	0.37	0.35	0.05	0.03	0.02	0.003
Excavator	100	ton/hr	1	8	63	504	0.0011	0.00017	lb/ton	0.11	0.21	0.03	0.02	0.03	0.004
Subtotal - Off-Road Equipment Emissions											*1.28*	*0.17*		*0.45*	*0.06*
On-Site Haul Trucks - Unpaved Road Travel															
Operational Haul Trucks	756	mile/yr	-	-	-	-	0.226	0.023	lb/VMT	-	0.64	0.09	-	0.06	0.01
Recycle Processing Haul Trucks	1,090	mile/yr	-	-	-	-	0.284	0.028	lb/VMT	-	1.16	0.15	-	0.12	0.02
Subtotal											*1.80*	*0.24*		*0.18*	*0.02*
Wind Erosion (annual)	4.0	acres	-	24	365	8760	1.36	0.20	lb/acre/day	-	5.44	0.99		0.82	0.15
Total Excavation/Processing Fugitives										-	***10.7***	***1.70***	-	***1.7***	***0.27***
Total Operation and Processing Fugitives and Crushing Equipment Emissions										**-**	**13.2**	**1.7568**	**-**	**2.1**	**0.2859**

Table F3
Ghilotti - 304 Todd Road, Santa Rosa
Emissions Factors Used For Facility Operation and Processing Fugitive PM10 & PM2.5 Emissions

	PM10 Emission Factors			PM2.5 Emission Factors				
Emission Source	**Uncontrolled**	**% Control**	**Controlled**	**Uncontrolled**	**Fraction of PM10**	**Controlled**	**Units**	**Reference**
Feed Hopper	0.000016	0%	0.000016	0.000003	0.20	0.000003	lb/ton	8/04AP-42 Section 11.19.2 (Crushed Stone Processing) - uncontrolled
Primary Crushing	-	-	0.00054	-	-	0.00010	lb/ton	8/04 AP-42 Section 11.19.2 (Crushed Stone Processing) - tertiary crushing (estimate for primary crusher)
Secondary Crushing	-	-	0.00054	-	-	0.00010	lb/ton	8/04 AP-42 Section 11.19.2 (Crushed Stone Processing) - tertiary crushing (estimate for secondary crusher)
Fines Crushing	0.015	-	0.0012	-	-	0.00007	lb/ton	8/04AP-42 Section 11.19.2 (Crushed Stone Processing) - Fines Crushing
Screening	0.0087	-	0.00074	-	-	0.00005	lb/ton	8/04AP-42 Section 11.19.2 (Crushed Stone Processing) - Screening
Fines Screening	0.072	-	0.0022	-	-	0.00005	lb/ton	8/04AP-42 Section 11.19.2 (Crushed Stone Processing) - Fines screening
Conveyor Transfer Points	0.0011	-	0.000046	0.00031	-	0.000013	lb/ton	8/04 AP-42 Section 11.19.2 (Crushed Stone Processing) - Conveyor transfer point
Loading/stockpiling	0.0011	0%	0.0011	0.00017	0.15	0.00017	lb/ton	11/06 AP-42 Section 13.2.4 (Aggregate handling and Storage Piles) - Material drop operations
Avg of Conveyor Transfer + Stockpiling	-		0.00058	-	-	0.000240	lb/ton	uncontrolled drop to conveyor & controlled loadout
Operation - Haul Truck Unpaved Travel (daily)*	1.88	85%	0.282	0.188	-	0.028	lb/VMT	AP-42 Unpaved Roads
Operation - Haul Truck Unpaved Travel (Annual)*	1.50	85%	0.226	0.150	-	0.023	lb/VMT	AP-42 Unpaved Roads
Processing - Haul Truck Unpaved Travel (daily)*	2.37	85%	0.355	0.237	-	0.036	lb/VMT	AP-42 Unpaved Roads
Processing - Haul Truck Unpaved Travel (Annual)*	1.89	85%	0.284	0.189	-	0.028	lb/VMT	AP-42 Unpaved Roads
Bulldozing (lb/hr)**	0.75	50%	0.38	0.41	-	0.21	lb/hr	AP-42 Western Surface Coal Mining (overburden dozing)
Wind Erosion for Storage Piles	1.7	0%	1.7	0.26	0.15	0.26	lb/acre-day	BAAQMD Permit Handbook, Section 11.7 Crushing and Grinding
Wind Erosion for Storage Piles (annual)	1.4	0%	1.4	0.20	0.15	0.20	lb/acre-day	BAAQMD Permit Handbook, Section 11.7 Crushing and Grinding

Note: * Controlled emission factor assumes 85% control effectiveness for use of cheical dust suppressant, watering, and reduced speed

** Controlled emission factor assumes 50% control effectiveness for use of watering

On-Site Equipment/Vehicles Unpaved Road Emission Factors

Equipment Type	**Average Weight (tons)**	**Silt* Content (%)**	**PM10 Uncontrolled Factor (lb/VMT)**	**PM10** Controlled Factor (lb/VMT)**	**PM2.5 Uncontrolled Factor (lb/VMT)**	**PM2.5** Controlled Factor (lb/VMT)**
Loaders (Cat 980)	33.5	6.9	2.70	0.81	0.27	0.08
Motor Grader***	-	3 mph	0.28	0.12	0.02	0.01

Note: *Default CalEEMod silt content for travel areas. Value for grader is the grader travel speed.

** Controlled emission factor assumes 70% control effectiveness for watering and reduced speeds for equipment travel and 55% for grading for watering.

*** AP-42 Western Surface Coal Mining (Table 11.9.1 - grading)

Vehicle/Process/Emission Factor Information		
Loader Capacity =	5	cubic yards
Loader Capacity =	6.5	tons
Operation Truck Travel Distance =	1,000	round-trip feet
Recycle Processing Truck Travel Distance =	2,283	round-trip feet
Haul Truck Capacity (CY) =	15	per truck
Haul Truck Capacity (tons) =	20.0	per truck
Haul Truck Weight (unloaded) =	15.0	tons
Average Haul Truck Wt. (load & no load)	25.0	tons
Operation - Annual No. Trucks =	3,990	trucks/year
Recycle Processing - Annual No. Trucks =	2,520	trucks/year
Average wind speed (mph)	5.26	Santa Rosa Airport (2001-2005 from BAAQMD)
No. days with precip. > 0.01 inch	73	NWS Station, Santa Rosa, Ca
Recycle Material Moisture content (%) =	2.1	AP-42 & BAAQMD
Site Area Material Moisture content (%) =	7.9	CalEEMod
Site Area Silt Content (%)	6.9	CalEEMod

304 Todd Road - Ghiolotti Yard (Yellow and Green Area)

Sonoma-San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Industrial Park	1.00	1000sqft	19.00	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	75
Climate Zone	4			**Operational Year**	2019
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - No real structures on site

Construction Phase - Use construction to model annual operational emissions

Off-road Equipment - based on provided list

Off-road Equipment - Based on provided list

Trips and VMT - Assumes 15 roundtrips per day for 266 trips per year at 20 miles per trip. Assume 3 workers per average day (or 10 daily trips)

Grading - Assumes each acre is disturbed daily

Vehicle Trips - Using construciton to model operational since construction yard

Construction Off-road Equipment Mitigation - Used project equipment list that includes Tier level

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstructionPhase	NumDays	10.00	260.00
tblGrading	AcresOfGrading	6.50	33.15
tblLandUse	LotAcreage	0.02	19.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	430
tblProjectCharacteristics	OperationalYear	2018	2019
tblTripsAndVMT	HaulingTripNumber	0.00	7,980.00
tblTripsAndVMT	WorkerTripNumber	25.00	10.00

tblVehicleTrips	ST_TR	2.49	0.01
tblVehicleTrips	SU_TR	0.73	0.01
tblVehicleTrips	WD_TR	6.83	0.01

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					
2017	0.0761	1.6968	0.4932	3.5600e-003	0.0940	0.0228	0.1169	0.0228	0.0216	0.0444	0.0000	344.0413	344.0413	0.0257	0.0000	344.6834
Maximum	**0.0761**	**1.6968**	**0.4932**	**3.5600e-003**	**0.0940**	**0.0228**	**0.1169**	**0.0228**	**0.0216**	**0.0444**	**0.0000**	**344.0413**	**344.0413**	**0.0257**	**0.0000**	**344.6834**

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					
2017	**0.0645**	**1.6307**	**0.5028**	**3.5600e-003**	**0.0940**	**0.0166**	**0.1106**	**0.0228**	**0.0160**	**0.0388**	**0.0000**	**344.0413**	**344.0413**	**0.0257**	**0.0000**	**344.6833**
Maximum	**0.0645**	**1.6307**	**0.5028**	**3.5600e-003**	**0.0940**	**0.0166**	**0.1106**	**0.0228**	**0.0160**	**0.0388**	**0.0000**	**344.0413**	**344.0413**	**0.0257**	**0.0000**	**344.6833**

	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	**15.27**	**3.90**	**-1.94**	**0.00**	**0.00**	**27.41**	**5.36**	**0.00**	**25.92**	**12.60**	**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	**1-1-2017**	**3-31-2017**	0.4420	0.4228
2	**4-1-2017**	**6-30-2017**	0.4354	0.4160
3	**7-1-2017**	**9-30-2017**	0.4402	0.4206
		Highest	0.4420	0.4228

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2017	12/29/2017	5	260	

Acres of Grading (Site Preparation Phase): 33.15

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Air Compressors	4	0.10	78	0.48
Site Preparation	Crawler Tractors	2	0.20	212	0.43
Site Preparation	Excavators	2	0.20	158	0.38
Site Preparation	Forklifts	1	2.00	89	0.20
Site Preparation	Other Construction Equipment	0	0.50	172	0.42
Site Preparation	Other General Industrial Equipment	0	0.50	88	0.34
Site Preparation	Other Material Handling Equipment	1	0.20	168	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37

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
Site Preparation	10	10.00	0.00	7,980.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Site Preparation - 2017

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					0.0176	0.0000	0.0176	1.9000e-003	0.0000	1.9000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0182	0.1812	0.1096	1.8000e-004		0.0109	0.0109		0.0101	0.0101	0.0000	16.4131	16.4131	4.5800e-003	0.0000	16.5278
Total	**0.0182**	**0.1812**	**0.1096**	**1.8000e-004**	**0.0176**	**0.0109**	**0.0285**	**1.9000e-003**	**0.0101**	**0.0120**	**0.0000**	**16.4131**	**16.4131**	**4.5800e-003**	**0.0000**	**16.5278**

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	0.0496	1.5089	0.3187	3.2700e-003	0.0662	0.0119	0.0781	0.0182	0.0114	0.0295	0.0000	317.3673	317.3673	0.0206	0.0000	317.8820
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	0.0000	0.0000	0.0000	0.0000
Worker	8.3300e-003	6.6100e-003	0.0649	1.1000e-004	0.0102	9.0000e-005	0.0103	2.7200e-003	9.0000e-005	2.8000e-003	0.0000	10.2609	10.2609	5.1000e-004	0.0000	10.2736
Total	**0.0579**	**1.5155**	**0.3836**	**3.3800e-003**	**0.0764**	**0.0120**	**0.0884**	**0.0209**	**0.0115**	**0.0323**	**0.0000**	**327.6282**	**327.6282**	**0.0211**	**0.0000**	**328.1556**

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					0.0176	0.0000	0.0176	1.9000e-003	0.0000	1.9000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.5400e-003	0.1152	0.1192	1.8000e-004		4.6000e-003	4.6000e-003		4.5300e-003	4.5300e-003	0.0000	16.4131	16.4131	4.5800e-003	0.0000	16.5277
Total	**6.5400e-003**	**0.1152**	**0.1192**	**1.8000e-004**	**0.0176**	**4.6000e-003**	**0.0222**	**1.9000e-003**	**4.5300e-003**	**6.4300e-003**	**0.0000**	**16.4131**	**16.4131**	**4.5800e-003**	**0.0000**	**16.5277**

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	0.0496	1.5089	0.3187	3.2700e-003	0.0662	0.0119	0.0781	0.0182	0.0114	0.0295	0.0000	317.3673	317.3673	0.0206	0.0000	317.8820
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	0.0000	0.0000	0.0000	0.0000
Worker	8.3300e-003	6.6100e-003	0.0649	1.1000e-004	0.0102	9.0000e-005	0.0103	2.7200e-003	9.0000e-005	2.8000e-003	0.0000	10.2609	10.2609	5.1000e-004	0.0000	10.2736
Total	**0.0579**	**1.5155**	**0.3836**	**3.3800e-003**	**0.0764**	**0.0120**	**0.0884**	**0.0209**	**0.0115**	**0.0323**	**0.0000**	**327.6282**	**327.6282**	**0.0211**	**0.0000**	**328.1556**

304 Todd Road - Ghiolotti Yard (Crushing - Red Area)

Sonoma-San Francisco County, Annual

Updated in Jan. 2018

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Industrial Park	1.00	1000sqft	19.00	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	75
Climate Zone	4			**Operational Year**	2019
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - No real structures on site

Construction Phase - Use construction to model annual operational emissions - Crushing = 63 days/year = 50,400 tons

Off-road Equipment - based on provided list

Off-road Equipment - Based on provided list - but using 68 days/year (50,000tons)

Trips and VMT - Assumes 50,000 tons at 20 tons/roundtrip assume no new employees

Grading - fugitive calculations separate

Vehicle Trips - Using construciton to model operational since construction yard

Construction Off-road Equipment Mitigation - Used project equipment list that includes Tier level

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstructionPhase	NumDays	10.00	63.00
tblEnergyUse	LightingElect	3.88	3.98
tblEnergyUse	T24E	6.11	6.40
tblEnergyUse	T24NG	16.31	16.39
tblGrading	AcresOfGrading	78.75	0.00
tblLandUse	LotAcreage	0.02	19.00
tblOffRoadEquipment	HorsePower	85.00	309.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	430
tblTripsAndVMT	HaulingTripNumber	0.00	5,000.00

2.0 Emissions Summary

2.1 Overall Construction

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					
2017	0.0897	2.0010	1.4989	4.3500e-003	0.4266	0.0505	0.4771	0.2214	0.0502	0.2716	0.0000	418.2887	418.2887	0.0590	0.0000	419.7644
Maximum	**0.0897**	**2.0010**	**1.4989**	**4.3500e-003**	**0.4266**	**0.0505**	**0.4771**	**0.2214**	**0.0502**	**0.2716**	**0.0000**	**418.2887**	**418.2887**	**0.0590**	**0.0000**	**419.7644**

	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	**62.58**	**36.64**	**-29.89**	**0.00**	**0.00**	**51.18**	**9.99**	**0.00**	**48.15**	**14.65**	**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	**1-1-2017**	**3-31-2017**	3.3992	2.0952
		Highest	3.3992	2.0952

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2017	3/29/2017	5	63	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	2	8.00	212	0.43
Site Preparation	Crushing/Proc. Equipment	1	8.00	309	0.78
Site Preparation	Excavators	2	8.00	158	0.38
Site Preparation	Generator Sets	1	4.00	84	0.74
Site Preparation	Graders	1	4.00	187	0.41
Site Preparation	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37

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
Site Preparation	9	23.00	0.00	5,000.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2017

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					0.3794	0.0000	0.3794	0.2085	0.0000	0.2085	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2041	2.2087	0.9181	2.2400e-003		0.0960	0.0960		0.0896	0.0896	0.0000	213.7187	213.7187	0.0459	0.0000	214.8649
Total	**0.2041**	**2.2087**	**0.9181**	**2.2400e-003**	**0.3794**	**0.0960**	**0.4754**	**0.2085**	**0.0896**	**0.2982**	**0.0000**	**213.7187**	**213.7187**	**0.0459**	**0.0000**	**214.8649**

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	0.0311	0.9454	0.1997	2.0500e-003	0.0415	7.4500e-003	0.0489	0.0114	7.1200e-003	0.0185	0.0000	198.8517	198.8517	0.0129	0.0000	199.1742
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	0.0000	0.0000	0.0000	0.0000
Worker	4.6400e-003	3.6800e-003	0.0362	6.0000e-005	5.6900e-003	5.0000e-005	5.7400e-003	1.5100e-003	5.0000e-005	1.5600e-003	0.0000	5.7185	5.7185	2.8000e-004	0.0000	5.7255
Total	**0.0357**	**0.9491**	**0.2359**	**2.1100e-003**	**0.0472**	**7.5000e-003**	**0.0547**	**0.0129**	**7.1700e-003**	**0.0201**	**0.0000**	**204.5702**	**204.5702**	**0.0132**	**0.0000**	**204.8998**

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					0.3794	0.0000	0.3794	0.2085	0.0000	0.2085	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0540	1.0518	1.2630	2.2400e-003		0.0430	0.0430		0.0430	0.0430	0.0000	213.7185	213.7185	0.0459	0.0000	214.8647
Total	**0.0540**	**1.0518**	**1.2630**	**2.2400e-003**	**0.3794**	**0.0430**	**0.4224**	**0.2085**	**0.0430**	**0.2516**	**0.0000**	**213.7185**	**213.7185**	**0.0459**	**0.0000**	**214.8647**

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	0.0311	0.9454	0.1997	2.0500e-003	0.0415	7.4500e-003	0.0489	0.0114	7.1200e-003	0.0185	0.0000	198.8517	198.8517	0.0129	0.0000	199.1742
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	0.0000	0.0000	0.0000	0.0000
Worker	4.6400e-003	3.6800e-003	0.0362	6.0000e-005	5.6900e-003	5.0000e-005	5.7400e-003	1.5100e-003	5.0000e-005	1.5600e-003	0.0000	5.7185	5.7185	2.8000e-004	0.0000	5.7255
Total	**0.0357**	**0.9491**	**0.2359**	**2.1100e-003**	**0.0472**	**7.5000e-003**	**0.0547**	**0.0129**	**7.1700e-003**	**0.0201**	**0.0000**	**204.5702**	**204.5702**	**0.0132**	**0.0000**	**204.8998**

		Data Request for Onsite Equipment Use									
ject Name:		**Ghilotti Construction**									**Complete ALL Portions in Yellow**
	Project Size	**19**	**total acres**		**19**	**acres disturbed**					
		0	**s.f. buildings**								
	Typical operation Hours	**7**	**am to**		**6**	**pm**					
Qty	**Description**	**HP**	**Load Factor**	**Tier Level (ie, 0, 2, 3, 4)**	**Average Hours/day**	**Total Work Days/year**	**Avg. Hours per day based on 260 days of**	**horsepower hours**	**Annual Hours**	**Work Area (see attached)**	**Comments**
	Aerial Lifts	62	0.31	4					0		
4	Air Compressors	78	0.48	3	1	12	0.05		12	Yellow	
	Bore/Drill Rigs	205	0.5	N/A					0		
	Cement and Mortar Mixers	9	0.56	N/A					0		
	Concrete/Industrial Saws	81	0.73	N/A					0		
	Cranes	226	0.29	N/A					0		
2	Crawler Tractors	208	0.43	3	1	266	1.02	23,791	266	Yellow	In addition, there are 44 days @ 8 hours per day = 352 hrs.
2	Crawler Tractors	208	0.43	3	8	44	1.35	31,483	352	Red	
1	**Crushing/Proc. Equipment**	**309**	0.78	3	8	44	1.35	84,839	352	Red	
15	Dump Trucks	16	0.38	3	1	266	1.02		266	Green	Trucks modeled as on-road vehicles
2	Excavators	162	0.38	3	1	266	1.02	16,375	266	Yellow	In addition, there are 44 days @ 8 hours per day = 352 hrs.
2	Excavators	162	0.38	3	8	44	1.35	21,669	352	Red	
1	Forklifts	89	0.2	2	2	266	2.05	9,470	532	Yellow	
1	Generator Sets	84	0.74	3	4	22	0.34	5,470	88	Red	
1	Graders	174	0.41	3	4	44	0.68	12,556	176	Red	
	Off-Highway Tractors	122	0.44	N/A					0		
	Off-Highway Trucks	400	0.38	N/A					0		~~44 days crushing changed to 63 days~~
1	Other Construction Equipment	171	0.42	N/A	1	266	1.02	19,104	266	Yellow	
1	Other General Industrial Equipment	150	0.34	N/A	1	266	1.02	13,566	266	Yellow	
1	Other Material Handling Equipment	167	0.40	N/A	1	266	1.02	17,769	266	Yellow	
	Pavers	125	0.42	4					0		
	Paving Equipment	130	0.36	3					0		
	Plate Compactors	8	0.43	N/A					0		
	Pressure Washers	13	0.2	N/A					0		
	Pumps	84	0.74	N/A					0		
	Rollers	80	0.38	3					0		
	Rough Terrain Forklifts	100	0.4	2					0		
	Rubber Tired Dozers	255	0.4	N/A					0		
2	Rubber Tired Loaders	199	0.36	3	8	44	1.35	25,217	352	Red	
	Scrapers	361	0.48	3					0		
	Signal Boards	6	0.82	N/A					0		
	Skid Steer Loaders	64	0.37	3					0		
	Surfacing Equipment	253	0.3	N/A					0		
	Sweepers/Scrubbers	64	0.46	3					0		
	Tractors/Loaders/Backhoes	97	0.37	3					0		
	Trenchers	80	0.5	N/A					0		
	Welders	46	0.45	N/A					0		
								281309			
								122612			

Attachment 2: Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to Toxic Air Contaminates (TACs) requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. The State of California Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (CARB) develop recommended methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[4] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[5] This HRA used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[6] Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

Cancer Risk

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency of exposure, and the exposure duration. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways).

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors is allowed by the BAAQMD if there are no schools in the project vicinity that would have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0).

Functionally, cancer risk is calculated using the following parameters and formulas:

Cancer Risk (per million) = $CPF \times Inhalation\ Dose \times ASF \times ED/AT \times FAH \times 10^6$

Where:

CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)

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[4] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

[5] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.

[6] BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. January 2016.

AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = $C_{air} \times DBR \times A \times (EF/365) \times 10^{-6}$

Where:

C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

The health risk parameters used in this evaluation are summarized as follows:

Parameter	*Exposure Type* →	Infant		Child		Adult
	Age Range →	3rd Trimester	0<2	2 < 9	2 < 16	16 - 30
DPM Cancer Potency Factor (mg/kg-day)$^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day)*		361	1,090	631	572	261
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Exposure Duration (years)		0.25	2	14	14	14
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		0.85-1.0	0.85-1.0	0.72-1.0	0.72-1.0	0.73

* 95th percentile breathing rates for 3rd trimester and infants and 80th percentile for children and adults

Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of a hazard index (HI), which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is diesel particulate matter (DPM). For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ($\mu g/m^3$).

Annual $PM_{2.5}$ Concentrations

While not a TAC, fine particulate matter ($PM_{2.5}$) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under the California Environmental Quality Act (CEQA). The thresholds of significance for $PM_{2.5}$ (project level and cumulative) are in terms of an increase in the annual average concentration. When considering $PM_{2.5}$ impacts, the contribution from all sources of $PM_{2.5}$ emissions should be included. For projects with potential impacts from nearby local roadways, the $PM_{2.5}$ impacts should include those from vehicle exhaust emissions, $PM_{2.5}$ generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Attachment 3: Project Community Risk Assessment

Ghilotti - Santa Rosa, CA

DPM Emissions and Modeling Emission Rates - Unmitigated

Emissions Model Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2017	North Trucks	0.0009	DPM_N_T	1.8	0.00046	5.77E-05	6,989	8.26E-09
2017	North Equipment	0.0046	DPM_N_E	9.2	0.00229	2.89E-04	8,010	3.60E-08
2017	Crushing Equip	0.0430	DPM_C_E	86.0	0.02142	2.70E-03	9,752	2.77E-07
2017	Crushing Trucks	0.0008	DPM_C_T	1.7	0.00041	5.21E-05	24,889	2.09E-09
Total		***0.0494***		***99***	***0.0246***	***0.0031***		

Operation Hours

hr/day =	11	(6am - 5pm)
days/yr =	365	
hours/year =	4015	

PM2.5 Fugitive Dust Emissions for Modeling - Unmitigated

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	PM2.5 Emissions (lb/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2017	North Trucks	FUG_N_T	0.0085	17.1	0.00425	5.35E-04	6,989	7.66E-08
2017	Wind Erosion Area*	FUG_WND	0.1489	297.8	0.03400	4.28E-03	16,036	2.67E-07
2017	Crushing Area	FUG_C_E	0.0455	91.1	0.02268	2.86E-03	9,752	2.93E-07
2017	Crushing Trucks	FUG_C_T	0.0829	165.8	0.04129	5.20E-03	24,889	2.09E-07
Total			***0.2859***	***571.7***	***0.1022***	***0.0129***		

Note: * Wind erosion emissions assumed to occur during any hour of the day

Operation Hours

hr/day =	11	(6am - 5pm)
days/yr =	365	
hours/year =	4015	

Ghilotti - Santa Rosa, CA - Facility Health Impact Summary

Maximum Impacts at Off-Site Residences

Emissions Year	Maximum Concentrations: Exhaust PM10/DPM ($\mu g/m^3$)	Maximum Concentrations: Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million): Child	Cancer Risk (per million): Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
2017	0.0154	0.2276	**9.1**	**1.3**	**0.003**	**0.243**

Ghilotti - 304 Todd Road, Santa Rosa, CA - Construction Impacts
Maximum DPM Cancer Risk Calculations From Construction
Off-Site Residential Receptor Locations - 1.5 meters

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	0.85	0.85	0.72	0.72	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information				Adult - Exposure Information					
				DPM Conc (ug/m3)	Age	Infant/Child Cancer		Modeled DPM Conc (ug/m3)	Age	Adult Cancer		
Exposure Year	**Exposure Duration (years)**	**Age**	**Year**	**Annual**	**Sensitivity Factor**	**Risk (per million)**	**Year**	**Annual**	**Sensitivity Factor**	**Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	0.25	-0.25 - 0*	2017	0.0154	10	0.18	2017	0.0154	-	-		
1	1	0 - 1	2017	0.0154	10	2.15	2017	0.0154	1	0.04	0.2276	0.243
2	1	1 - 2	2018	0.0154	10	2.15	2018	0.0154	1	0.04		
3	1	2 - 3	2019	0.0154	3	0.29	2019	0.0154	1	0.04		
4	1	3 - 4		0.0154	3	0.29	2020	0.0154	1	0.04		
5	1	4 - 5		0.0154	3	0.29	2021	0.0154	1	0.04		
6	1	5 - 6		0.0154	3	0.29	2022	0.0154	1	0.04		
7	1	6 - 7		0.0154	3	0.29	2023	0.0154	1	0.04		
8	1	7 - 8		0.0154	3	0.29	2024	0.0154	1	0.04		
9	1	8 - 9		0.0154	3	0.29	2025	0.0154	1	0.04		
10	1	9 - 10		0.0154	3	0.29	2026	0.0154	1	0.04		
11	1	10 - 11		0.0154	3	0.29	2027	0.0154	1	0.04		
12	1	11 - 12		0.0154	3	0.29	2028	0.0154	1	0.04		
13	1	12 - 13		0.0154	3	0.29	2029	0.0154	1	0.04		
14	1	13 - 14		0.0154	3	0.29	2030	0.0154	1	0.04		
15	1	14 - 15		0.0154	3	0.29	2031	0.0154	1	0.04		
16	1	15 - 16		0.0154	3	0.29	2032	0.0154	1	0.04		
17	1	16-17		0.0154	1	0.04	2033	0.0154	1	0.04		
18	1	17-18		0.0154	1	0.04	2034	0.0154	1	0.04		
19	1	18-19		0.0154	1	0.04	2035	0.0154	1	0.04		
20	1	19-20		0.0154	1	0.04	2036	0.0154	1	0.04		
21	1	20-21		0.0154	1	0.04	2037	0.0154	1	0.04		
22	1	21-22		0.0154	1	0.04	2038	0.0154	1	0.04		
23	1	22-23		0.0154	1	0.04	2039	0.0154	1	0.04		
24	1	23-24		0.0154	1	0.04	2040	0.0154	1	0.04		
25	1	24-25		0.0154	1	0.04	2041	0.0154	1	0.04		
26	1	25-26		0.0154	1	0.04	2042	0.0154	1	0.04		
27	1	26-27		0.0154	1	0.04	2043	0.0154	1	0.04		
28	1	27-28		0.0154	1	0.04	2044	0.0154	1	0.04		
29	1	28-29		0.0154	1	0.04	2045	0.0154	1	0.04		
30	1	29-30		0.0154	1	0.04	2046	0.0154	1	0.04		
Total Increased Cancer Risk						**9.10**				**1.32**		

* Third trimester of pregnancy

304 Todd Road - Ghiolotti Yard (Yellow and Green Area)

Sonoma-San Francisco County, Annual

Onsite Emissions Only

1.0 Project Characteristics

1.1 Land Usage

Industrial Park	1.00	1000sqft	19.00	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	75
Climate Zone	4			**Operational Year**	2019
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - PG&E current rate

Land Use - No real structures on site

Construction Phase - Use construction to model annual operational emissions

Off-road Equipment - based on provided list

Off-road Equipment - Based on provided list

Trips and VMT - Assumes 15 roundtrips per day for 266 trips per year at 20 miles per trip. Assume 3 workers per average day (or 10 daily trips)

Grading - Assumes each acre is disturbed daily

Vehicle Trips - Using construciton to model operational since construction yard

Construction Off-road Equipment Mitigation - Used project equipment list that includes Tier level

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 3
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstEquipMitigation	Tier	No Change	Tier 2
tblConstructionPhase	NumDays	10.00	260.00
tblGrading	AcresOfGrading	6.50	33.15
tblLandUse	LotAcreage	0.02	19.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	430
tblProjectCharacteristics	OperationalYear	2018	2019
tblTripsAndVMT	HaulingTripLength	20.00	0.25
tblTripsAndVMT	HaulingTripNumber	0.00	7,980.00

tblTripsAndVMT	VendorTripLength	7.30	0.25
tblTripsAndVMT	WorkerTripLength	10.80	0.25
tblTripsAndVMT	WorkerTripNumber	25.00	10.00
tblVehicleTrips	ST_TR	2.49	0.01
tblVehicleTrips	SU_TR	0.73	0.01
tblVehicleTrips	WD_TR	6.83	0.01

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

2017	0.0314	0.5877	0.2095	5.3000e-004	0.0187	0.0118	0.0305	2.2200e-003	0.0110	0.0132	0.0000	50.1993	50.1993	0.0128	0.0000	50.5183
Maximum	**0.0314**	**0.5877**	**0.2095**	**5.3000e-004**	**0.0187**	**0.0118**	**0.0305**	**2.2200e-003**	**0.0110**	**0.0132**	**0.0000**	**50.1993**	**50.1993**	**0.0128**	**0.0000**	**50.5183**

Mitigated Construction

Maximum	**0.0197**	**0.5216**	**0.2191**	**5.3000e-004**	**0.0187**	**5.5300e-003**	**0.0243**	**2.2200e-003**	**5.4100e-003**	**7.6300e-003**	**0.0000**	**50.1993**	**50.1993**	**0.0128**	**0.0000**	**50.5183**

Percent Reduction	**37.07**	**11.25**	**-4.58**	**0.00**	**0.00**	**53.10**	**20.54**	**0.00**	**50.82**	**42.28**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

1	**1-1-2017**	**3-31-2017**	0.1511	0.1319
2	**4-1-2017**	**6-30-2017**	0.1562	0.1367
3	**7-1-2017**	**9-30-2017**	0.1579	0.1382
		Highest	0.1579	0.1382

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2017	12/29/2017	5	260	

Acres of Grading (Site Preparation Phase): 33.15

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Air Compressors	4	0.10	78	0.48
Site Preparation	Crawler Tractors	2	0.20	212	0.43
Site Preparation	Excavators	2	0.20	158	0.38
Site Preparation	Forklifts	1	2.00	89	0.20
Site Preparation	Other Construction Equipment	0	0.50	172	0.42
Site Preparation	Other General Industrial Equipment	0	0.50	88	0.34
Site Preparation	Other Material Handling Equipment	1	0.20	168	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37

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
Site Preparation	10	10.00	0.00	7,980.00	0.25	0.25	0.25	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Site Preparation - 2017

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					0.0176	0.0000	0.0176	1.9000e-003	0.0000	1.9000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0182	0.1812	0.1096	1.8000e-004		0.0109	0.0109		0.0101	0.0101	0.0000	16.4131	16.4131	4.5800e-003	0.0000	16.5278
Total	**0.0182**	**0.1812**	**0.1096**	**1.8000e-004**	**0.0176**	**0.0109**	**0.0285**	**1.9000e-003**	**0.0101**	**0.0120**	**0.0000**	**16.4131**	**16.4131**	**4.5800e-003**	**0.0000**	**16.5278**

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	0.0108	0.4054	0.0858	3.4000e-004	9.1000e-004	9.1000e-004	1.8200e-003	2.6000e-004	8.7000e-004	1.1300e-003	0.0000	33.2627	33.2627	8.1000e-003	0.0000	33.4651
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	0.0000	0.0000	0.0000	0.0000
Worker	2.3900e-003	1.0300e-003	0.0142	1.0000e-005	2.5000e-004	1.0000e-005	2.6000e-004	7.0000e-005	1.0000e-005	8.0000e-005	0.0000	0.5235	0.5235	8.0000e-005	0.0000	0.5254
Total	**0.0132**	**0.4065**	**0.0999**	**3.5000e-004**	**1.1600e-003**	**9.2000e-004**	**2.0800e-003**	**3.3000e-004**	**8.8000e-004**	**1.2100e-003**	**0.0000**	**33.7862**	**33.7862**	**8.1800e-003**	**0.0000**	**33.9905**

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					0.0176	0.0000	0.0176	1.9000e-003	0.0000	1.9000e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.5400e-003	0.1152	0.1192	1.8000e-004		4.6000e-003	4.6000e-003		4.5300e-003	4.5300e-003	0.0000	16.4131	16.4131	4.5800e-003	0.0000	16.5277
Total	**6.5400e-003**	**0.1152**	**0.1192**	**1.8000e-004**	**0.0176**	**4.6000e-003**	**0.0222**	**1.9000e-003**	**4.5300e-003**	**6.4300e-003**	**0.0000**	**16.4131**	**16.4131**	**4.5800e-003**	**0.0000**	**16.5277**

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	0.0108	0.4054	0.0858	3.4000e-004	9.1000e-004	9.1000e-004	1.8200e-003	2.6000e-004	8.7000e-004	1.1300e-003	0.0000	33.2627	33.2627	8.1000e-003	0.0000	33.4651
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	0.0000	0.0000	0.0000	0.0000
Worker	2.3900e-003	1.0300e-003	0.0142	1.0000e-005	2.5000e-004	1.0000e-005	2.6000e-004	7.0000e-005	1.0000e-005	8.0000e-005	0.0000	0.5235	0.5235	8.0000e-005	0.0000	0.5254
Total	**0.0132**	**0.4065**	**0.0999**	**3.5000e-004**	**1.1600e-003**	**9.2000e-004**	**2.0800e-003**	**3.3000e-004**	**8.8000e-004**	**1.2100e-003**	**0.0000**	**33.7862**	**33.7862**	**8.1800e-003**	**0.0000**	**33.9905**

Attachment 4: Cumulative Source Community Risk Assessment

Bay Area Air Quality Management District
Risk & Hazard Stationary Source Inquiry Form

This form is required when users request stationary source data from BAAQMD. This form is to be used with the BAAQMD's Google Earth stationary source screening tables.
For guidance on conducting a risk & hazard screening, including for roadways & freeways, refer to the District's Risk & Hazard Analysis flow chart. Also see the District's Recommen

Table A: Requestor Contact Information	
Contact Name:	James Reyff
Affiliation:	Illingworth & Rodkin, Inc.
Phone:	707-794-0400x24
Email:	jreyff@illingworthrodkin.com
Date of Request	
Project Name:	Todd Rd
Address:	304 Todd
City:	Santa Rosa
County:	Sonoma
Type (residential, commercial, mixed use, industrial, etc.):	Industrial
Project size (# of units, or building square feet):	Industrial yard and crushing
Comments:	Nearby industrial sources

For Air District assistance, the following steps must be completed:

1. Complete all the contact and project information requested in Table A. Incomplete forms will not be processed. Please include a project s
2. Download and install the free program Google Earth, http://www.google.com/earth/download/ge/, and then download the county speci Earth stationary source application files from the District's website, http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx. The small points on the map represent stationary sources permitted by the District (Map A on p permitted sources include diesel back-up generators, gas stations, dry cleaners, boilers, printers, auto spray booths, etc. Click on a point t source's information Table, including the name, location, and preliminary estimated cancer risk, hazard index, and PM2.5 concentration.
3. Find the project site in Google Earth by inputting the site's address in the Google Earth search box.
4. Identify stationary sources near the project. Verify that the location of the source on the map matches with the source's address in the In Table, by using the Google Earth address search box to confirm the source's address location. Please report any mapping errors to the Dis
5. List the stationary source information in Table B Section 1 below.
6. Note that a small percentage of the stationary sources have Health Risk Screening Assessment (HRSA) data INSTEAD of screening level da sources will be noted by an asterisk next to the Plant Name (Map B on right). If HRSA values are presented, these values have already bee and cannot be adjusted further.
7. Email this completed form to District staff. District staff will provide the most recent risk, hazard, and PM2.5 data that are available for th If this information or data are not available, source emissions data will be provided. Staff will respond to inquiries within three weeks.

Note that a public records request received for the same stationary source information will cancel the processing of your SSIF request.

Submit forms, maps, and questions to Alison Kirk at 415-749-5169, or akirk@baaqmd.gov .

Table B: Stationary Sources

Table B Section 1: Requestor fills out these columns based on Google Earth data | **Table B Section 2: BAAQMD returns form with additional information in these columns as needed**

Distance from Receptor (feet)	Plant # or Gas Dispensary #	Facility Name	Street Address	Screening Level Cancer Risk (1)	Screening Level Hazard Index (1)	Screening Level PM2.5 (1)	Permit #s (2)	Source #s (2)	Fuel Code (3)	Type of Source(s) (4)						
930	G8860	Ghilotti Construction Co	246 Ghilotti Avenue	na	na	na										
200	G9435	Royal Petroleum Company	365 Todd Road	na	na	na										
900	2157	Syar Industries	261 Ghilotti Ave	0.07	0	197	7279		natural gas	asphalt drum mixer		Used emissions information for Plant 2157 provided				

Footnotes:
1. These Cancer Risk, Hazard Index, and PM2.5 columns represent the values in the Google Earth Plant Information Table.
2. Each plant may have multiple permits and sources.
3. Fuel codes: 98 = diesel, 189 = Natural Gas.
4. Permitted sources include diesel back-up generators, gas stations, dry cleaners, boilers, printers, auto spray booths, etc.

Date last updated: 5/30/12

Bay Area Air Quality Management District

Roadway Screening Analysis Calculator

County specific tables containing estimates of risk and hazard impacts from roadways in the Bay Area.

INSTRUCTIONS:

Input the site-specific characteristics of your project by using the drop down menu in the "Search Parameter" box. We recommend that this analysis be used for roadways with 10,000 AADT and above.

• County: Select the County where the project is located. The calculator is only applicable for projects within the nine Bay Area counties.

• Roadway Direction: Select the orientation that best matches the roadway. If the roadway orientation is neither clearly north-south nor east-west, use the highest values predicted from either orientation.

• Side of the Roadway: Identify on which side of the roadway the project is located.

• Distance from Roadway: Enter the distance in feet from the nearest edge of the roadway to the project site. The calculator estimates values for distances greater than 10 feet and less than 1000 feet. For distances greater than 1000 feet, the user can choose to extrapolate values using a distribution curve or apply 1000 feet values for greater distances.

• Annual Average Daily Traffic (ADT): Enter the annual average daily traffic on the roadway. These data may be collected from the city or the county (if the area is unincorporated).

When the user has completed the data entries, the screening level PM2.5 annual average concentration and the cancer risk results will appear in the Results Box on the right. Please note that the roadway tool is not applicable for California State Highways and the District refers the user to the Highway Screening Analysis Tool at: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

Notes and References listed below the Search Boxes

Search Parameters

County	Sonoma
Roadway Direction	East-West
Side of the Roadway	South
Distance from Roadway	390 feet
Annual Average Daily Traffic (ADT)	10,000

Results

Sonoma County

EAST-WEST DIRECTIONAL ROADWAY

PM2.5 annual average

0.020 ($\mu g/m^3$)

Cancer Risk

0.83 (per million)

Todd Road

Data for Sonoma County based on meteorological data collected from Santa Rosa in 2005

Adjusted for 2015 OEHHA and EMFAC2014 for 2018

0.57
(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

Notes and References:
1. Emissions were developed using EMFAC2011 for fleet mix in 2014 assuming 10,000 AADT and includes impacts from diesel and gasoline vehicle exhaust, brake and tire wear, and resuspended dust.
2. Roadways were modeled using ~~CALINE4~~-Cal3qhcr air dispersion model assuming a source length of one kilometer. Meteorological data used to estimate the screening values are noted at the bottom of the "Results" box.
3. Cancer risks were estimated for 70 year lifetime exposure starting in 2014 that includes sensitivity values for early life exposures and OEHHA toxicity values adopted in 2013.

Syar Industries Emission data obtained from BAAQMD

BAY AREA AIR QUALITY MANAGEMENT DISTRICT Printed: NOV 3, 2016
DETAIL POLLUTANTS - ABATED
MOST RECENT P/O APPROVED (2016)

Syar Industries Inc (P# 2157)

S#	SOURCE NAME / MATERIAL	SOURCE CODE	THROUGHPUT	DATE	POLLUTANT	CODE	LBS/DAY
1	DRYER FOR ASPHALTIC CONCRETE PLANT						
		C3300098					
			0				0.00E+00
		C3300189					
					Benzene	41	3.56E-04
					Formaldehyde	124	4.19E-03
					Toluene	293	1.90E-04
					Organics (other, including	990	3.20E-01
					Particulates (part not spe	1990	9.05E-05
					Nitrous Oxide (N2O)	2030	1.29E-02
					Nitrogen Oxides (part not	2990	7.82E+00
					Sulfur Dioxide (SO2)	3990	3.17E-02
					Carbon Monoxide (CO) pollu	4990	1.96E+00
					Carbon Dioxide, non-biogen	6960	6.84E+03
					Methane (CH4)	6970	1.06E-01
		G4006031					
					Particulates (part not spe	1990	1.04E+00
3	DIESEL TANK						
		T431?315					
					Distillate oil	315	1.55E-02
7	ASPHALT TANK #4						
		T431?030					
					Asphalt	30	0.00E+00
8	ASPHALT TANK #5						
		T431?030					
					Asphalt	30	0.00E+00
10	200 TON ASPHATIC CONCRETE STORAGE BIN						
		G4067031					
					Particulates (part not spe	1990	3.43E-02
11	Conveyors						
		G4030262					
					Particulates (part not spe	1990	2.58E+01
20	Aggregate Stockpiles						
		G4076244					
					Particulates (part not spe	1990	6.41E+00
21	Feed Bins & Conveyors						
		G4079244					
					Particulates (part not spe	1990	7.25E+01

22 Asphalt Drum Mixer

C2830189

Benzene	41	6.07E-04
Formaldehyde	124	7.13E-03
Toluene	293	3.23E-04
Organics (other, including	990	5.44E-01
Particulates (part not spe	1990	2.85E-03
Nitrous Oxide (N2O)	2030	2.20E-02
Nitrogen Oxides (part not	2990	3.81E-01
Sulfur Dioxide (SO2)	3990	5.41E-02
Carbon Monoxide (CO) pollu	4990	5.71E+00
Carbon Dioxide, non-biogen	6960	1.17E+04
Methane (CH4)	6970	1.81E-01

G4077030

Organics (other, including	990	9.29E+00
Particulates (part not spe	1990	2.95E+00
Nitrogen Oxides (part not	2990	9.29E+00
Sulfur Dioxide (SO2)	3990	9.62E+00
Carbon Monoxide (CO) pollu	4990	8.96E+00

23 Asphalt Storage Tank Model C-TA-30E/DC, 30,000 Gal

T43??030

Asphalt	30	0.00E+00

24 Asphalt Storage Tank, 30,000 Gallon, with Natural Gas Heater

T43??030

Asphalt	30	0.00E+00

PLANT TOTAL:

lbs/day	Pollutant
0.00E+00	Asphalt (30)
9.63E-04	Benzene (41)
1.85E+04	Carbon Dioxide, non-biogenic CO2 (6960)
1.66E+01	Carbon Monoxide (CO) pollutant (4990)
1.55E-02	Distillate oil (315)
1.13E-02	Formaldehyde (124)
2.87E-01	Methane (CH4) (6970)
1.75E+01	Nitrogen Oxides (part not spec elsewhere) (2990)
3.49E-02	Nitrous Oxide (N2O) (2030)
1.02E+01	Organics (other, including CH4) (990)
1.09E+02	Particulates (part not spec elsewhere) (1990)
9.71E+00	Sulfur Dioxide (SO2) (3990)
5.13E-04	Toluene (293)

Ghilotti Cumulative Sources

Sonoma-San Francisco County, Annual

Syar Off Road and Trucks

1.0 Project Characteristics

1.1 Land Usage

Industrial Park	1.00	1000sqft	10.00	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	75
Climate Zone	4			**Operational Year**	2018
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - current PG&E factor

Land Use - Use Industrial Park - emissions computed based on construction

Construction Phase - Using construciton to compute equipment and truck traffic

Off-road Equipment -

Off-road Equipment - Based on estimated equipment

Trips and VMT - Estimated average daily condition of 200 truck trips/day

tblConstructionPhase	NumDays	10.00	260.00
tblGrading	AcresOfGrading	130.00	0.00
tblLandUse	LotAcreage	0.02	10.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	430
tblTripsAndVMT	HaulingTripLength	20.00	0.50
tblTripsAndVMT	HaulingTripNumber	0.00	53,200.00
tblTripsAndVMT	VendorTripLength	7.30	0.50
tblTripsAndVMT	WorkerTripLength	10.80	0.50
tblTripsAndVMT	WorkerTripNumber	15.00	20.00

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					
2017	**0.8564**	**11.4621**	**3.8258**	**8.6800e-003**	**3.1440**	**0.4183**	**3.5623**	**1.7248**	**0.3851**	**2.1099**	**0.0000**	**816.5463**	**816.5463**	**0.2297**	**0.0000**	**822.2875**
Maximum	**0.8564**	**11.4621**	**3.8258**	**8.6800e-003**	**3.1440**	**0.4183**	**3.5623**	**1.7248**	**0.3851**	**2.1099**	**0.0000**	**816.5463**	**816.5463**	**0.2297**	**0.0000**	**822.2875**

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					
2017	0.8564	11.4621	3.8257	8.6800e-003	3.1440	0.4183	3.5623	1.7248	0.3851	2.1099	0.0000	816.5456	816.5456	0.2297	0.0000	822.2868
Maximum	**0.8564**	**11.4621**	**3.8257**	**8.6800e-003**	**3.1440**	**0.4183**	**3.5623**	**1.7248**	**0.3851**	**2.1099**	**0.0000**	**816.5456**	**816.5456**	**0.2297**	**0.0000**	**822.2868**

	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	**11-29-2016**	**2-27-2017**	1.9548	1.9548
2	**2-28-2017**	**5-28-2017**	3.0465	3.0465
3	**5-29-2017**	**8-28-2017**	3.1217	3.1217
4	**8-29-2017**	**9-30-2017**	1.1197	1.1197
		Highest	3.1217	3.1217

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2017	12/29/2017	5	260	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	1	8.00	212	0.43
Site Preparation	Excavators	1	8.00	158	0.38
Site Preparation	Rubber Tired Dozers	4	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37

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
Site Preparation	6	20.00	0.00	53,200.00	0.50	0.50	0.50	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2017

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					3.1315	0.0000	3.1315	1.7213	0.0000	1.7213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.7759	8.6638	3.2037	6.1300e-003		0.4113	0.4113		0.3784	0.3784	0.0000	569.3117	569.3117	0.1744	0.0000	573.6726
Total	**0.7759**	**8.6638**	**3.2037**	**6.1300e-003**	**3.1315**	**0.4113**	**3.5427**	**1.7213**	**0.3784**	**2.0997**	**0.0000**	**569.3117**	**569.3117**	**0.1744**	**0.0000**	**573.6726**

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	0.0754	2.7960	0.5913	2.5300e-003	0.0116	7.0100e-003	0.0186	3.2200e-003	6.7000e-003	9.9200e-003	0.0000	245.7261	245.7261	0.0550	0.0000	247.1021
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	0.0000	0.0000	0.0000	0.0000
Worker	5.0500e-003	2.3200e-003	0.0307	2.0000e-005	9.7000e-004	3.0000e-005	1.0000e-003	2.6000e-004	3.0000e-005	2.9000e-004	0.0000	1.5085	1.5085	1.7000e-004	0.0000	1.5129
Total	**0.0804**	**2.7983**	**0.6221**	**2.5500e-003**	**0.0125**	**7.0400e-003**	**0.0196**	**3.4800e-003**	**6.7300e-003**	**0.0102**	**0.0000**	**247.2346**	**247.2346**	**0.0552**	**0.0000**	**248.6149**

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					3.1315	0.0000	3.1315	1.7213	0.0000	1.7213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.7759	8.6638	3.2037	6.1300e-003		0.4113	0.4113		0.3784	0.3784	0.0000	569.3110	569.3110	0.1744	0.0000	573.6719
Total	**0.7759**	**8.6638**	**3.2037**	**6.1300e-003**	**3.1315**	**0.4113**	**3.5427**	**1.7213**	**0.3784**	**2.0997**	**0.0000**	**569.3110**	**569.3110**	**0.1744**	**0.0000**	**573.6719**

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	0.0754	2.7960	0.5913	2.5300e-003	0.0116	7.0100e-003	0.0186	3.2200e-003	6.7000e-003	9.9200e-003	0.0000	245.7261	245.7261	0.0550	0.0000	247.1021
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	0.0000	0.0000	0.0000	0.0000
Worker	5.0500e-003	2.3200e-003	0.0307	2.0000e-005	9.7000e-004	3.0000e-005	1.0000e-003	2.6000e-004	3.0000e-005	2.9000e-004	0.0000	1.5085	1.5085	1.7000e-004	0.0000	1.5129
Total	**0.0804**	**2.7983**	**0.6221**	**2.5500e-003**	**0.0125**	**7.0400e-003**	**0.0196**	**3.4800e-003**	**6.7300e-003**	**0.0102**	**0.0000**	**247.2346**	**247.2346**	**0.0552**	**0.0000**	**248.6149**

Ghilotti Cumulative Sources

Sonoma-San Francisco County, Annual

Ghilotti Yard adjacent to site

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Industrial Park	1.00	1000sqft	10.00	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	75
Climate Zone	4			**Operational Year**	2018
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	430	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - current PG&E factor

Land Use - Use Industrial Park - emissions computed based on construction

Construction Phase - Using construciton to compute equipment and truck traffic

Off-road Equipment -

Off-road Equipment - Based on estimated equipment

Trips and VMT - Estimated average daily condition

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	260.00
tblConstructionPhase	PhaseEndDate	11/28/2016	12/29/2017
tblConstructionPhase	PhaseStartDate	11/29/2016	1/1/2017
tblLandUse	LotAcreage	0.02	10.00
tblOffRoadEquipment	LoadFactor	0.20	0.20
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Forklifts
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	430
tblTripsAndVMT	HaulingTripLength	20.00	0.25
tblTripsAndVMT	HaulingTripNumber	0.00	26,600.00
tblTripsAndVMT	VendorTripLength	7.30	0.25
tblTripsAndVMT	WorkerTripLength	10.80	0.25
tblTripsAndVMT	WorkerTripNumber	3.00	20.00

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					
2017	**0.0684**	**1.5921**	**0.4774**	**1.3500e-003**	**3.5200e-003**	**0.0228**	**0.0263**	**9.9000e-004**	**0.0210**	**0.0220**	**0.0000**	**130.4424**	**130.4424**	**0.0328**	**0.0000**	**131.2629**
Maximum	**0.0684**	**1.5921**	**0.4774**	**1.3500e-003**	**3.5200e-003**	**0.0228**	**0.0263**	**9.9000e-004**	**0.0210**	**0.0220**	**0.0000**	**130.4424**	**130.4424**	**0.0328**	**0.0000**	**131.2629**

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					
2017	0.0684	1.5921	0.4774	1.3500e-003	3.5200e-003	0.0228	0.0263	9.9000e-004	0.0210	0.0220	0.0000	130.4424	130.4424	0.0328	0.0000	131.2629
Maximum	**0.0684**	**1.5921**	**0.4774**	**1.3500e-003**	**3.5200e-003**	**0.0228**	**0.0263**	**9.9000e-004**	**0.0210**	**0.0220**	**0.0000**	**130.4424**	**130.4424**	**0.0328**	**0.0000**	**131.2629**

	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	**11-29-2016**	**2-27-2017**	0.2604	0.2604
2	**2-28-2017**	**5-28-2017**	0.4112	0.4112
3	**5-29-2017**	**8-28-2017**	0.4243	0.4243
4	**8-29-2017**	**9-30-2017**	0.1522	0.1522
		Highest	0.4243	0.4243

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/1/2017	12/29/2017	5	260	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	0	8.00	212	0.43
Site Preparation	Excavators	0	8.00	158	0.38
Site Preparation	Forklifts	1	8.00	89	0.20
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40

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
Site Preparation	1	20.00	0.00	26,600.00	0.25	0.25	0.25	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2017

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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0276	0.2386	0.1632	2.0000e-004		0.0197	0.0197		0.0181	0.0181	0.0000	18.5199	18.5199	5.6700e-003	0.0000	18.6618
Total	**0.0276**	**0.2386**	**0.1632**	**2.0000e-004**	**0.0000**	**0.0197**	**0.0197**	**0.0000**	**0.0181**	**0.0181**	**0.0000**	**18.5199**	**18.5199**	**5.6700e-003**	**0.0000**	**18.6618**

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	0.0361	1.3514	0.2858	1.1400e-003	3.0200e-003	3.0400e-003	6.0700e-003	8.5000e-004	2.9100e-003	3.7600e-003	0.0000	110.8755	110.8755	0.0270	0.0000	111.5503
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	0.0000	0.0000	0.0000	0.0000
Worker	4.7700e-003	2.0500e-003	0.0283	1.0000e-005	5.0000e-004	3.0000e-005	5.2000e-004	1.4000e-004	2.0000e-005	1.6000e-004	0.0000	1.0470	1.0470	1.5000e-004	0.0000	1.0509
Total	**0.0408**	**1.3535**	**0.3142**	**1.1500e-003**	**3.5200e-003**	**3.0700e-003**	**6.5900e-003**	**9.9000e-004**	**2.9300e-003**	**3.9200e-003**	**0.0000**	**111.9225**	**111.9225**	**0.0271**	**0.0000**	**112.6012**

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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0276	0.2386	0.1632	2.0000e-004		0.0197	0.0197		0.0181	0.0181	0.0000	18.5199	18.5199	5.6700e-003	0.0000	18.6617
Total	**0.0276**	**0.2386**	**0.1632**	**2.0000e-004**	**0.0000**	**0.0197**	**0.0197**	**0.0000**	**0.0181**	**0.0181**	**0.0000**	**18.5199**	**18.5199**	**5.6700e-003**	**0.0000**	**18.6617**

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	0.0361	1.3514	0.2858	1.1400e-003	3.0200e-003	3.0400e-003	6.0700e-003	8.5000e-004	2.9100e-003	3.7600e-003	0.0000	110.8755	110.8755	0.0270	0.0000	111.5503

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	0.0000	0.0000	0.0000	0.0000
Worker	4.7700e-003	2.0500e-003	0.0283	1.0000e-005	5.0000e-004	3.0000e-005	5.2000e-004	1.4000e-004	2.0000e-005	1.6000e-004	0.0000	1.0470	1.0470	1.5000e-004	0.0000	1.0509
Total	**0.0408**	**1.3535**	**0.3142**	**1.1500e-003**	**3.5200e-003**	**3.0700e-003**	**6.5900e-003**	**9.9000e-004**	**2.9300e-003**	**3.9200e-003**	**0.0000**	**111.9225**	**111.9225**	**0.0271**	**0.0000**	**112.6012**

Air Quality Modeling Calculations

Model Days/year =	365	
hours/day =	11	6am - 5pm
hours/year =	4015	
PM2.5/PM10 Ratio =	0.15	

Emissions in Model	Volume Source PM2.5 Emissions			Area Source PM2.5 Emissions					
Area No.	(lb/day)	(lb/yr)	(lb/hr)	(lb/day)	(lb/yr)	(lb/hr)	(g/s)	(m^2)	($g/s/m^2$)
1	1.61E-01	5.88E+01	1.47E-02						
2	5.66E+00	2.07E+03	5.14E-01						
3	5.66E+00	2.07E+03	5.14E-01						
4				4.83E+00	1.76E+03	4.39E-01	5.53E-02	22,638	2.44E-06

Syar Asphalt - Santa Rosa, CA

DPM Emissions and Modeling Emission Rates

Emissions Model Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2017	Syar Equipment	0.4183	DPM_SYAR	836.6	0.20837	2.63E-02	22,638	1.16E-06
Total		***0.4183***		***836.6***	***0.2084***	***0.0263***		

Operation Hours

hr/day =	11	(6am - 5pm)
days/yr =	365	
hours/year =	4015	

Syar - Santa Rosa, CA - Facility Health Impact Summary

Maximum Impacts at Ghilotti Facility MEI Location

Emissions Year	Maximum Concentrations: Exhaust PM10/DPM ($\mu g/m^3$)	Maximum Concentrations: Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million): Child	Cancer Risk (per million): Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
2017	0.0554	0.4842	**32.8**	**4.8**	**0.011**	**0.54**

Syar - Santa Rosa, CA - On-Site Equipment & Truck Operation Impacts
Maximum DPM Cancer Risk Calculations From Construction
Impacts at Ghilotti Facility MEI Location

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air $(\mu g/m^3)$
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	0.85	0.85	0.72	0.72	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information			Infant/Child	Adult - Exposure Information			Adult		
				DPM Conc (ug/m3)	Age	Cancer	Modeled		Age	Cancer		
Exposure Year	**Exposure Duration (years)**	**Age**	**Year**	**Annual**	**Sensitivity Factor**	**Risk (per million)**	**Year**	**DPM Conc (ug/m3) Annual**	**Sensitivity Factor**	**Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	0.25	-0.25 - 0*	2017	0.0554	10	0.64	2017	0.0554	-	-		
1	1	0 - 1	2017	0.0554	10	7.73	2017	0.0554	1	0.16	0.4842	0.540
2	1	1 - 2	2018	0.0554	10	7.73	2018	0.0554	1	0.16		
3	1	2 - 3	2019	0.0554	3	1.03	2019	0.0554	1	0.16		
4	1	3 - 4		0.0554	3	1.03	2020	0.0554	1	0.16		
5	1	4 - 5		0.0554	3	1.03	2021	0.0554	1	0.16		
6	1	5 - 6		0.0554	3	1.03	2022	0.0554	1	0.16		
7	1	6 - 7		0.0554	3	1.03	2023	0.0554	1	0.16		
8	1	7 - 8		0.0554	3	1.03	2024	0.0554	1	0.16		
9	1	8 - 9		0.0554	3	1.03	2025	0.0554	1	0.16		
10	1	9 - 10		0.0554	3	1.03	2026	0.0554	1	0.16		
11	1	10 - 11		0.0554	3	1.03	2027	0.0554	1	0.16		
12	1	11 - 12		0.0554	3	1.03	2028	0.0554	1	0.16		
13	1	12 - 13		0.0554	3	1.03	2029	0.0554	1	0.16		
14	1	13 - 14		0.0554	3	1.03	2030	0.0554	1	0.16		
15	1	14 - 15		0.0554	3	1.03	2031	0.0554	1	0.16		
16	1	15 - 16		0.0554	3	1.03	2032	0.0554	1	0.16		
17	1	16-17		0.0554	1	0.16	2033	0.0554	1	0.16		
18	1	17-18		0.0554	1	0.16	2034	0.0554	1	0.16		
19	1	18-19		0.0554	1	0.16	2035	0.0554	1	0.16		
20	1	19-20		0.0554	1	0.16	2036	0.0554	1	0.16		
21	1	20-21		0.0554	1	0.16	2037	0.0554	1	0.16		
22	1	21-22		0.0554	1	0.16	2038	0.0554	1	0.16		
23	1	22-23		0.0554	1	0.16	2039	0.0554	1	0.16		
24	1	23-24		0.0554	1	0.16	2040	0.0554	1	0.16		
25	1	24-25		0.0554	1	0.16	2041	0.0554	1	0.16		
26	1	25-26		0.0554	1	0.16	2042	0.0554	1	0.16		
27	1	26-27		0.0554	1	0.16	2043	0.0554	1	0.16		
28	1	27-28		0.0554	1	0.16	2044	0.0554	1	0.16		
29	1	28-29		0.0554	1	0.16	2045	0.0554	1	0.16		
30	1	29-30		0.0554	1	0.16	2046	0.0554	1	0.16		
Total Increased Cancer Risk						**32.75**				**4.77**		

* Third trimester of pregnancy

Ghilotti Yard - Santa Rosa, CA

DPM Emissions and Modeling Emission Rates

Emissions Model Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2017	Equipment & Trucks	0.0228	DPM_SYAR	45.6	0.01136	1.43E-03	9,942	1.44E-07
Total		***0.0228***		***45.6***	***0.0114***	***0.0014***		

Operation Hours

hr/day =	11	(6am - 5pm)
days/yr =	365	
hours/year =	4015	

Ghilotti Yard - Santa Rosa, CA - Health Impact Summary

Maximum Impacts at Ghilotti Facility MEI Location

Emissions Year	Maximum Concentrations: Exhaust PM10/DPM ($\mu g/m^3$)	Maximum Concentrations: Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million): Child	Cancer Risk (per million): Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
2017	0.0009	0.0000	**0.5**	**0.1**	**0.000**	**0.00**

Ghilotti Yard - Santa Rosa, CA - On-Site Equipment & Truck Operation Impacts
Maximum DPM Cancer Risk Calculations From Construction
Impacts at Ghilotti Facility MEI Location

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	0.85	0.85	0.72	0.72	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information			Infant/Child	Adult - Exposure Information			Adult		
				DPM Conc (ug/m3)	Age	Cancer	Modeled		Age	Cancer		
Exposure Year	**Exposure Duration (years)**	**Age**	**Year**	**Annual**	**Sensitivity Factor**	**Risk (per million)**	**DPM Conc (ug/m3) Year**	**Annual**	**Sensitivity Factor**	**Risk (per million)**	**Fugitive PM2.5**	**Total PM2.5**
0	0.25	-0.25 - 0*	2017	0.0009	10	0.01	2017	0.0009	-	-		
1	1	0 - 1	2017	0.0009	10	0.12	2017	0.0009	1	0.00	0.0000	0.001
2	1	1 - 2	2018	0.0009	10	0.12	2018	0.0009	1	0.00		
3	1	2 - 3	2019	0.0009	3	0.02	2019	0.0009	1	0.00		
4	1	3 - 4		0.0009	3	0.02	2020	0.0009	1	0.00		
5	1	4 - 5		0.0009	3	0.02	2021	0.0009	1	0.00		
6	1	5 - 6		0.0009	3	0.02	2022	0.0009	1	0.00		
7	1	6 - 7		0.0009	3	0.02	2023	0.0009	1	0.00		
8	1	7 - 8		0.0009	3	0.02	2024	0.0009	1	0.00		
9	1	8 - 9		0.0009	3	0.02	2025	0.0009	1	0.00		
10	1	9 - 10		0.0009	3	0.02	2026	0.0009	1	0.00		
11	1	10 - 11		0.0009	3	0.02	2027	0.0009	1	0.00		
12	1	11 - 12		0.0009	3	0.02	2028	0.0009	1	0.00		
13	1	12 - 13		0.0009	3	0.02	2029	0.0009	1	0.00		
14	1	13 - 14		0.0009	3	0.02	2030	0.0009	1	0.00		
15	1	14 - 15		0.0009	3	0.02	2031	0.0009	1	0.00		
16	1	15 - 16		0.0009	3	0.02	2032	0.0009	1	0.00		
17	1	16-17		0.0009	1	0.00	2033	0.0009	1	0.00		
18	1	17-18		0.0009	1	0.00	2034	0.0009	1	0.00		
19	1	18-19		0.0009	1	0.00	2035	0.0009	1	0.00		
20	1	19-20		0.0009	1	0.00	2036	0.0009	1	0.00		
21	1	20-21		0.0009	1	0.00	2037	0.0009	1	0.00		
22	1	21-22		0.0009	1	0.00	2038	0.0009	1	0.00		
23	1	22-23		0.0009	1	0.00	2039	0.0009	1	0.00		
24	1	23-24		0.0009	1	0.00	2040	0.0009	1	0.00		
25	1	24-25		0.0009	1	0.00	2041	0.0009	1	0.00		
26	1	25-26		0.0009	1	0.00	2042	0.0009	1	0.00		
27	1	26-27		0.0009	1	0.00	2043	0.0009	1	0.00		
28	1	27-28		0.0009	1	0.00	2044	0.0009	1	0.00		
29	1	28-29		0.0009	1	0.00	2045	0.0009	1	0.00		
30	1	29-30		0.0009	1	0.00	2046	0.0009	1	0.00		
Total Increased Cancer Risk						**0.52**				**0.08**		

* Third trimester of pregnancy

Final Traffic Impact Study for the Ghilotti Construction Yard

Prepared for the County of Sonoma

Submitted by
W-Trans

March 7, 2018

TRAFFIC ENGINEERING
TRANSPORTATION PLANNING
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Table of Contents

G. Speed Survey Data

Executive Summary

The proposed project would update the Ghilotti Construction Use Permit to reflect existing non-compliant uses. It is understood the property is zoned M3 (Limited Rural Industrial), and is currently being used to temporarily store contractor's equipment, stockpile rock rip-rap material, and process broken asphalt and concrete for recycling and reuse. The project is expected to generate a maximum of 50 new truck trips per day including a maximum of 30 trips during either the a.m. or p.m. peak hour.

The study area includes the intersections of Todd Road with Standish Avenue-Ghilotti Avenue, Moorland Avenue, US 101 North and South ramps, and Santa Rosa Avenue. Analysis indicates that the study intersections are operating acceptably under Existing Conditions except for Todd Road/Standish Avenue-Ghilotti Avenue, which operates unacceptably at LOS E during the p.m. peak hour. Existing p.m. peak hour volumes meet warrants for a traffic signal.

Upon the addition of project-generated traffic to Existing volumes, the study intersections are expected to continue operating acceptably during the a.m. peak hour, but Todd Road/Standish Avenue-Ghilotti Avenue is expected to deteriorate to LOS F during the p.m. peak hour with an increase in average delay that exceeds the five seconds allowed under County Standards.

Under Baseline Conditions, all study intersections would operate acceptably with or without project-related trips except for Todd Road/Standish Avenue-Ghilotti Avenue, which would be expected to deteriorate to LOS F with an increase in delay that exceeds five seconds upon the addition of project-related traffic. Under the anticipated Future volumes, the intersections of Todd Road with the US 101 North and South ramps and Todd Road/Moorland Avenue are expected to continue operating acceptably overall during both peak hours; Todd Road/Standish Avenue-Ghilotti Avenue and Todd Road/Santa Rosa Avenue are expected to operate unacceptably at LOS F during both peak hours. The intersections would continue operating at the same levels of service with the addition of project-related traffic. Although Todd Road/Santa Rosa Avenue is projected to deteriorate to LOS F, the project would add less than five seconds of delay so the impact would be considered less-than-significant per County standards.

Upon installation of a traffic signal and southbound left-turn lane at Todd Road/Standish Avenue-Ghilotti Avenue, the intersection would operate acceptably during both peak hours and for all evaluated scenarios; the project applicant should pay a proportional share fee of 11.1 percent toward these improvements.

The project would not cause any queues to exceed available storage that would not be expected to do so otherwise.

Pedestrian and transit facilities are adequate to serve the project site given the site location and anticipated demand and bicycle facilities would be adequate upon completion of the planned Class II bike lanes on Todd Road. Because the project site shares frontage with Todd Road, the applicant should make an in-lieu payment toward the cost of the future striping project, as opposed to striping an isolated short bike lane segment at this time.

Sight distances along Todd Road at Ghilotti Avenue are adequate for the measured approach speeds and the posted speed limit; however the bushes/trees along the roadway frontage west of Ghilotti Avenue should be trimmed regularly to maintain adequate sight lines.

Introduction

This report presents an analysis of the potential traffic impacts that would be associated with development of a construction yard at 304 Todd Road in the County of Sonoma. The traffic study was completed in accordance with the criteria established by the County of Sonoma, and is consistent with standard traffic engineering techniques. The scope of work and methodology reflect direction obtained from County staff.

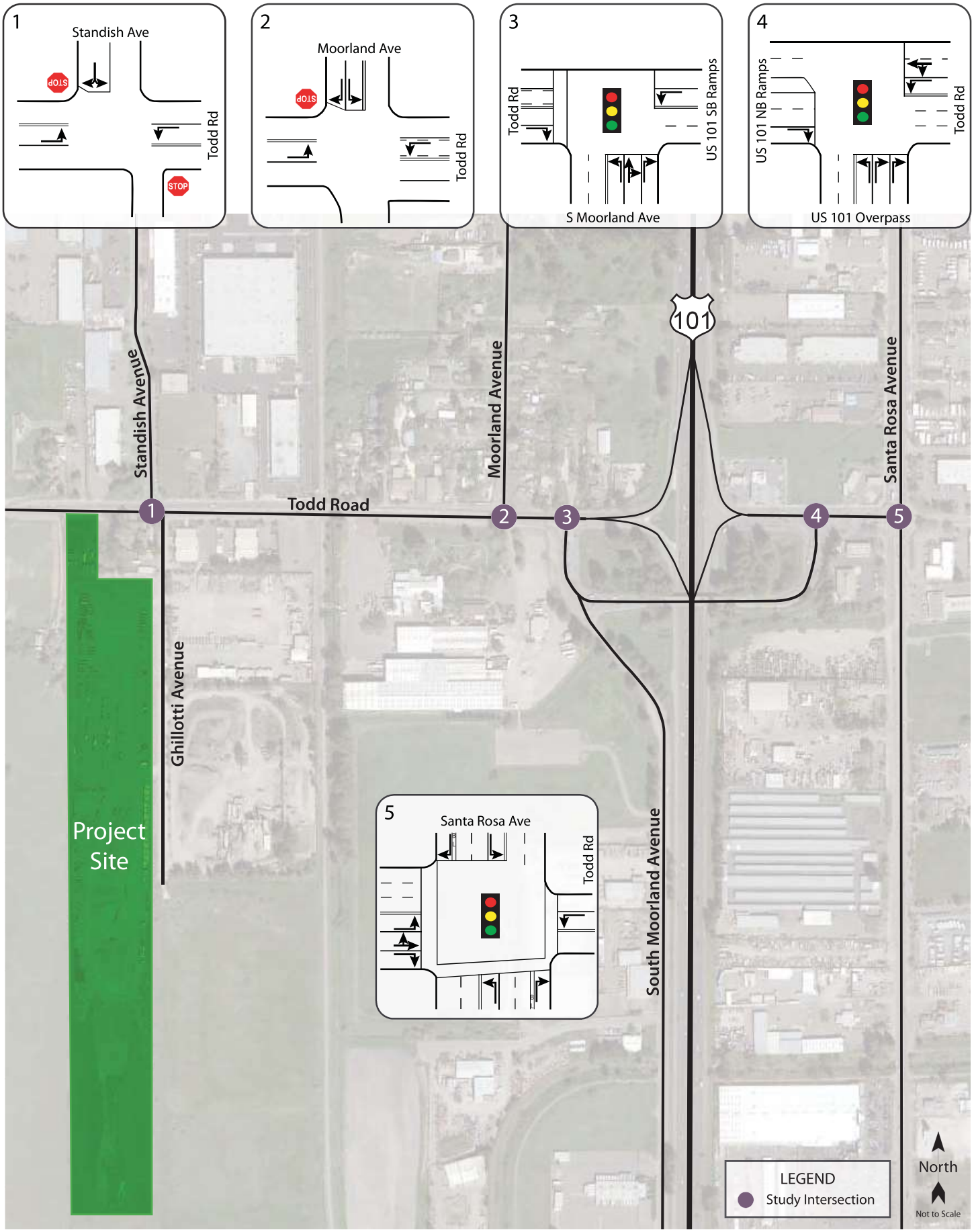
Prelude

The purpose of a traffic impact study is to provide County staff and policy makers with data that they can use to make an informed decision regarding the potential traffic impacts of a proposed project, and any associated improvements that would be required to mitigate these impacts to a level of insignificance as defined by the County's General Plan or other policies. Vehicular traffic impacts are typically evaluated by determining the number of new trips that the proposed use would be expected to generate, distributing these trips to the surrounding street system based on existing travel patterns or anticipated travel patterns specific to the proposed project, then analyzing the impact the new traffic would be expected to have on critical intersections or roadway segments. Impacts relative to access for pedestrians, bicyclists, and to transit are also addressed.

Project Profile

The proposed project is a modification of the Ghilotti Construction Use Permit to reflect existing non-compliant uses pursuant to the Notice of Violation received from the County dated August 9, 2011. The property is zoned M3 (Limited Rural Industrial), and is currently being used to temporarily store contractor's equipment, stockpile rock rip-rap material, and process broken asphalt and concrete for recycling and reuse. The requested permit would bring the most recent previous use into compliance.

The project site is located at 304 Todd Road in the County of Sonoma, as shown in Figure 1.



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Traffic Impact Study for the Ghilotti Construction Yard

Figure 1– Study Area and Lane Configurations

Transportation Setting

Operational Analysis

Study Area and Periods

The study area selected with input from County staff consists of the section of Todd Road fronting the project and the project access point as well as the following intersections.

1. Todd Road/Standish Avenue-Ghilotti Avenue
2. Todd Road/Moorland Avenue
3. Todd Road/US 101 South Ramps
4. Todd Road/US 101 North Ramps
5. Todd Road/Santa Rosa Avenue

Operating conditions during the weekday a.m. and p.m. peak periods were evaluated to capture the highest potential impacts for the proposed project as well as the highest volumes on the local transportation network. The morning peak hour occurs between 7:00 and 9:00 a.m. and reflects conditions during the home to work or school commute, while the p.m. peak hour occurs between 4:00 and 6:00 p.m. and typically reflects the highest level of congestion during the homeward bound commute. At the study intersections, the a.m. peak hour generally occurred between 7:30 and 8:30 a.m. and the p.m. peak hour occurred between 4:15 and 5:15 p.m.

Study Intersections

Todd Road/Standish Avenue-Ghilotti Avenue is an unsignalized four-way intersection stop-controlled on the Standish Avenue and Ghilotti Avenue approaches, which are offset by approximately 40 feet. Left-turn lanes are present on the eastbound and westbound Todd Road approaches.

Todd Road/Moorland Avenue is an unsignalized tee intersection, stop-controlled on the southbound Moorland Avenue approach. There is a left-turn lane provided on the eastbound approach and a two-way left-turn lane on the westbound approach between Moorland Avenue and South Moorland Avenue. Additionally, there is a private driveway that intersects Todd Road from the south.

Todd Road/US 101 South Ramps is a signalized tee intersection with left-turn pockets and protected left-turn phasing on the northbound and westbound approaches. A marked crosswalk is present on the west leg.

Todd Road/US 101 North Ramps is a signalized tee intersection with left-turn pockets and protected left-turn phasing on the northbound and westbound approaches. Additionally, a left-turn lane on the eastbound approach provides access to the service station located northwest of the intersection.

Todd Road/Santa Rosa Avenue is a signalized intersection with left-turn pockets provided on all four approaches and protected left-turn phasing on the northbound and southbound approaches; the eastbound and westbound approaches have split phasing. The northbound, southbound, and eastbound approaches have dedicated right-turn lanes, and marked crosswalks are provided on the south, east, and west legs.

The locations of the study intersections and the existing lane configurations and controls are shown in Figure 1.

Study Roadway

Todd Road in the project vicinity is a two-lane county road running east-west; it is discontinuous at US 101, and east of Santa Rosa Avenue the roadway is known as East Todd Road. Within the project vicinity, the street ranges from 20 feet wide to 68 feet wide depending on the presence of turn lanes, width of the travel lanes, and width of the shoulders. Adjacent to the project site the posted speed limit is 35 miles per hour (mph). Vehicles are the primary mode of travel in the surrounding network as there are no bicycle lanes present and pedestrian facilities are limited.

Collision History

The collision history for the study area was reviewed to determine any trends or patterns that may indicate a safety issue. Collision rates were calculated based on records available from the California Highway Patrol as published in their Statewide Integrated Traffic Records System (SWITRS) reports. The most current five-year period available is January 1, 2012 through December 31, 2016.

As presented in Table 1, the calculated collision rates for the study intersections were compared to average collision rates for similar facilities statewide, as indicated in *2013 Collision Data on California State Highways*, California Department of Transportation (Caltrans). The signalized intersections have collision rates comparable to statewide averages indicating that the intersections are operating as expected with regards to safety, though it is noted that Todd Road/Santa Rosa Avenue had a collision rate slightly higher than the statewide average and both of the unsignalized intersections have collision rates higher than the statewide averages which warranted further analysis.

Table 1 – Collision Rates at the Study Intersections

Study Intersection	Number of Collisions (2012-2016)	Calculated Collision Rate (c/mve)	Statewide Average Collision Rate (c/mve)
1. Todd Rd/Standish Ave-Ghilotti Ave	10	**0.46**	0.26
2. Todd Rd/Moorland Ave	17	**0.64**	0.14
2. Todd Rd/US 101 South Ramps	12	0.37	0.43
2. Todd Rd/US 101 North Ramps	8	0.25	0.27
3. Todd Rd/Santa Rosa Ave	27	**0.49**	0.43

Note: c/mve = collisions per million vehicles entering; **Bold** = above-average collision rate

Further review of the individual collisions that occurred at Todd Road/Standish Avenue-Ghilotti Avenue revealed that of the ten total collisions, seven were either a broadside or sideswipe. Similarly, over half of the collisions at Todd Road/Moorland Avenue were either a broadside or sideswipe. Signalization of the intersections could help to reduce the frequency of these types of collisions. The collision rate at Santa Rosa Avenue/Todd Road is higher than the statewide average largely due to the proximity of the gas stations on the northwest and southwest corners. Both of the gas stations have driveways within 90 feet of the intersection that create additional conflict zones. Consolidation of the driveways or restricting access to right-in right-out movements only could help to reduce the incidence of collisions. The collision rate calculations for the study intersections are provided in Appendix A.

Alternative Modes

Pedestrian Facilities

Pedestrian facilities include sidewalks, crosswalks, pedestrian signal phases, curb ramps, curb extensions, and various streetscape amenities such as lighting, benches, etc. As might be expected given the rural location of the project site, a connected pedestrian network is lacking.

Bicycle Facilities

The *Highway Design Manual*, Caltrans, 2012, classifies bikeways into three categories:

- **Class I Multi-Use Path** – a completely separated right-of-way for the exclusive use of bicycles and pedestrians with cross flows of motorized traffic minimized.
- **Class II Bike Lane** – a striped and signed lane for one-way bike travel on a street or highway.
- **Class III Bike Route** – signing only for shared use with motor vehicles within the same travel lane on a street or highway.

Although there are no existing bicycle facilities in the project area, there are plans to construct Class II bike lanes on Todd Road between Llano Road and Santa Rosa Avenue and on Standish Avenue. Additionally, the Sonoma Marin Area Rail Transit (SMART) Pathway is located approximately 600 feet east of the project site and would provide access to a Class I regional trail. Table 2 summarizes the planned bicycle facilities in the project vicinity, as contained in the *2010 Santa Rosa Bicycle and Pedestrian Master Plan*, and the existing and planned alternative modes in the project vicinity are shown in Figure 2

Table 2 – Planned Bicycle Facilities

Facility	Class	Length (miles)	Begin Point	End Point
SMART Pathway	I	Regional		
Standish Ave	II	0.5	Todd Rd	W Robles Ave
Todd Rd	II	2.8	Llano Rd	Santa Rosa Ave

Source: *2010 Santa Rosa Bicycle and Pedestrian Master Plan*

Transit Facilities

Sonoma County Transit (SCT) provides fixed route bus service in Sonoma County. SCT Route 42 serves the bus stops on Todd Road adjacent to the project site and provides weekday commute service between the industrial area in which the project is located and the Santa Rosa Transit Mall.

Two bicycles can be carried on most SCT buses. Bike rack space is on a first come, first served basis. Additional bicycles are allowed on SCT buses at the discretion of the driver.

Dial-a-ride, also known as paratransit, or door-to-door service, is available for those who are unable to independently use the transit system due to a physical or mental disability. Volunteer Wheels, the ADA paratransit operator for Sonoma County Transit, is designed to serve the needs of individuals with disabilities within the incorporated areas of Sonoma County, the Greater Santa Rosa Area, and between the County's nine incorporated cities.

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Traffic Impact Study for the Ghilotti Construction Yard

Figure 2– Alternative Modes

Capacity Analysis

Intersection Level of Service Methodologies

Level of Service (LOS) is used to rank traffic operation on various types of facilities based on traffic volumes and roadway capacity using a series of letter designations ranging from A to F. Generally, Level of Service A represents free flow conditions and Level of Service F represents forced flow or breakdown conditions. A unit of measure that indicates a level of delay generally accompanies the LOS designation.

The study intersections were analyzed using methodologies published in the *Highway Capacity Manual* (HCM), Transportation Research Board, 2010. This source contains methodologies for various types of intersection control, all of which are related to a measurement of delay in average number of seconds per vehicle.

The Levels of Service for the intersections of Todd Road with Standish Avenue-Ghilotti Avenue and Moorland Avenue, which have side-street stop controls, were analyzed using the "Two-Way Stop-Controlled" intersection capacity method from the HCM. This methodology determines a level of service for each minor turning movement by estimating the level of average delay in seconds per vehicle. Results are presented for individual movements together with the weighted overall average delay for the intersection.

The study intersections that are controlled by a traffic signal, or may be in the future, were evaluated using the signalized methodology from the HCM. This methodology is based on factors including traffic volumes, green time for each movement, phasing, whether or not the signals are coordinated, truck traffic, and pedestrian activity. Average stopped delay per vehicle in seconds is used as the basis for evaluation in this LOS methodology. Delays were calculated using signal timing provided by County and Caltrans staff, though for the Future conditions scenarios delays were calculated using optimized signal timing.

The Vistro software was used to analyze the intersections of Todd Road with Standish Avenue-Ghilotti Avenue and Moorland Avenue. The signalized intersections included in the study area were analyzed using microsimulation and the SimTraffic software to account for the proximity of the intersections. The average delays for ten microsimulation runs were calculated to determine the resulting Levels of Service for each scenario.

The ranges of delay associated with the various levels of service are indicated in Table 3.

Table 3 – Intersection Level of Service Criteria		
LOS	**Two-Way Stop-Controlled**	**Signalized**
A	Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street.	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase, so do not stop at all.
B	Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street.	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.
C	Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street.	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.
D	Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street.	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.
E	Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street.	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.
F	Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues.	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.

Reference: *Highway Capacity Manual,* Transportation Research Board, 2000

Traffic Operation Standards

Based on the most recent criteria published by the County of Sonoma, the project would have a significant traffic impact if it results in any of the following conditions.

1. **On-site roads and frontage improvements** – Proposed on-site circulation and street frontage would not meet the County's minimum standards for roadway or driveway design, or potentially result in safety hazards, as determined by the County in consultation with a registered traffic engineer.

2. **Parking** – Proposed on-site parking supply would not be adequate to accommodate parking demand.

3. **Emergency Access** – The project site would have inadequate emergency access.

4. **Alternative Transportation** – The project provides inadequate facilities for alternative transportation modes (e.g., bus turnouts, bicycle racks, pedestrian pathways) and/or the project creates potential conflicts with adopted policies, plans, or programs supporting alternative transportation.

5. **Road Hazards** – Hazards are increased due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment, heavy pedestrian or truck traffic).

6. **Vehicle Queues** – The addition of project traffic causes the 95th percentile queue length to exceed roadway turn lane storage capacity.

7. **Signal Warrants** – The addition of the project's vehicle or pedestrian traffic causes an intersection to meet or exceed Caltrans signal warrant criteria.

8. **Turn Lanes** – The addition of project traffic causes an intersection to meet or exceed criteria for provision of a right or left turn lane on an intersection approach.

9. **Sight Lines** – The project constructs an unsignalized intersection (including driveways) or adds traffic to an existing unsignalized intersection approach that does not have adequate sight lines based upon Caltrans criteria for state highway intersections and County criteria for County roadway intersections.

10. **Intersections** – The County Level of Service standard for intersections is Level of Service D. The project would have a significant traffic impact if the project's traffic would cause an intersection currently operating at an acceptable level of service (LOS D or better) to operate below the standard (LOS E or F).

    If the intersection currently operates or is projected to operate below the County standard (at LOS E or F), the project's impact is significant and cumulatively considerable if it causes the delay for any critical movement to increase by five seconds or more. The delay will be determined by comparing intersection operation with and without the project's traffic for both the existing near-term and projected future conditions. These criteria apply to all controlled or uncontrolled intersections with projected traffic volumes over 30 vehicles per hour per approach or per exclusive left turn movement.

11. **Roadway Operation** – The Level of Service Standard for County roadway operations is to maintain a Level of Service C per Policy CT-3.1.

Caltrans

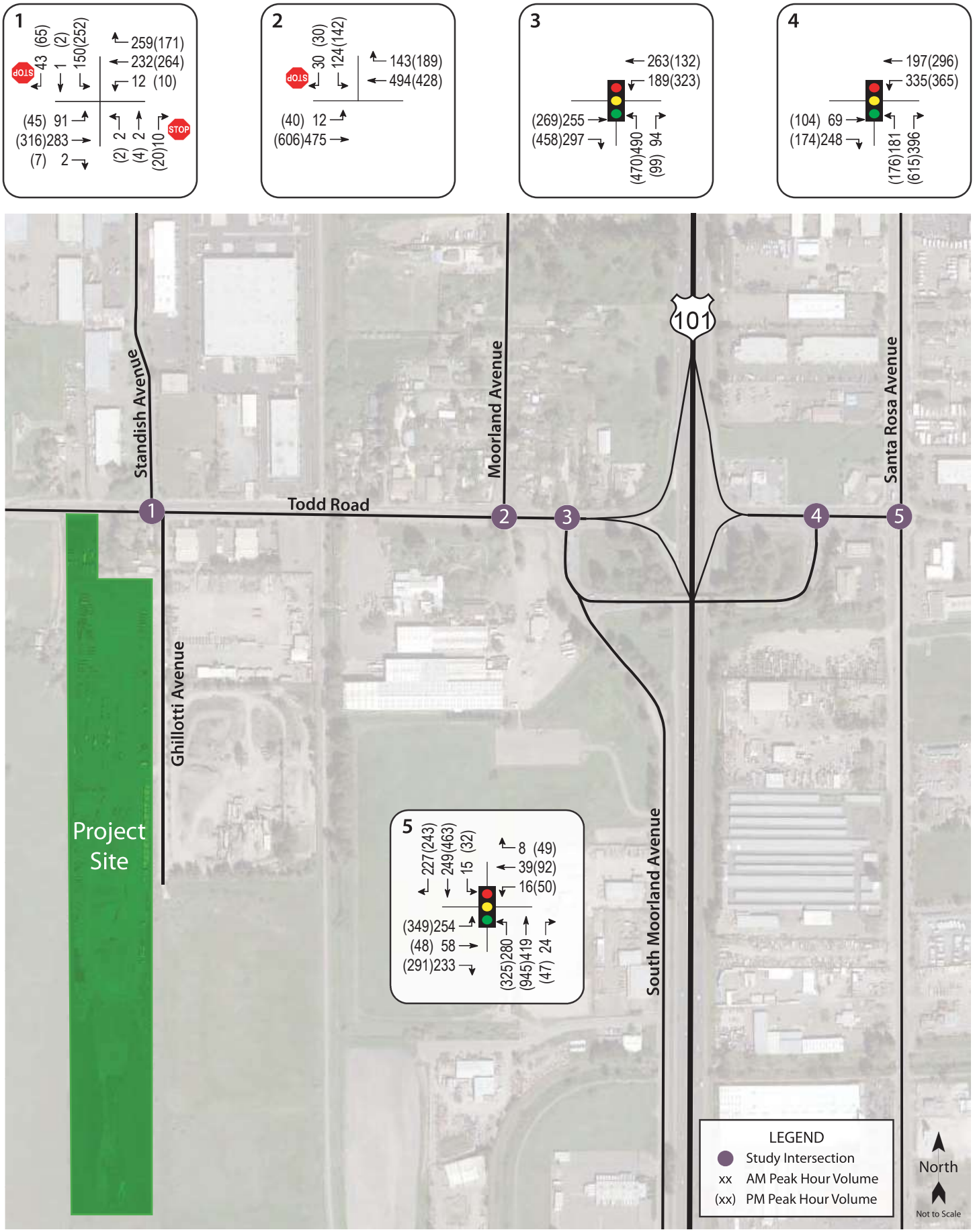
In the *Guide for the Preparation of Traffic Impact Studies*, Caltrans indicates that they endeavor to maintain operation at the transition from LOS C to LOS D. The Caltrans criteria was applied to the intersections of Todd Road with the US 101 North and South ramps.

Existing Conditions

Standard traffic engineering practice for conducting traffic studies includes the assessment of existing conditions and the evaluation of conditions that would be associated with the operation or occupation of a proposed project. For the purposes of analyzing traffic impacts associated with updating a Use Permit to reflect existing activity, traffic anticipated to be generated by the proposed uses were deducted from the volumes collected in October 2016 and May 2017 to document "Existing Conditions," or those without the construction yard.

Under Existing Conditions the study intersections operate acceptably at LOS B or better overall during the a.m. peak hour; however, Todd Road/Standish Avenue-Ghilotti Avenue operates unacceptably at LOS E overall during the p.m. peak hour and the southbound Standish Avenue approach operates at LOS F during both peaks. It is noted the southbound approach at Todd Road/Moorland Avenue operates at LOS E and F during the morning and evening peak hours, respectively; however, the intersection operates at LOS A overall during both peak hours.

The Existing traffic volumes are shown in Figure 3. A summary of the intersection level of service calculations is contained in Table 4, and copies of the Level of Service calculations for all evaluated scenarios for the unsignalized intersections are provided in Appendix B; Level of Service calculations for the signalized intersections are provided in Appendix C. It should be noted that because microsimulation was used to evaluate the signalized intersections the calculated delay can vary between runs, and while results were reported based on the average of ten runs in an attempt to converge on a single value, it is important to view the results with an understanding that there is a certain amount of fluctuation involved.



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Traffic Impact Study for the Ghilotti Construction Yard

Figure 3 – Existing Traffic Volumes

Table 4 – Existing Peak Hour Intersection Levels of Service					
Study Intersection *Approach*		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**
1.	Todd Rd/Standish Ave-Ghilotti Ave	10.3	B	**38.4**	**E**
	Northbound (Ghilotti Ave) Approach	*13.6*	*B*	*12.7*	*B*
	Southbound (Standish Ave) Approach	*52.1*	*F*	**	***F***
	Install signal and restripe to add SB left-turn lane	16.9	B	18.2	B
2.	Todd Rd/Moorland Ave	5.4	A	9.6	A
	Southbound (Moorland Ave) Approach	*44.3*	*E*	*78.2*	*F*
3.	Todd Rd/US 101 South Ramps	17.8	B	22.7	C
4.	Todd Rd/US 101 North Ramps	7.4	A	6.3	A
5.	Todd Rd/Santa Rosa Ave	10.9	B	18.6	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* ** = delay greater than 120 seconds; **Bold** text = deficient operation; Shaded cells = conditions with recommended improvements

Due to high delay calculated at Todd Road/Standish Avenue-Ghilotti Avenue during the p.m. peak hour, a signal warrant analysis was performed to determine potential need for a traffic signal. Chapter 4C of the *California Manual on Uniform Traffic Control Devices* (CA-MUTCD) provides guidance on when a traffic signal should be considered based on nine different warrants, or criteria. For the purposes of this study, Warrant 3, the Peak Hour volume warrant, which determines the need for traffic control based on the highest volume hour of the day, was used as an initial indication of traffic control needs. The use of this signal warrant is common practice for planning studies.

Existing volumes at Todd Toad/Standish Avenue-Ghilotti Avenue are sufficient to meet the criteria established by Warrant 3, and for this reason, it is recommended that the County consider installing a traffic signal at the intersection and restriping the Standish Avenue approach to provide a southbound left-turn lane in order to reduce delay during the p.m. peak hour. Upon completion of these improvements, the intersection would be expected to operate acceptably during both peak hours, as shown in Table 4. Further, a signal would address the pattern of crashes that resulted in an above-average collision rate at this location. The delays upon installation of a traffic signal were calculated assuming split phasing as the north and south legs are offset and optimized signal timing. A copy of the signal warrant analysis spreadsheet is included in Appendix D.

Baseline Conditions

Baseline operating conditions were assessed to reflect the addition of traffic associated with projects that are approved in the study area and would potentially be operational within the near-term. County Staff identified the following project to be included in this scenario.

- **Shamrock Materials** – An approved materials processing plant that would be accessed via Ghilotti Avenue and located just south of the Ghilotti Construction offices. The project would include a concrete batching facility, recycling operation, composting facility, sand and gravel processing plant, maintenance shop, and associated offices. As contained in the *Shamrock Materials Traffic Impact Study Updated Report*, prepared by W-Trans, the project would be expected to generate 231 new trips per day, including 16 trips during the morning peak hour and 10 during the evening peak hour. The same trip distribution assumptions used in the traffic study for the project were used in this analysis, including 45 percent to/from both US 101 North and South and five percent via Todd Road to both the east and west.

Intersection Levels of Service

The anticipated traffic associated with the Shamrock project was added to the volumes analyzed in the Existing Conditions scenario in order to determine Baseline volumes. Under these conditions, the study intersections are projected to continue operating at the same levels of service as Existing Conditions. These results are summarized in Table 5 and Baseline volumes are shown in Figure 4.

Table 5 – Baseline Peak Hour Intersection Levels of Service

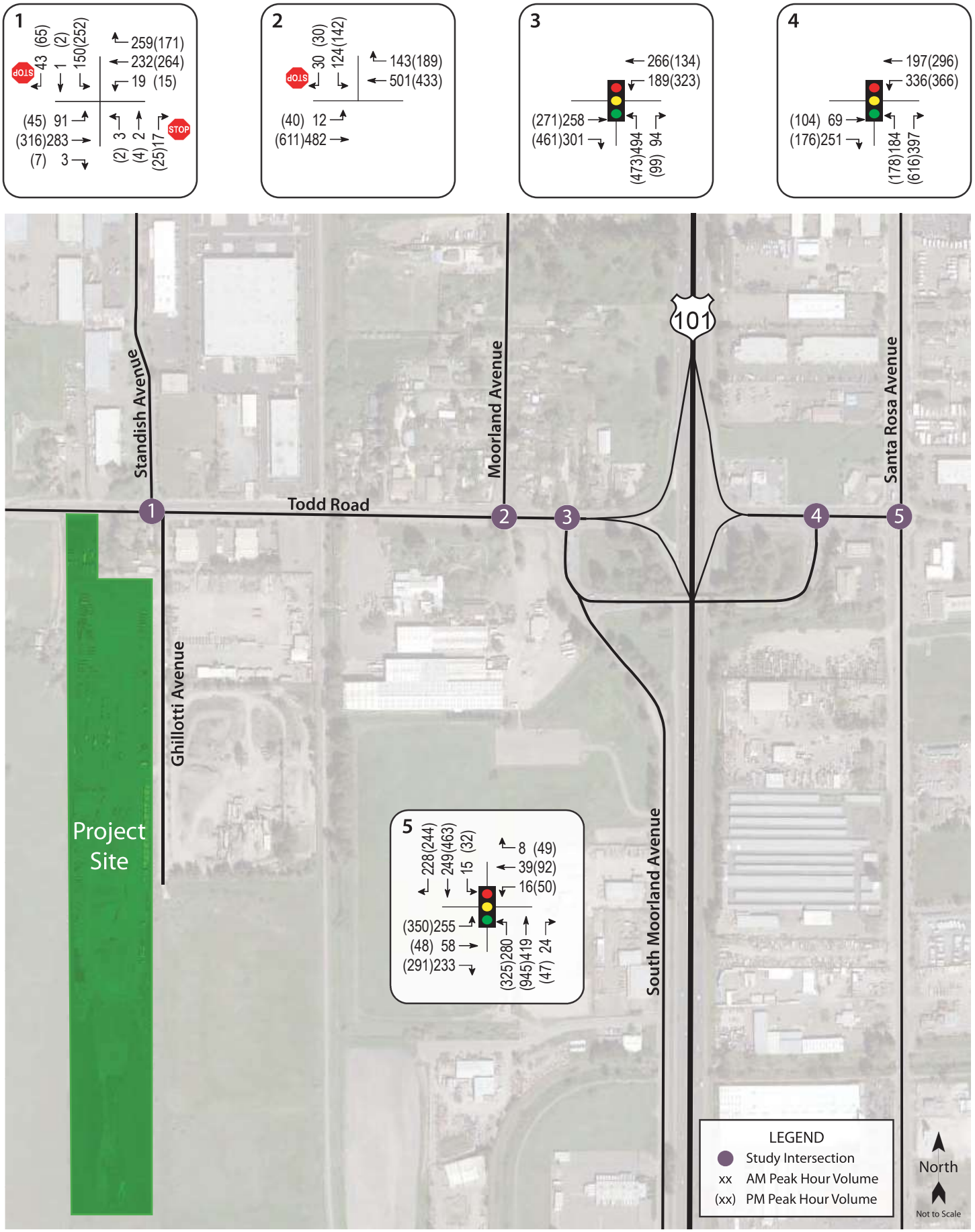
Study Intersection *Approach*	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. Todd Rd/Standish Ave-Ghilotti Ave	11.5	B	**42.0**	**E**
Northbound (Ghilotti Ave) Approach	*13.2*	*B*	*12.4*	*B*
Southbound (Standish Ave) Approach	*59.0*	*F*	**	***F***
Install signal and restripe to add SB left-turn lane	17.5	B	18.6	B
2. Todd Rd/Moorland Ave	5.6	A	9.9	A
Southbound (Moorland Ave) Approach	*46.4*	*E*	*81.4*	*F*
3. Todd Rd/US 101 South Ramps	16.9	B	17.9	B
4. Todd Rd/US 101 North Ramps	7.1	A	7.2	A
5. Todd Rd/Santa Rosa Ave	10.9	B	19.8	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* ** = delay greater than 120 seconds; **Bold** text = deficient operation; Shaded cells = conditions with recommended improvements

Future Conditions

Segment volumes for the horizon year of 2040 were obtained from the County's gravity demand model maintained by the Sonoma County Transportation Authority (SCTA) and translated to peak hour turning movement volumes at the study intersections using the "Furness" method. The Furness method is an iterative process that employs existing turn movement data, existing link volumes, and future link volumes to project likely future turning movement volumes at intersections.

Under the anticipated Future volumes, the intersections are expected to operate at LOS A or B overall during both peak hours, except that Todd Road/Standish Avenue-Ghilotti Avenue and Todd Road/Santa Rosa Avenue are expected to deteriorate to LOS F during both peak hours. It is noted that the LOS at Todd Road/Moorland Avenue is expected to improve during the a.m. peak hour under Future conditions as the model is projecting fewer southbound volumes in 2040; this is likely attributable to the anticipated overcrossing at Bellevue Avenue to the north. Future volumes are shown in Figure 5 and operating conditions are summarized in Table 6.



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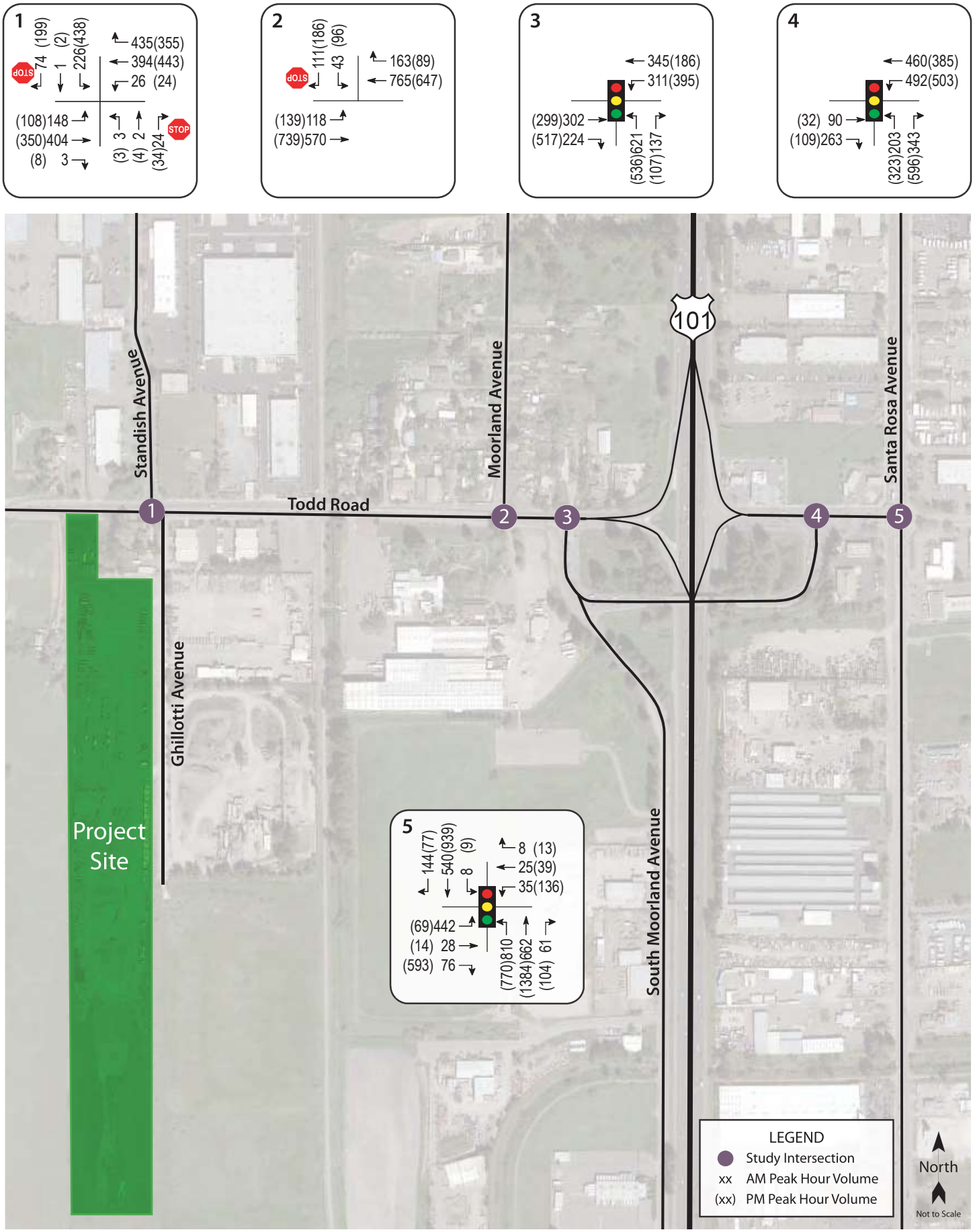
Traffic Impact Study for the Ghilotti Construction Yard

Figure 4 – Baseline Traffic Volumes



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Traffic Impact Study for the Ghilotti Construction Yard

Figure 5 – Future Traffic Volumes

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Table 6 – Future Peak Hour Intersection Levels of Service					
Study Intersection ***Approach***		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**
1.	Todd Rd/Standish Ave-Ghilotti Ave	**	**F**	**	**F**
	Northbound (Ghilotti Ave) Approach	*18.2*	*C*	*17.9*	*C*
	Southbound (Standish Ave) Approach	**	***F***	**	***F***
	Install signal and restripe to add SB left-turn lane	30.1	C	38.2	D
2.	Todd Rd/Moorland Ave	3.8	A	14.3	B
	Southbound (Moorland Ave) Approach	*35.1*	*E*	*91.4*	*F*
3.	Todd Rd/US 101 South Ramps	19.6	B	17.5	B
4.	Todd Rd/US 101 North Ramps	7.6	A	7.4	A
5.	Todd Rd/Santa Rosa Ave	**63.8**	**F**	**77.2**	**F**
	Restripe to provide 2 NB left-turn lanes	24.1	C	40.8	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* ** = delay greater than 120 seconds; **Bold** text = deficient operation; Shaded cells = conditions with recommended improvements; SB = Southbound; NB = Northbound

As might be expected with no changes to the intersection's geometry or controls, the operation of Todd Road/ Standish Avenue-Ghilotti Avenue is anticipated to deteriorate significantly with the increase in traffic projected over the next 24 years. In fact, the delays estimated are well beyond what is reasonable, and indicate that the theoretical results are unreliable. As previously noted, it is recommended that the County install a traffic signal at the intersection and restripe the southbound approach to provide a left-turn lane in order to achieve acceptable levels of service during both peak hours under projected Future volumes.

Additionally, the northbound approach at Todd Road/Santa Rosa Avenue would need to be restriped to provide two left-turn lanes to accommodate the large increase in traffic anticipated for this movement. This improvement could be accomplished by restriping the western through lane into a second left-turn lane and the dedicated right-turn lane into a shared through/right lane. This configuration would result in two left-turn lanes, a single through lane, and a shared through/right lane. A conceptual striping plan for this improvement is contained in Appendix E. It should be noted that this improvement could also necessitate some modification to detection.

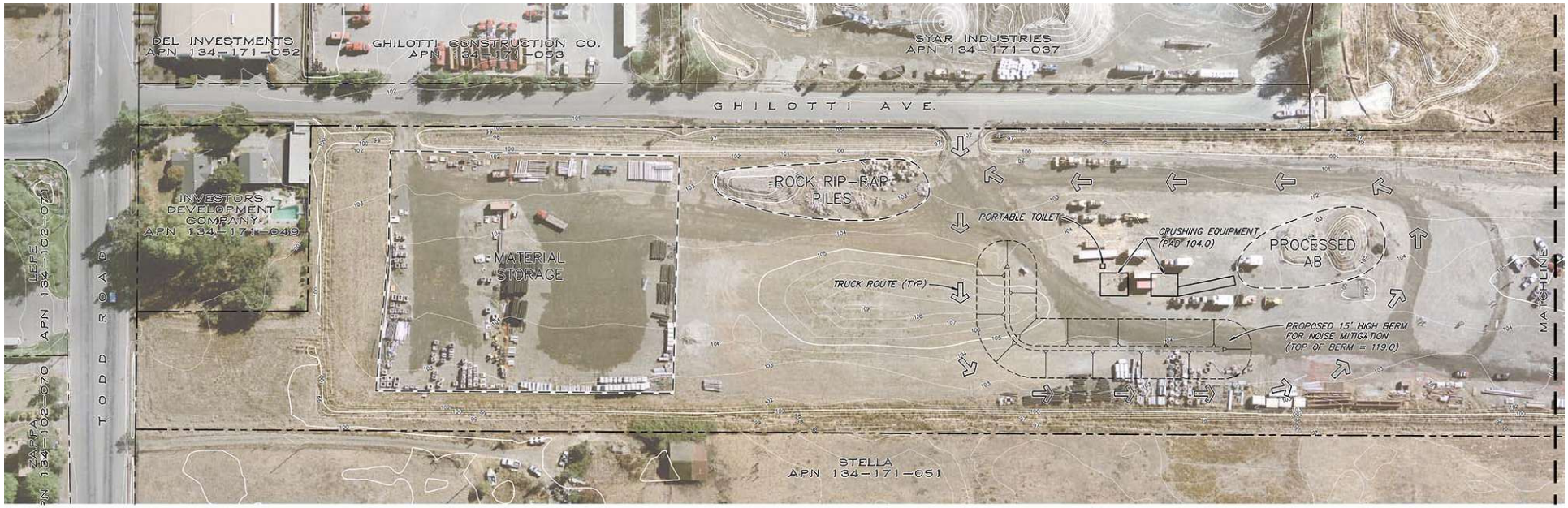
Project Description

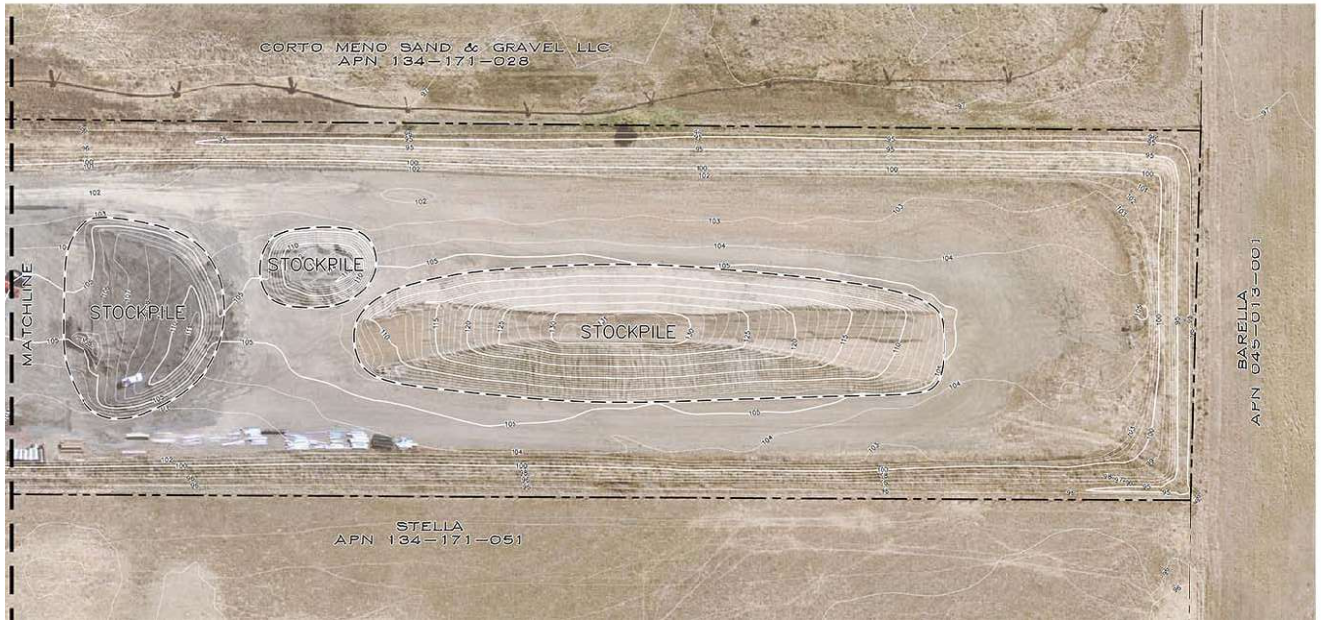
The proposed project would update the Ghilotti Construction Use Permit to reflect existing non-compliant uses. It is understood the property is zoned M3 (Limited Rural Industrial), and is currently being used to temporarily store contractor's equipment, stockpile rock rip-rap material, and process broken asphalt and concrete for recycling and reuse. The project site is located at 304 Todd Road and accessed via Ghilotti Avenue; the site plan is shown in Figure 6.

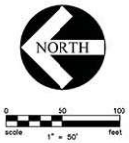
Trip Generation

The anticipated trip generation potential for the proposed project was estimated using data from the *Proposal Statement & Project Description* submitted by Ghilotti Construction to Sonoma County as well as information received directly from Ghilotti Construction. The majority of traffic associated with the proposed project would be due to the import and export of materials which would occur on an as-needed basis varying with the demand imposed by ongoing countywide construction projects.

Most trips would be made by semi-end dump trucks, semi-bottom dump trucks, and transfer trailers; daily traffic is estimated to range between zero and 50 trips per day. Though the actual volume on a typical daily basis is







SITE PLAN

GHILOTTI PROPERTY

APN 134-171-050

304 TODD ROAD, SANTA ROSA

SONOMA COUNTY, CALIFORNIA

JULY 20, 2011

PREPARED BY:

CARLILE • MACY

CIVIL ENGINEERS • URBAN PLANNERS • LAND SURVEYORS • LANDSCAPE ARCHITECTS

15 THIRD STREET, SANTA ROSA, CA 95401

TEL (707) 542-6451 FAX (707) 542-5212

PROJECT No. 1998057.A0

Source: Carlile Macy, 7/11

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Traffic Impact Study for the Ghilotti Construction Yard

Figure 5 – Site Plan

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expected to be substantially lower, to be conservative it was assumed that a maximum of 30 trips would be made during either the a.m. or p.m. peak hour (15 trips in and 15 trips out).

Additionally, to account for the fact the trips would be made by large trucks, which have a more significant impact on traffic variables such as headway, speed, density, etc. than standard passenger vehicles, a passenger car equivalent (PCE) factor was used in the analysis. The *Highway Capacity Manual* (HCM), 6th Edition provides PCE factors based on terrain and recommends using 2.0 for level terrain and 3.0 for rolling terrain. Although the surrounding roadway network is flat, a ratio of three vehicles to one truck was used in the analysis to provide conservative results. After applying the PCE factor, it is estimated the proposed project would result in impacts similar to one that generates 90 passenger car trips during the peak hour, including 45 trips in and 45 trips out. The applied trip generation estimates are shown in Table 7.

Table 7 – Trip Generation Summary

Land Use	Max Daily	AM Peak Hour			PM Peak Hour		
	Trips	Trips	In	Out	Trips	In	Out
Construction Yard (Trucks)	50	30	15	15	30	15	15
Construction Yard (PCE)	150	90	45	45	90	45	45

Note: PCE = Passenger Car Equivalent

Trip Distribution

The pattern used to allocate new project trips to the street network was determined based on the likely origins/ destinations for site-generated traffic. Trips would be predominantly to and from construction projects located throughout the county and would occur via US 101. Maximum PCE trips are summarized in Table 8, and the applied distribution assumptions are shown in Figure 7.

Table 8 – Trip Distribution Assumptions

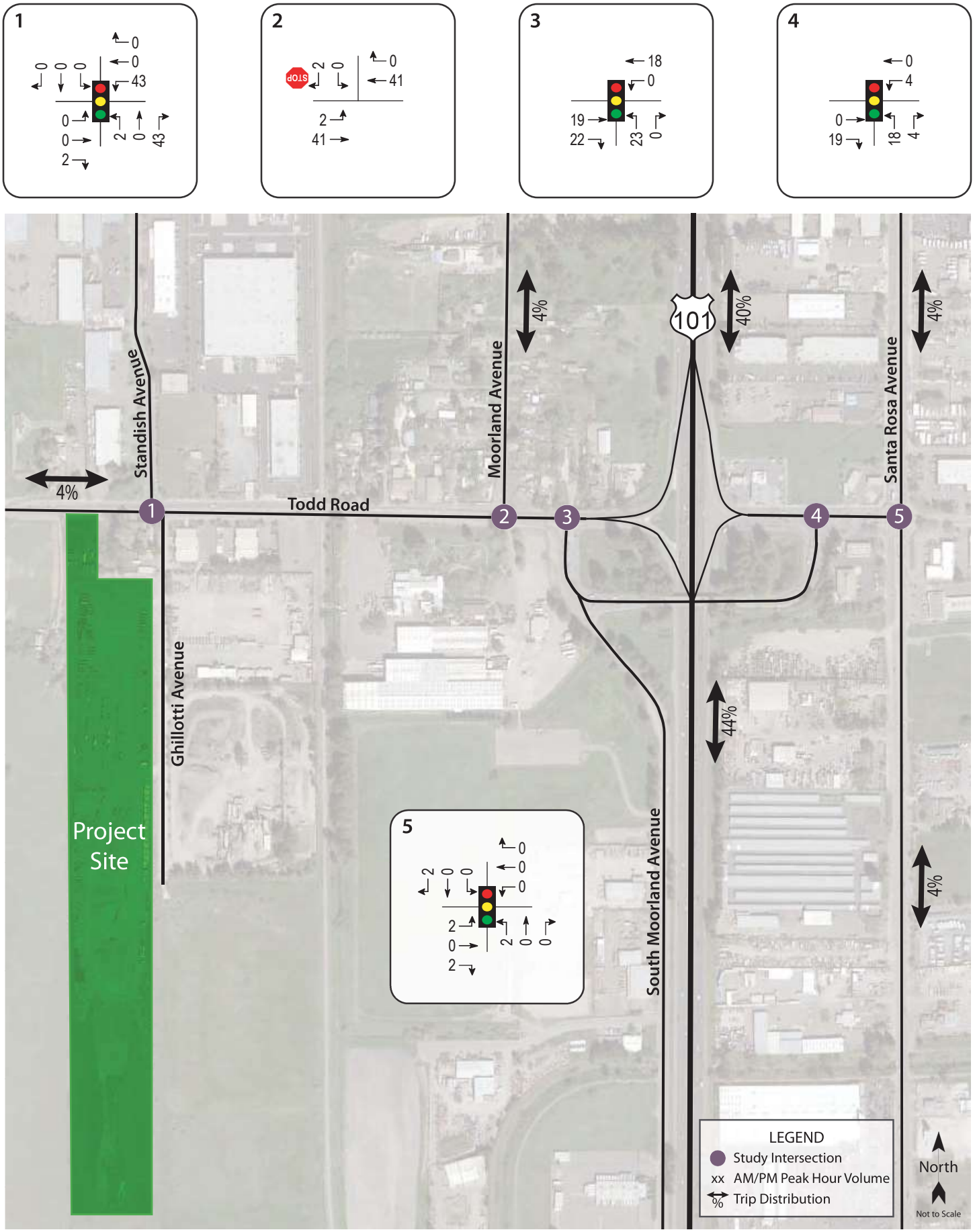
Route	Percent	Daily Trips	AM Trips	PM Trips
US 101 (North)	40%	60	36	36
US 101 (South)	44%	66	38	38
Todd Rd (West of Standish Ave)	4%	6	4	4
Moorland Ave (North of Todd Rd)	4%	6	4	4
Santa Rosa Ave (North of Todd Rd)	4%	6	4	4
Santa Rosa Ave (South of Todd Rd)	4%	6	4	4
TOTAL	**100%**	**150**	**90**	**90**

Note: Trips do not correspond to exact percentages due to rounding

Intersection Operation

Existing plus Project Conditions

Upon the addition of project-related traffic to the Existing volumes, the study intersections are expected to continue operating acceptably during both peak hours, except for Todd Road/Standish Avenue-Ghilotti Avenue which would be expected to further deteriorate from LOS E to LOS F during the p.m. peak hour. The intersection is currently operating unacceptably under Existing Conditions so the project would not cause the intersection to



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Traffic Impact Study for the Ghilotti Construction Yard

Figure 7 – Project Traffic Volumes and Trip Distribution

drop from acceptable operation to unacceptable operation; however, the project would increase the average delay by more than five seconds so the impact would be considered significant under the County's standard. These results are summarized in Table 9 and Existing plus Project traffic volumes are shown in Figure 8.

Table 9 – Existing and Existing plus Project Peak Hour Intersection Levels of Service

	Study Intersection ***Approach***	**Existing Conditions**				**Existing plus Project**			
		AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1.	Todd Rd/Standish Ave-Ghilotti Ave	10.3	B	**38.4**	**E**	20.6	C	**74.8**	**F**
	Northbound (Ghilotti Ave) Approach	*13.6*	*B*	*12.7*	*B*	*12.2*	*B*	*12.5*	*B*
	Southbound (Standish Ave) Approach	*52.1*	*F*	**	***F***	*114.7*	*F*	**	***F***
	With signal and SB left-turn lane	16.9	B	18.2	B	20.0	B	21.1	C
2.	Todd Rd/Moorland Ave	5.4	A	9.6	A	6.9	A	12.8	B
	Southbound (Moorland Ave) Approach	*44.3*	*E*	*78.2*	*F*	*59.0*	*F*	*109.3*	*F*
3.	Todd Rd/US 101 South Ramps	17.8	B	22.7	C	18.5	B	22.2	C
4.	Todd Rd/US 101 North Ramps	7.4	A	6.3	A	6.9	A	7.1	A
5.	Todd Rd/Santa Rosa Ave	10.9	B	18.6	B	12.1	B	19.6	B

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* ** = delay greater than 120 seconds; **Bold** text = deficient operation; Shaded cells = conditions with recommended improvements

It should be noted that with the addition of project-related traffic volumes, average delay on the northbound Ghilotti Avenue approach decreases during both peak hours. While this is counter-intuitive, this condition occurs when a project adds trips to movements that are currently underutilized or have delays that are below the approach average, resulting in a better balance between movements and lower average delay for that specific approach. The project adds traffic predominantly to the right-turn movement, which has an average delay that is lower than the average for the entire approach, resulting in a slight reduction in the average delay. This same reasoning also explains why delay decreases slightly at Todd Road/US 101 South Ramps during the evening peak hour.

Finding – The project would increase the overall average delay at Todd Road/Standish Avenue-Ghilotti Avenue by more than five seconds during the p.m. peak hour and therefore would have a significant impact per the County Standard.

Recommendation – It is understood that the County is planning on installing a traffic signal at Todd Road/ Standish Avenue-Ghilotti Avenue and will accept proportional share payments towards this project. To mitigate project impacts, is recommended that Ghilotti Construction pay a proportional share fee of 11.1 percent toward the installation of a traffic signal and southbound left-turn lane at Todd Road/Standish Avenue-Ghilotti Avenue. A copy of the Equitable Share Calculation spreadsheet is contained in Appendix D.

Baseline plus Project Conditions

With project-related traffic added to Baseline volumes, the study intersections are expected to operate acceptably except for Todd Road/Standish Avenue-Ghilotti Avenue during the p.m. peak hour. Baseline plus Project volumes are provided in Figure 9, and the resulting levels of service are summarized in Table 10.

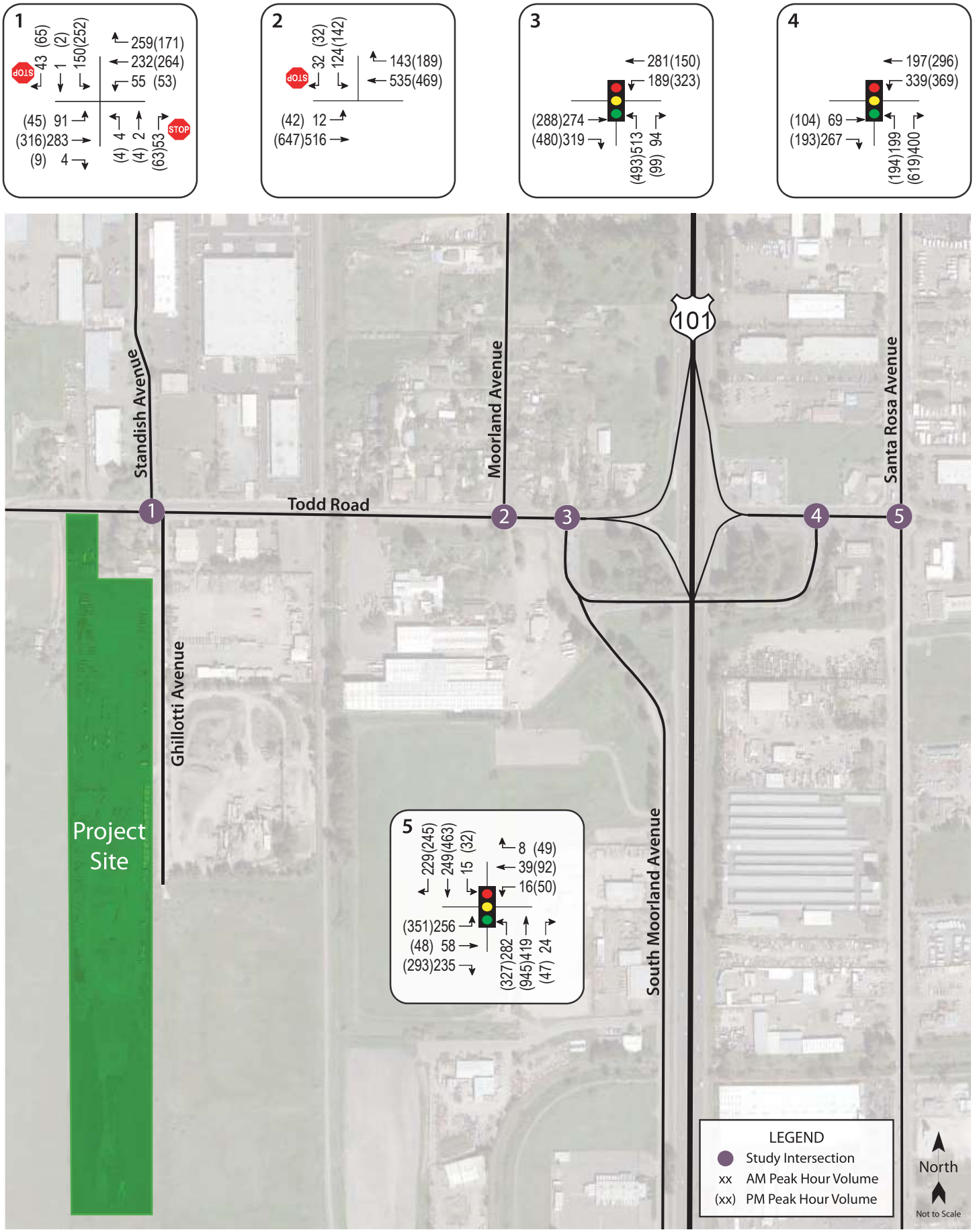

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Figure 8 – Existing plus Project Traffic Volumes

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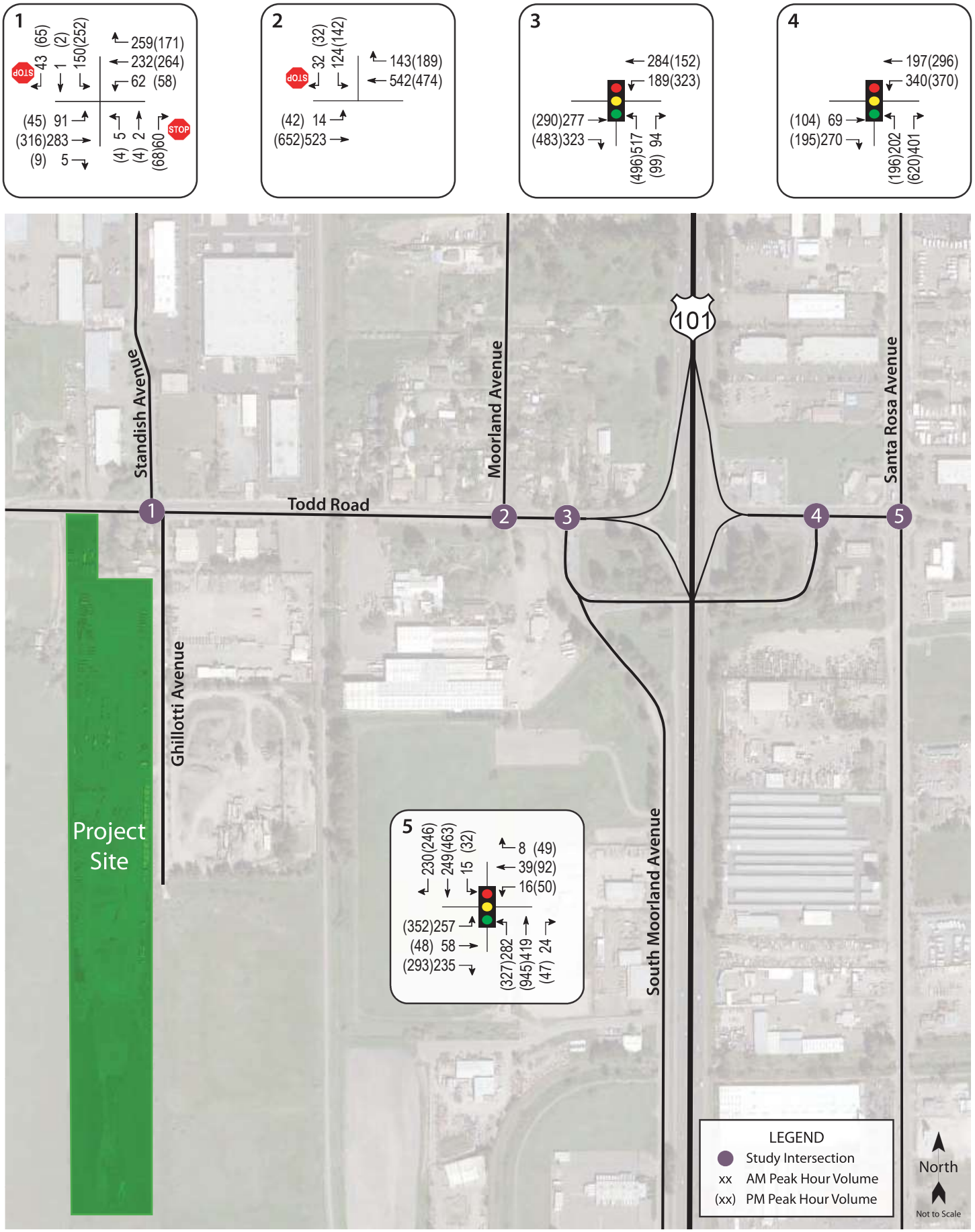

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Traffic Impact Study for the Ghilotti Construction Yard

Figure 9 – Baseline plus Project Traffic Volumes

W-Trans

Table 10 – Baseline and Baseline plus Project Peak Hour Intersection Levels of Service									
Study Intersection ***Approach***		**Baseline Conditions**				**Baseline plus Project**			
		AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1.	Todd Rd/Standish Ave-Ghilotti Ave	11.5	B	**42.0**	**E**	23.3	C	**79.5**	**F**
	Northbound (Ghilotti Ave) Approach	*13.2*	*B*	*12.4*	*B*	*12.5*	*B*	*12.5*	*B*
	Southbound (Standish Ave) Approach	*59.0*	*F*	**	***F***	**	*F*	**	***F***
	With signal and SB left-turn lane	17.5	B	18.6	B	20.5	C	21.5	C
2.	Todd Rd/Moorland Ave	5.6	A	9.9	A	7.2	A	13.2	B
	Southbound (Moorland Ave) Approach	*46.4*	*E*	*81.4*	*F*	*62.2*	*F*	*113.8*	*F*
3.	Todd Rd/US 101 South Ramps	16.9	B	17.9	B	19.4	B	22.4	C
4.	Todd Rd/US 101 North Ramps	7.1	A	7.2	A	7.4	A	7.4	A
5.	Todd Rd/Santa Rosa Ave	10.9	B	19.8	B	12.1	B	18.8	B

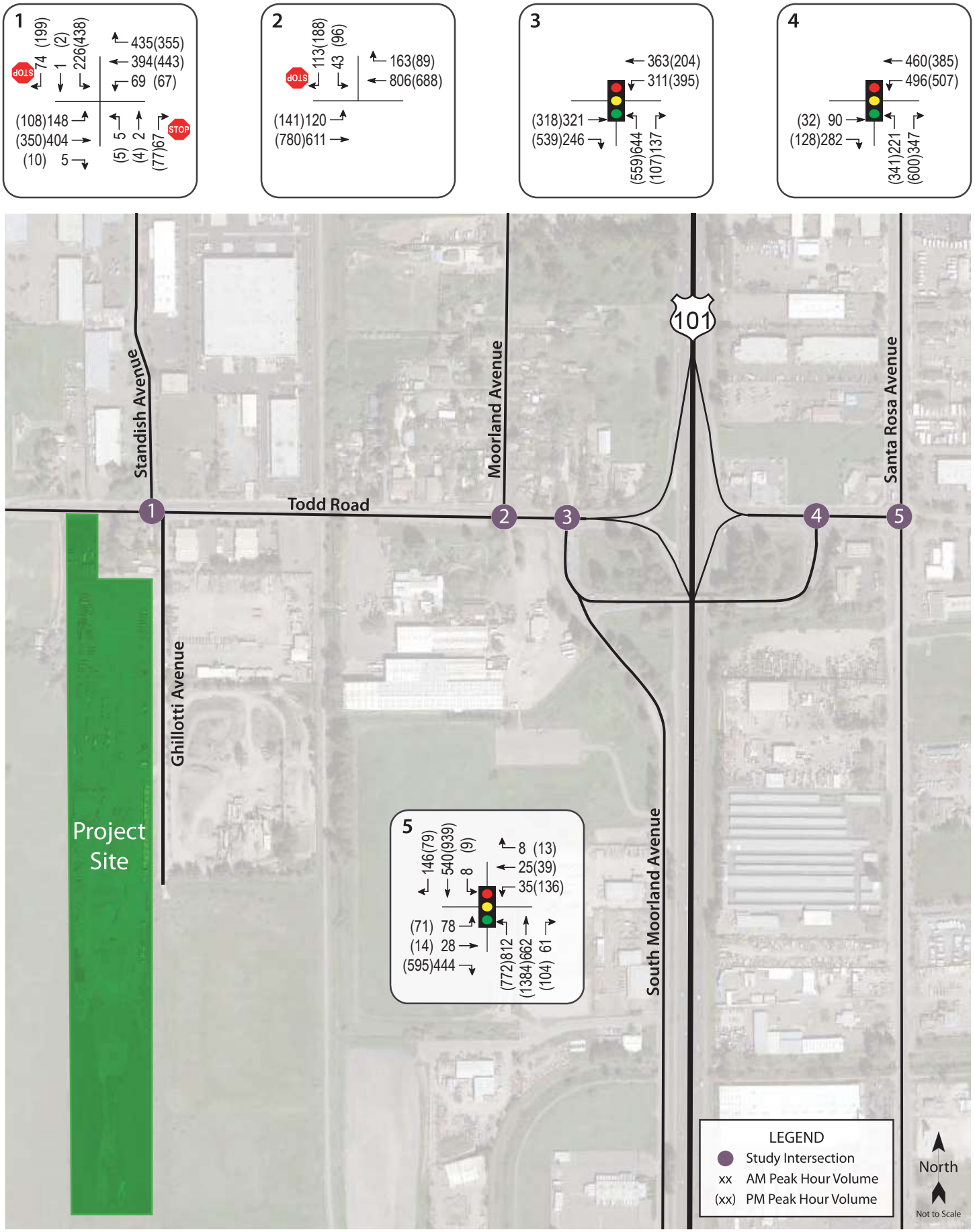
Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* ** = delay greater than 120 seconds; **Bold** text = deficient operation; Shaded cells = conditions with recommended improvements

Finding – Consistent with Existing plus Project Conditions, the project would increase the overall average delay at Todd Road/Standish Avenue-Ghilotti Avenue by more than five seconds during the p.m. peak hour and therefore would have a significant impact per the County Standard.

Recommendation – As stated previously, the County is planning on installing a traffic signal at Todd Road/ Standish Avenue-Ghilotti Avenue and will accept proportional share payments towards this project. To mitigate its impacts, the project should pay its proportional share of 11.1 percent toward the cost of the improvements.

Future plus Project Conditions

Upon the addition of project-related traffic to Future volumes, the study intersections that were operating acceptably would continue to operate acceptably and the intersections that were operating unacceptably would continue to operate unacceptably. Future plus Project volumes are shown in Figure 10, and the Future plus Project levels of service are summarized in Table 11.



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Traffic Impact Study for the Ghilotti Construction Yard

Figure 10 – Future plus Project Traffic Volumes

Table 11 – Future and Future plus Project Peak Hour Intersection Levels of Service									
Study Intersection ***Approach***		**Future Conditions**				**Future plus Project**			
		AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
		Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1.	Todd Rd/Standish Ave-Ghilotti Ave	**	**F**	**	**F**	**	**F**	**	**F**
	Northbound (Ghilotti Ave) Approach	*18.2*	*C*	*17.9*	*C*	*17.3*	*C*	*18.2*	*C*
	Southbound (Standish Ave) Approach	**	***F***	**	***F***	**	***F***	**	***F***
	With signal and SB left-turn lane	30.1	C	38.2	D	36.6	D	44.1	D
2.	Todd Rd/Moorland Ave	3.8	A	14.3	B	4.2	A	17.5	C
	Southbound (Moorland Ave) Approach	*35.1*	*E*	*91.4*	*F*	*40.8*	*E*	*116.8*	*F*
3.	Todd Rd/US 101 South Ramps	19.6	B	18.9	B	21.4	C	16.4	B
4.	Todd Rd/US 101 North Ramps	7.6	A	7.4	A	7.5	A	7.4	A
5.	Todd Rd/Santa Rosa Ave	**63.8**	**F**	**77.2**	**F**	**63.9**	**F**	**80.4**	**F**
	With two NB Left-turn Lanes	24.1	C	40.8	D	21.2	C	38.2	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; Results for minor approaches to two-way stop-controlled intersections are indicated in *italics;* ** = delay greater than 120 seconds; **Bold** text = deficient operation; Shaded cells = conditions with recommended improvements; SB = Southbound; NB = Northbound

Finding – Installation of a traffic signal at Todd Road/Standish Avenue-Ghilotti Avenue will be necessary to achieve acceptable operation under the projected Future conditions with or without the proposed project. Although Todd Road/Santa Rosa Avenue is expected to deteriorate to LOS F under Future Conditions, the addition of project traffic would result in less than a five-second increase in delay at the intersection, so the impact would be less-than-significant impact under the County's criterion. As noted for Future conditions without the project, in order for the intersection to operate acceptably the northbound approach would need to be restriped to provide two left-turn lanes. This improvement could be accomplished by restriping the western through lane into a second left-turn lane and the dedicated right-turn lane into a shared through/right-turn lane. This configuration would result in two left-turn lanes, a single through lane, and a shared through/right-turn lane.

Recommendation – As stated previously, the County is planning on installing a traffic signal at Todd Road/ Standish Avenue-Ghilotti Avenue and will accept proportional share payments towards this project. To mitigate its impacts, the project should pay its proportional share of 11.1 percent toward the cost of the improvements.

Queuing

Under each scenario, the projected 95th percentile queues in the left-turn pockets at the study intersections were determined using the SimTraffic application of Synchro, and averaging the 95th percentile queue for each of ten runs. All five intersections were evaluated with their existing controls and lane configurations for all scenarios; no improvements were assumed to be in place. These results are summarized in Table 12 and copies of the SimTraffic projections are contained in Appendix F.

Table 12 – 95th Percentile Left-turn Queues at Study Intersections

Study Intersection Approach	Avail. Storage	95th Percentile Queues											
		AM Peak Hour						PM Peak Hour					
		E	E+P	B	B+P	F	F+P	E	E+P	B	B+P	F	F+P
Todd Rd/Standish Ave-Ghilotti Ave													
Southbound	-	134	111	106	147	529	520	213	269	208	270	541	480
Eastbound	120	46	43	43	39	75	83	29	28	30	29	63	32
Westbound	150	11	28	11	30	18	28	9	24	14	25	14	10
Todd Rd/Moorland Ave													
Southbound	50	**97**	**139**	**124**	**137**	**72**	**140**	**204**	**387**	**137**	**254**	**277**	**230**
Eastbound	100	23	20	17	25	65	86	37	35	33	52	57	58
Todd Rd/US 101 S Ramps													
Northbound	160	**298**	**290**	**278**	**307**	**300**	**296**	**304**	**292**	**263**	**293**	**230**	**238**
Westbound	285	132	141	148	146	200	216	259	284	249	259	205	248
Todd Rd/US 101 N Ramps													
Northbound	100	**133**	**137**	**111**	**139**	**158**	**153**	**110**	**118**	**117**	**130**	**154**	**156**
Westbound	190	136	126	129	124	149	152	143	134	138	175	132	131
Todd Rd/Santa Rosa Ave													
Northbound	105	**155**	**158**	**169**	**171**	**342**	**365**	**264**	**268**	**305**	**292**	**340**	**370**
Southbound	200	25	20	17	22	11	19	39	60	39	48	19	13
Eastbound	300	85	82	92	99	54	54	116	136	123	141	45	46
Westbound	60	27	37	26	33	48	53	**86**	**82**	**62**	**73**	**104**	**104**

Notes: 95th Percentile Queue based on the average of ten SimTraffic runs; all distances are measured in feet; E = Existing conditions; E+P = Existing plus Project conditions; B = Baseline conditions; B+P = Baseline plus Project conditions; F = Future conditions; F+P = Future plus Project conditions; **Bold** = queue length exceeds available storage

At Todd Road/Standish Avenue-Ghilotti Avenue, no left-turn queues are expected to exceed available storage; however the southbound left-turn queue is projected to reach a maximum length of 541 feet during the evening peak hour under Future Conditions. Signalization of the intersection and the provision of a separate left-turn lane would be expected to reduce the southbound queue to a more reasonable length.

Southbound queues are expected to exceed available storage at Todd Road/Moorland Avenue during both peak hours and for all evaluated scenarios; however there is no potential to extend the existing left-turn lane without acquiring additional right-of-way. The County should consider installing a traffic signal at the intersection. In addition to reducing queuing, a traffic signal would also reduce the high delay projected for the southbound approach under Future Conditions.

Northbound queues are expected to exceed available storage at Todd Road/US 101 South ramps and Todd Road/US 101 North ramps during both peak hours and for all evaluated scenarios. There is no potential to extend the northbound left-turn lane at Todd Road/US 101 South ramps due to the proximity of the South Moorland Avenue/Overcrossing intersection; however there is room to extend the northbound left-turn lane at Todd Road/US 101 North ramps. As this is a tee intersection, there is no through traffic to be impacted by the excess queueing, though some modification to the signal timing could achieve relief and allow right-turning traffic to

pass by the queue of left-turning vehicles. Again, because there is no higher-speed through traffic, the normal safety concern associated with left-turn queues that extend beyond available storage does not apply.

At Todd Road/Santa Rosa Avenue, left-turn queues are expected to exceed available storage in the northbound direction during both peak hours and all evaluated scenarios; however because the left-turn lane connects to a two-way left-turn lane that extends approximately 2,500 feet to Mountain View Avenue there is no safety concern associated with the queuing. Field observations confirmed that the queue is currently extending into the two-way left-turn lane well beyond the end of the existing left-turn lane during the p.m. peak hour. The dual left-turn lanes identified as being needed to reduce the northbound approach delay under Future Conditions would also reduce queuing. Westbound left-turn queues are expected to exceed available storage under all evaluated scenarios during the evening peak hour; however the project would not add any trips to this movement.

Finding – The project would not cause any queues to exceed available storage that would not be expected to exceed available storage without the project.

Alternative Modes

Pedestrian Facilities

The proposed use of the site as a construction yard would not be expected to generate any pedestrian traffic so the existing lack of pedestrian facilities would have no impact.

Finding – Pedestrian facilities serving the project site are adequate for the demand given the rural setting.

Bicycle Facilities

The planned bicycle facilities summarized in the *2010 Santa Rosa Bicycle and Pedestrian Master Plan* would provide adequate access for the anticipated demand. Since the project site has limited frontage on Todd Road and it would make more sense to stripe an appreciable length of the roadway in both directions versus an isolated short segment in one direction only, the project should make an in-lieu payment towards the planned bicycle facility improvements to be completed at a later time.

Finding – Bicycle facilities serving the project site are expected to be adequate upon completion of the planned improvements.

Recommendation – Because the project site has frontage on Todd Road and Class II bike lanes are planned on the roadway, the project should make an in-lieu payment to the County towards the cost of striping a future Class II bike lane along the project frontage.

Transit

Existing transit routes are adequate to accommodate project-generated transit trips and the stops on Todd Road east of the project site are within acceptable walking distance.

Finding – Transit facilities serving the project site are adequate.

Access and Circulation

Site Access

Sight Distance

At unsignalized driveways and intersections, a substantially clear line of sight should be maintained between the driver of a vehicle waiting on the driveway and the driver of an approaching vehicle. Adequate time must be provided for the waiting vehicle to either cross, turn left, or turn right, without requiring the through traffic drivers to radically alter their speed.

Sight distances along Todd Road at Ghilotti Avenue were evaluated based on sight distance criteria contained in *A Policy on Geometric Design on Highways and Streets* published by American Association of State Highway and Transportation Officials (AASHTO). These guidelines include recommended sight distances at intersections, including stopping sight distances for drivers traveling along the major approaches and for drivers of stopped vehicles at the minor street approaches and driveways. These recommendations are based upon approach travel speeds, and take into account which direction a vehicle would turn onto the major approach, with greater sight distance needed for the more time-consuming task of turning left as compared to turning right.

For the posted 35-mph speed limit on Todd Road adjacent to the project site, the recommended corner sight distance is 390 feet for a left-turn and 335 feet for a right turn. Based on a review of the field conditions, sight distance extends 500 feet to both the east and west which is enough to satisfy speeds greater than 35 mph.

Radar speed samples were obtained on the westbound and eastbound approaches of Todd Road at Ghilotti Avenue and prevailing speeds were found to be at or below the posted 35-mph speed limit in both directions. The 85th percentile speed for westbound vehicles was 29 mph, with a peak observed speed of 30 mph; in the eastbound direction, the 85th percentile speed was 35 mph, with a peak observed speed of 41 mph. Based on these actual approach speeds, the available sight distance in each direction is adequate. A copy of the speed survey data is contained in Appendix G.

Finding – Sight distances along Todd Road at Ghilotti Avenue are adequate for the posted speed limit; however, it is noted that the bushes/trees along the roadway frontage west of Ghilotti Avenue have the potential to interrupt sight lines.

Recommendation – To ensure that adequate sight lines are maintained to the west from Ghilotti Avenue it is recommended that the bushes/trees along the roadway frontage be regularly maintained.

Conclusions and Recommendations

Conclusions

- The project is expected to generate a maximum of 50 new truck trips per day including a maximum of 30 trips during either the a.m. or p.m. peak hour.
- Under Existing Conditions the study intersections operate acceptably at LOS A or B overall during the a.m. peak hour; however, Todd Road/Standish Avenue-Ghilotti Avenue operates unacceptably at LOS E overall during the p.m. peak hour.
- Under Existing Conditions, p.m. peak hour volumes at the intersection of Todd Road/Standish Avenue-Ghilotti Avenue are sufficient to meet the Peak Hour Volume signal warrant.
- Upon the addition of project-generated traffic to Existing volumes, the study intersections are expected to continue operating acceptably during the a.m. peak hour, but Todd Road/Standish Avenue-Ghilotti Avenue is expected to deteriorate to LOS F during the p.m. peak hour with an increase in average delay that exceeds the five seconds allowed under County Standards.
- Under Baseline Conditions, which includes traffic associated with the Shamrock Materials facility, all study intersections would operate acceptably during both peak hours except that Todd Road/Standish Avenue-Ghilotti Avenue is expected to continue operating unacceptably at LOS E during the p.m. peak hour.
- Upon the addition of project-related traffic to Baseline volumes, the study intersections would be expected to continue operating acceptably except for Todd Road/Standish Avenue-Ghilotti Avenue which would deteriorate to LOS F during the p.m. peak hour with an increase in average delay that exceeds five seconds.
- Under the anticipated Future volumes, the intersections of Todd Road with the US 101 North and South ramps and Todd Road/Moorland Avenue are expected to continue operating acceptably overall during both peak hours; Todd Road/Standish Avenue-Ghilotti Avenue and Todd Road/Santa Rosa Avenue are expected to operate unacceptably at LOS F during both peak hours.
- Upon the addition of project-related traffic to Future volumes, the study intersections would all be expected to continue operating at the same levels of service as without it.
- The project would not cause any left-turn queues to exceed available storage that would not be expected to exceed available storage without the project.
- Pedestrian and transit facilities are adequate to serve the project site given the site location and anticipated demand. Bicycle facilities will be adequate upon completion of the planned Class II bike lanes on Todd Road.
- Sight distances along Todd Road at Ghilotti Avenue are adequate for the measured approach speeds and the posted speed limit.

Recommendations

- It is understood that the County is planning on installing a traffic signal at Todd Road/Standish Avenue-Ghilotti Avenue and will accept proportional share payments towards this project. As part of these

improvements the Standish Avenue approach should be restriped to provide a southbound left-turn lane with at least 135 feet of storage length.

- The County should consider restriping the northbound approach at Santa Rosa Avenue/Todd Road to provide two northbound left-turn lanes to accommodate the anticipated growth under Future volumes.

- The project applicant should pay a proportional share fee of 11.1 percent toward the installation of a traffic signal and southbound left-turn lane at Todd Road/Standish Avenue-Ghilotti Avenue.

- The project applicant should make an in-lieu payment toward the cost of striping a Class II bike lane along the project frontage on Todd Road.

- The bushes/trees along the roadway frontage west of Ghilotti Avenue should be trimmed regularly to maintain adequate sight lines.

Study Participants and References

Study Participants

Principal in Charge	Dalene J. Whitlock, PE, PTOE
Assistant Engineer	Cameron Nye, EIT
Graphics	Hannah Yung
Editing/Formatting	Angela McCoy

References

2010 Santa Rosa Bicycle and Pedestrian Master Plan, City of Santa Rosa, 2010
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Appendix A

Collision Rate Calculations

Intersection Collision Rate Calculations

Ghilotti Construction Yard TIS

Intersection # 1: Todd Rd & Standish Ave-Ghilotti Ave

Date of Count: Wednesday, June 07, 2017

Number of Collisions: 10
Number of Injuries: 3
Number of Fatalities: 0
ADT: 11900
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

Intersection Type: Offset
Control Type: Stop & Yield Controls
Area: Suburban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{10 \times 1{,}000{,}000}{11{,}900 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.46 c/mve**	**0.0%**	**30.0%**
Statewide Average*	**0.26 c/mve**	**0.9%**	**37.4%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 2: Todd Rd & Moorland Ave

Date of Count: Wednesday, June 07, 2017

Number of Collisions: 17
Number of Injuries: 7
Number of Fatalities: 0
ADT: 14600
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

Intersection Type: Tee
Control Type: Stop & Yield Controls
Area: Suburban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{17 \times 1{,}000{,}000}{14{,}600 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.64 c/mve**	**0.0%**	**41.2%**
Statewide Average*	**0.14 c/mve**	**0.7%**	**38.0%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Ghilotti Construction Yard TIS

Intersection # 3: Todd Rd & US 101 S Ramps

Date of Count: Wednesday, June 07, 2017

Number of Collisions: 12
Number of Injuries: 2
Number of Fatalities: 0
ADT: 17800
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Suburban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{12 \times 1{,}000{,}000}{17{,}800 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.37 c/mve**	**0.0%**	**16.7%**
Statewide Average*	**0.43 c/mve**	**0.4%**	**37.9%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection # 4: Todd Rd & US 101 N Ramps

Date of Count: Wednesday, June 07, 2017

Number of Collisions: 8
Number of Injuries: 2
Number of Fatalities: 0
ADT: 17400
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

Intersection Type: Tee
Control Type: Signals
Area: Suburban

$$\text{collision rate} = \frac{\text{Number of Collisions x 1 Million}}{\text{ADT x 365 Days per Year x Number of Years}}$$

$$\text{collision rate} = \frac{8 \times 1{,}000{,}000}{17{,}400 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.25 c/mve**	**0.0%**	**25.0%**
Statewide Average*	**0.27 c/mve**	**0.6%**	**37.3%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Intersection Collision Rate Calculaions

Ghilotti Construction Yard TIS

Intersection # 5: Santa Rosa Ave & Todd Rd

Date of Count: Thursday, April 27, 2017

Number of Collisions: 27
Number of Injuries: 3
Number of Fatalities: 0
ADT: 30400
Start Date: January 1, 2012
End Date: December 31, 2016
Number of Years: 5

Intersection Type: Four-Legged
Control Type: Signals
Area: Suburban

$$\text{collision rate} = \frac{\text{Number of Collisions} \times 1 \text{ Million}}{\text{ADT} \times 365 \text{ Days per Year} \times \text{Number of Years}}$$

$$\text{collision rate} = \frac{27 \times 1{,}000{,}000}{30{,}400 \times 365 \times 5}$$

	Collision Rate	Fatality Rate	Injury Rate
Study Intersection	**0.49 c/mve**	**0.0%**	**11.1%**
Statewide Average*	**0.43 c/mve**	**0.4%**	**37.9%**

ADT = average daily total vehicles entering intersection
c/mve = collisions per million vehicles entering intersection
* 2013 Collision Data on California State Highways, Caltrans

Appendix B

Unsignalized Intersection Level of Service Calculations

Generated with PTV VISTRO

Version 5.00-00

Intersection Level Of Service Report

Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	54.5
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.720

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	2	10	150	1	43	91	283	2	12	232	259
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	2	10	150	1	43	91	283	2	12	232	259
Peak Hour Factor	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	3	40	0	12	25	76	1	3	63	70
Total Analysis Volume [veh/h]	2	2	11	162	1	46	98	305	2	13	250	279
Pedestrian Volume [ped/h]	0			0			0			0		

Generated with PTV VISTRO

Version 5.00-00

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.01	0.72	0.00	0.07	0.09	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	22.63	23.15	10.20	54.46	53.26	43.92	8.83	0.00	0.00	7.90	0.00	0.00
Movement LOS	C	C	B	F	F	E	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.11	0.11	0.11	5.77	5.77	5.77	0.31	0.00	0.00	0.03	0.00	0.00
95th-Percentile Queue Length [ft]	2.68	2.68	2.68	144.16	144.16	144.16	7.80	0.00	0.00	0.79	0.00	0.00
d_A, Approach Delay [s/veh]	13.58			52.14			2.14			0.19		
Approach LOS	B			F			A			A		
d_I, Intersection Delay [s/veh]	10.31											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	51.8
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.668

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	124	30	12	475	494	143
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	124	30	12	475	494	143
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	8	3	132	137	40
Total Analysis Volume [veh/h]	138	33	13	528	549	159
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane						
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.67	0.07	0.01	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	51.81	13.01	9.10	0.00	0.00	0.00
Movement LOS	F	B	A	A	A	A
95th-Percentile Queue Length [veh]	4.09	0.22	0.04	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	102.29	5.48	1.11	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	44.32		0.22		0.00	
Approach LOS	E		A		A	
d_I, Intersection Delay [s/veh]	5.42					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	138.5
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.050

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	4	20	252	2	65	45	316	7	10	264	171
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	4	20	252	2	65	45	316	7	10	264	171
Peak Hour Factor	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	5	68	1	17	12	85	2	3	71	46
Total Analysis Volume [veh/h]	2	4	21	271	2	70	48	339	8	11	284	184
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.03	1.05	0.01	0.10	0.04	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	20.98	19.62	10.56	138.50	137.17	129.92	8.44	0.00	0.00	8.00	0.00	0.00
Movement LOS	C	C	B	F	F	F	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.17	0.17	0.17	14.47	14.47	14.47	0.14	0.00	0.00	0.03	0.00	0.00
95th-Percentile Queue Length [ft]	4.31	4.31	4.31	361.75	361.75	361.75	3.44	0.00	0.00	0.69	0.00	0.00
d_A, Approach Delay [s/veh]	12.68			136.74			1.03			0.18		
Approach LOS	B			F			A			A		
d_I, Intersection Delay [s/veh]	38.37											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	92.1
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.873

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	142	30	40	606	428	189
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	142	30	40	606	428	189
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	38	8	11	161	114	50
Total Analysis Volume [veh/h]	151	32	43	645	455	201
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane						
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.87	0.06	0.05	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	92.14	12.21	9.05	0.00	0.00	0.00
Movement LOS	F	B	A	A	A	A
95th-Percentile Queue Length [veh]	6.28	0.19	0.15	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	156.97	4.80	3.63	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	78.17		0.57		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	9.62					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	16.9
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.582

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	2	10	150	1	43	91	283	2	12	232	259
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	2	10	150	1	43	91	283	2	12	232	259
Peak Hour Factor	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	3	40	0	12	25	76	1	3	63	70
Total Analysis Volume [veh/h]	2	2	11	162	1	46	98	305	2	13	250	279
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	21	0	0	9	0	10	9	0	21	20	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	1	8	8	4	34	1	31
g / C, Green / Cycle	0.02	0.13	0.13	0.07	0.57	0.02	0.52
(v / s)_i Volume / Saturation Flow Rate	0.01	0.09	0.03	0.06	0.17	0.01	0.31
s, saturation flow rate [veh/h]	1640	1774	1588	1774	1861	1774	1704
c, Capacity [veh/h]	34	224	200	132	1059	33	875
d1, Uniform Delay [s]	29.18	25.34	23.73	27.34	6.70	29.26	10.35
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.70	4.41	0.59	7.93	0.69	7.54	3.09
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.44	0.72	0.23	0.74	0.29	0.40	0.60
d, Delay for Lane Group [s/veh]	37.88	29.75	24.32	35.27	7.39	36.79	13.45
Lane Group LOS	D	C	C	D	A	D	B
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	0.30	2.37	0.60	1.57	1.69	0.24	4.57
50th-Percentile Queue Length [ft]	7.50	59.15	15.03	39.35	42.25	6.08	114.31
95th-Percentile Queue Length [veh]	0.54	4.26	1.08	2.83	3.04	0.44	8.08
95th-Percentile Queue Length [ft]	13.51	106.46	27.06	70.83	76.05	10.94	201.98

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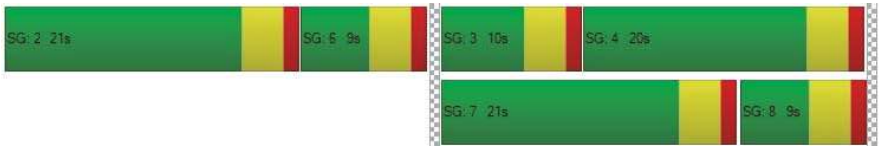
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	37.88	37.88	37.88	29.75	24.32	24.32	35.27	7.39	7.39	36.79	13.45	13.45
Movement LOS	D	D	D	C	C	C	D	A	A	D	B	B
d_A, Approach Delay [s/veh]	37.88			28.53			14.14			14.01		
Approach LOS	D			C			B			B		
d_I, Intersection Delay [s/veh]	16.95											
Intersection LOS	B											
Intersection V/C	0.582											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-	
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-	
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	



Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	18.2
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.634

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	4	20	252	2	65	45	316	7	10	264	171
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	4	20	252	2	65	45	316	7	10	264	171
Peak Hour Factor	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	5	68	1	17	12	85	2	3	71	46
Total Analysis Volume [veh/h]	2	4	21	271	2	70	48	339	8	11	284	184
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	9	0	0	26	0	9	16	0	9	16	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	2	12	12	3	30	1	28
g / C, Green / Cycle	0.03	0.19	0.19	0.05	0.50	0.02	0.46
(v / s)_i Volume / Saturation Flow Rate	0.02	0.15	0.05	0.03	0.19	0.01	0.27
s, saturation flow rate [veh/h]	1633	1774	1590	1774	1855	1774	1742
c, Capacity [veh/h]	53	343	307	85	914	29	803
d1, Uniform Delay [s]	28.69	23.17	20.56	28.09	9.54	29.36	11.98
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	7.24	4.12	0.39	5.78	1.20	8.14	3.08
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.51	0.79	0.23	0.57	0.38	0.38	0.58
d, Delay for Lane Group [s/veh]	35.93	27.29	20.95	33.87	10.74	37.50	15.06
Lane Group LOS	D	C	C	C	B	D	B
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	0.50	3.79	0.83	0.77	2.58	0.21	4.43
50th-Percentile Queue Length [ft]	12.43	94.69	20.84	19.21	64.39	5.32	110.80
95th-Percentile Queue Length [veh]	0.89	6.82	1.50	1.38	4.64	0.38	7.88
95th-Percentile Queue Length [ft]	22.37	170.45	37.52	34.58	115.90	9.57	197.12

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	35.93	35.93	35.93	27.29	20.95	20.95	33.87	10.74	10.74	37.50	15.06	15.06
Movement LOS	D	D	D	C	C	C	C	B	B	D	B	B
d_A, Approach Delay [s/veh]	35.93			25.96			13.55			15.57		
Approach LOS	D			C			B			B		
d_I, Intersection Delay [s/veh]	18.24											
Intersection LOS	B											
Intersection V/C	0.634											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	61.5
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.751

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	2	17	150	1	43	91	283	3	19	232	259
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	2	17	150	1	43	91	283	3	19	232	259
Peak Hour Factor	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	5	40	0	12	25	76	1	5	63	70
Total Analysis Volume [veh/h]	3	2	18	162	1	46	98	305	3	20	250	279
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop		Stop		Free		Free	
Flared Lane	No		Yes					
Storage Area [veh]	0		1		0		0	
Two-Stage Gap Acceptance	No		No					
Number of Storage Spaces in Median	0		0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.02	0.75	0.00	0.07	0.09	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	23.21	23.72	10.31	61.51	60.00	50.27	8.83	0.00	0.00	7.92	0.00	0.00
Movement LOS	C	C	B	F	F	F	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.16	0.16	0.16	6.26	6.26	6.26	0.31	0.00	0.00	0.05	0.00	0.00
95th-Percentile Queue Length [ft]	3.90	3.90	3.90	156.54	156.54	156.54	7.80	0.00	0.00	1.22	0.00	0.00
d_A, Approach Delay [s/veh]	13.16			59.03			2.13			0.29		
Approach LOS	B			F			A			A		
d_I, Intersection Delay [s/veh]	11.51											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	54.4
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.684

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	124	30	12	482	501	143
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	124	30	12	482	501	143
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	8	3	134	139	40
Total Analysis Volume [veh/h]	138	33	13	536	557	159
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.68	0.07	0.01	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	54.36	13.10	9.13	0.00	0.00	0.00
Movement LOS	F	B	A	A	A	A
95th-Percentile Queue Length [veh]	4.23	0.22	0.04	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	105.86	5.55	1.12	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	46.40		0.22		0.00	
Approach LOS	E		A		A	
d_I, Intersection Delay [s/veh]	5.61					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	152.7
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.084

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	4	25	252	2	65	45	316	7	15	264	171
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	4	25	252	2	65	45	316	7	15	264	171
Peak Hour Factor	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	7	68	1	17	12	85	2	4	71	46
Total Analysis Volume [veh/h]	2	4	27	271	2	70	48	339	8	16	284	184
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.04	1.08	0.01	0.10	0.04	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	21.32	19.92	10.61	152.67	151.10	143.63	8.44	0.00	0.00	8.01	0.00	0.00
Movement LOS	C	C	B	F	F	F	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.20	0.20	0.20	15.18	15.18	15.18	0.14	0.00	0.00	0.04	0.00	0.00
95th-Percentile Queue Length [ft]	5.06	5.06	5.06	379.52	379.52	379.52	3.44	0.00	0.00	1.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.39			150.81			1.03			0.26		
Approach LOS	B			F			A			A		
d_I, Intersection Delay [s/veh]	41.97											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	96.0
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.887

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	142	30	40	611	433	189
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	142	30	40	611	433	189
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	38	8	11	163	115	50
Total Analysis Volume [veh/h]	151	32	43	650	461	201
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.89	0.06	0.05	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	96.05	12.28	9.07	0.00	0.00	0.00
Movement LOS	F	B	A	A	A	A
95th-Percentile Queue Length [veh]	6.42	0.19	0.15	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	160.45	4.84	3.65	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	81.40		0.56		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	9.94					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	17.5
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.589

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	2	17	150	1	43	91	283	3	19	232	259
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	2	17	150	1	43	91	283	3	19	232	259
Peak Hour Factor	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	5	40	0	12	25	76	1	5	63	70
Total Analysis Volume [veh/h]	3	2	18	162	1	46	98	305	3	20	250	279
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	21	0	0	9	0	10	9	0	21	20	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	2	8	8	4	33	1	31
g / C, Green / Cycle	0.03	0.12	0.12	0.07	0.56	0.02	0.51
(v / s)_i Volume / Saturation Flow Rate	0.01	0.09	0.03	0.06	0.17	0.01	0.31
s, saturation flow rate [veh/h]	1627	1774	1588	1774	1860	1774	1704
c, Capacity [veh/h]	47	223	200	132	1030	46	861
d1, Uniform Delay [s]	28.83	25.35	23.73	27.34	7.20	28.93	10.70
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	7.61	4.43	0.60	7.95	0.74	6.28	3.27
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.49	0.72	0.23	0.74	0.30	0.43	0.61
d, Delay for Lane Group [s/veh]	36.44	29.77	24.33	35.29	7.94	35.21	13.97
Lane Group LOS	D	C	C	D	A	D	B
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	0.43	2.37	0.60	1.57	1.80	0.35	4.71
50th-Percentile Queue Length [ft]	10.81	59.18	15.04	39.36	45.03	8.68	117.63
95th-Percentile Queue Length [veh]	0.78	4.26	1.08	2.83	3.24	0.62	8.26
95th-Percentile Queue Length [ft]	19.45	106.52	27.07	70.85	81.05	15.62	206.56

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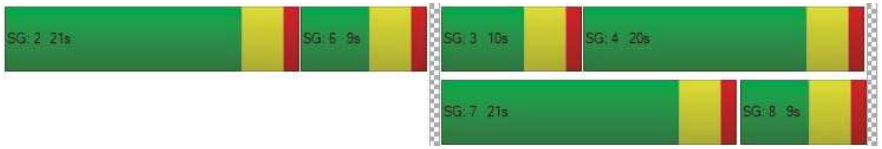
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	36.44	36.44	36.44	29.77	24.33	24.33	35.29	7.94	7.94	35.21	13.97	13.97
Movement LOS	D	D	D	C	C	C	D	A	A	D	B	B
d_A, Approach Delay [s/veh]	36.44			28.55			14.54			14.74		
Approach LOS	D			C			B			B		
d_I, Intersection Delay [s/veh]	17.53											
Intersection LOS	B											
Intersection V/C	0.589											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-	
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-	
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	



Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	18.6
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.639

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	4	25	252	2	65	45	316	7	15	264	171
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	4	25	252	2	65	45	316	7	15	264	171
Peak Hour Factor	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	7	68	1	17	12	85	2	4	71	46
Total Analysis Volume [veh/h]	2	4	27	271	2	70	48	339	8	16	284	184
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	9	0	0	26	0	9	16	0	9	16	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	2	12	12	3	29	1	28
g / C, Green / Cycle	0.04	0.19	0.19	0.05	0.48	0.02	0.46
(v / s)_i Volume / Saturation Flow Rate	0.02	0.15	0.05	0.03	0.19	0.01	0.27
s, saturation flow rate [veh/h]	1623	1774	1590	1774	1855	1774	1742
c, Capacity [veh/h]	61	342	307	85	894	39	794
d1, Uniform Delay [s]	28.49	23.17	20.57	28.09	9.95	29.11	12.20
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	7.15	4.13	0.39	5.78	1.27	6.87	3.19
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.54	0.79	0.23	0.57	0.39	0.41	0.59
d, Delay for Lane Group [s/veh]	35.65	27.30	20.95	33.88	11.22	35.98	15.39
Lane Group LOS	D	C	C	C	B	D	B
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	0.60	3.79	0.83	0.77	2.66	0.29	4.50
50th-Percentile Queue Length [ft]	14.93	94.72	20.84	19.21	66.55	7.20	112.58
95th-Percentile Queue Length [veh]	1.07	6.82	1.50	1.38	4.79	0.52	7.98
95th-Percentile Queue Length [ft]	26.87	170.50	37.52	34.58	119.79	12.96	199.59

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	35.65	35.65	35.65	27.30	20.95	20.95	33.88	11.22	11.22	35.98	15.39	15.39
Movement LOS	D	D	D	C	C	C	C	B	B	D	B	B
d_A, Approach Delay [s/veh]	35.65			25.97			13.97			16.07		
Approach LOS	D			C			B			B		
d_I, Intersection Delay [s/veh]	18.63											
Intersection LOS	B											
Intersection V/C	0.639											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report

Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	751.5
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	2.319

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	2	24	226	1	74	148	404	3	26	394	435
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	2	24	226	1	74	148	404	3	26	394	435
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	6	57	0	19	37	101	1	7	99	109
Total Analysis Volume [veh/h]	3	2	24	226	1	74	148	404	3	26	394	435
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.02	0.04	2.32	0.01	0.15	0.18	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	49.30	47.83	11.84	751.48	745.26	721.84	10.50	0.00	0.00	8.20	0.00	0.00
Movement LOS	E	E	B	F	F	F	B	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.32	0.32	0.32	26.65	26.65	26.65	0.67	0.00	0.00	0.07	0.00	0.00
95th-Percentile Queue Length [ft]	7.90	7.90	7.90	666.25	666.25	666.25	16.82	0.00	0.00	1.73	0.00	0.00
d_A, Approach Delay [s/veh]	18.20			744.17			2.80			0.25		
Approach LOS	C			F			A			A		
d_I, Intersection Delay [s/veh]	130.05											
Intersection LOS	F											

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Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	75.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.473

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	43	111	118	570	765	163
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	43	111	118	570	765	163
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	28	30	143	191	41
Total Analysis Volume [veh/h]	43	111	118	570	765	163
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.47	0.31	0.16	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	75.94	19.28	10.82	0.00	0.00	0.00
Movement LOS	F	C	B	A	A	A
95th-Percentile Queue Length [veh]	2.01	1.27	0.57	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	50.35	31.87	14.20	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	35.10		1.85		0.00	
Approach LOS	E		A		A	
d_I, Intersection Delay [s/veh]	3.78					
Intersection LOS	F					

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Intersection Level Of Service Report

Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	1,426.6
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	3.609

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	4	34	438	2	199	108	350	8	24	443	355
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	4	34	438	2	199	108	350	8	24	443	355
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	9	110	1	50	27	88	2	6	111	89
Total Analysis Volume [veh/h]	3	4	34	438	2	199	108	350	8	24	443	355
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.03	0.05	3.61	0.01	0.41	0.13	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	60.03	37.45	11.86	1426.63	1421.18	1404.35	10.02	0.00	0.00	8.06	0.00	0.00
Movement LOS	F	E	B	F	F	F	B	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.43	0.43	0.43	63.80	63.80	63.80	0.45	0.00	0.00	0.06	0.00	0.00
95th-Percentile Queue Length [ft]	10.87	10.87	10.87	1594.98	1594.98	1594.98	11.25	0.00	0.00	1.53	0.00	0.00
d_A, Approach Delay [s/veh]	17.88			1419.67			2.32			0.24		
Approach LOS	C			F			A			A		
d_I, Intersection Delay [s/veh]	461.98											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	232.1
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.143

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	96	186	139	739	647	89
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	96	186	139	739	647	89
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	47	35	185	162	22
Total Analysis Volume [veh/h]	96	186	139	739	647	89
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	1.14	0.42	0.16	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	232.06	18.82	9.93	0.00	0.00	0.00
Movement LOS	F	C	A	A	A	A
95th-Percentile Queue Length [veh]	6.80	2.03	0.57	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	169.96	50.82	14.18	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	91.41		1.57		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	14.32					
Intersection LOS	F					

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Intersection Level Of Service Report

Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	30.1
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.825

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	2	24	226	1	74	148	404	3	26	394	435
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	2	24	226	1	74	148	404	3	26	394	435
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	6	57	0	19	37	101	1	7	99	109
Total Analysis Volume [veh/h]	3	2	24	226	1	74	148	404	3	26	394	435
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	9	0	0	15	0	13	57	0	9	53	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	90	90	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	13	13	9	56	2	49
g / C, Green / Cycle	0.03	0.15	0.15	0.10	0.62	0.03	0.55
(v / s)_i Volume / Saturation Flow Rate	0.02	0.13	0.05	0.08	0.22	0.01	0.49
s, saturation flow rate [veh/h]	1618	1774	1587	1774	1860	1774	1705
c, Capacity [veh/h]	47	259	231	180	1155	47	931
d1, Uniform Delay [s]	43.23	37.64	34.47	39.63	8.28	43.27	18.06
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.73	8.98	0.80	8.91	0.85	9.50	12.55
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.62	0.87	0.32	0.82	0.35	0.55	0.89
d, Delay for Lane Group [s/veh]	55.96	46.61	35.27	48.54	9.13	52.77	30.60
Lane Group LOS	E	D	D	D	A	D	C
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	0.82	5.43	1.50	3.57	3.60	0.69	16.56
50th-Percentile Queue Length [ft]	20.59	135.63	37.62	89.28	89.88	17.13	414.01
95th-Percentile Queue Length [veh]	1.48	9.25	2.71	6.43	6.47	1.23	23.23
95th-Percentile Queue Length [ft]	37.06	231.13	67.71	160.70	161.79	30.84	580.85

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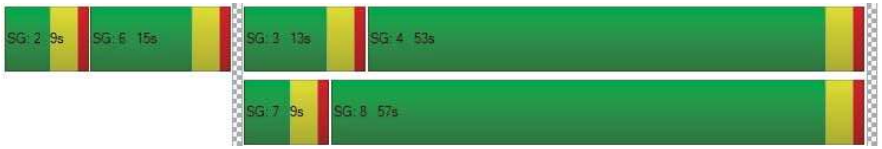
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	55.96	55.96	55.96	46.61	35.27	35.27	48.54	9.13	9.13	52.77	30.60	30.60
Movement LOS	E	E	E	D	D	D	D	A	A	D	C	C
d_A, Approach Delay [s/veh]	55.96			43.79			19.64			31.28		
Approach LOS	E			D			B			C		
d_I, Intersection Delay [s/veh]	30.14											
Intersection LOS	C											
Intersection V/C	0.825											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report

Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	38.2
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.908

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	4	34	438	2	199	108	350	8	24	443	355
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	11	0	0	66	0	0	3	0	0	66
Total Hourly Volume [veh/h]	3	4	23	438	2	133	108	350	5	24	443	289
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	6	110	1	33	27	88	1	6	111	72
Total Analysis Volume [veh/h]	3	4	23	438	2	133	108	350	5	24	443	289
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	9	0	0	27	0	9	45	0	9	45	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	90	90	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	24	24	6	45	2	41
g / C, Green / Cycle	0.03	0.27	0.27	0.07	0.50	0.03	0.45
(v / s)_i Volume / Saturation Flow Rate	0.02	0.25	0.09	0.06	0.19	0.01	0.42
s, saturation flow rate [veh/h]	1634	1774	1587	1774	1858	1774	1741
c, Capacity [veh/h]	48	472	423	129	932	45	790
d1, Uniform Delay [s]	43.19	32.17	26.48	41.18	13.82	43.36	23.18
k, delay calibration	0.11	0.26	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.60	16.74	0.43	12.89	1.18	9.73	18.46
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.63	0.93	0.32	0.83	0.38	0.54	0.93
d, Delay for Lane Group [s/veh]	55.79	48.91	26.91	54.07	15.01	53.09	41.63
Lane Group LOS	E	D	C	D	B	D	D
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	0.85	11.19	2.33	2.77	4.41	0.64	17.35
50th-Percentile Queue Length [ft]	21.22	279.64	58.28	69.35	110.30	15.94	433.63
95th-Percentile Queue Length [veh]	1.53	16.67	4.20	4.99	7.86	1.15	24.18
95th-Percentile Queue Length [ft]	38.20	416.77	104.90	124.83	196.42	28.70	604.39

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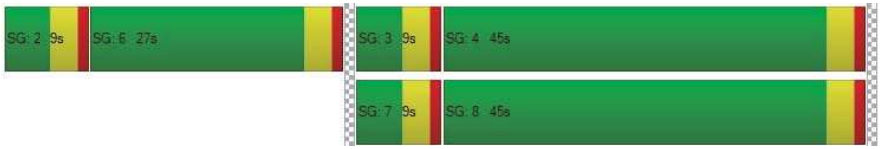
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	55.79	55.79	55.79	48.91	26.91	26.91	54.07	15.01	15.01	53.09	41.63	41.63
Movement LOS	E	E	E	D	C	C	D	B	B	D	D	D
d_A, Approach Delay [s/veh]	55.79			43.73			24.12			42.00		
Approach LOS	E			D			C			D		
d_I, Intersection Delay [s/veh]	38.23											
Intersection LOS	D											
Intersection V/C	0.908											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	116.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.947

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	2	10	150	1	43	91	283	2	12	232	259
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	42	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	2	53	150	1	43	91	283	4	54	232	259
Peak Hour Factor	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	14	40	0	12	25	76	1	15	63	70
Total Analysis Volume [veh/h]	4	2	57	162	1	46	98	305	4	58	250	279
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.01	0.08	0.95	0.00	0.07	0.09	0.00	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	26.37	26.79	10.72	116.91	113.27	101.34	8.83	0.00	0.00	8.02	0.00	0.00
Movement LOS	D	D	B	F	F	F	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.38	0.38	0.38	8.97	8.97	8.97	0.31	0.00	0.00	0.15	0.00	0.00
95th-Percentile Queue Length [ft]	9.43	9.43	9.43	224.25	224.25	224.25	7.80	0.00	0.00	3.64	0.00	0.00
d_A, Approach Delay [s/veh]	12.22			113.47			2.13			0.79		
Approach LOS	B			F			A			A		
d_I, Intersection Delay [s/veh]	20.39											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	70.6
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.766

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	124	30	12	475	494	143
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	2	41	40	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	124	32	14	516	534	143
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	9	4	143	148	40
Total Analysis Volume [veh/h]	138	36	16	573	593	159
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.77	0.08	0.02	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	70.62	13.58	9.28	0.00	0.00	0.00
Movement LOS	F	B	A	A	A	A
95th-Percentile Queue Length [veh]	5.03	0.26	0.06	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	125.66	6.41	1.43	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	58.82		0.25		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	6.85					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	287.6
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.391

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	4	20	252	2	65	45	316	7	10	264	171
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	42	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	4	63	252	2	65	45	316	9	52	264	171
Peak Hour Factor	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	17	68	1	17	12	85	2	14	71	46
Total Analysis Volume [veh/h]	4	4	68	271	2	70	48	339	10	56	284	184
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.02	0.10	1.39	0.01	0.10	0.04	0.00	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	24.49	22.70	11.17	287.60	283.96	274.49	8.44	0.00	0.00	8.12	0.00	0.00
Movement LOS	C	C	B	F	F	F	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.47	0.47	0.47	20.52	20.52	20.52	0.14	0.00	0.00	0.15	0.00	0.00
95th-Percentile Queue Length [ft]	11.75	11.75	11.75	512.96	512.96	512.96	3.44	0.00	0.00	3.64	0.00	0.00
d_A, Approach Delay [s/veh]	12.48			284.90			1.02			0.87		
Approach LOS	B			F			A			A		
d_I, Intersection Delay [s/veh]	74.28											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	130.5
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.994

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	142	30	40	606	428	189
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	2	41	40	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	142	32	42	647	468	189
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	38	9	11	172	124	50
Total Analysis Volume [veh/h]	151	34	45	688	498	201
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane						
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.99	0.07	0.05	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	130.49	12.69	9.22	0.00	0.00	0.00
Movement LOS	F	B	A	A	A	A
95th-Percentile Queue Length [veh]	7.47	0.22	0.16	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	186.82	5.43	3.95	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	108.84		0.57		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	12.71					
Intersection LOS	F					

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Intersection Level Of Service Report

Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	20.0
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.620

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	2	10	150	1	43	91	283	2	12	232	259
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	42	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	2	53	150	1	43	91	283	4	54	232	259
Peak Hour Factor	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	14	40	0	12	25	76	1	15	63	70
Total Analysis Volume [veh/h]	4	2	57	162	1	46	98	305	4	58	250	279
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	21	0	0	9	0	10	9	0	21	20	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	7	7	4	30	3	29
g / C, Green / Cycle	0.06	0.12	0.12	0.07	0.50	0.05	0.48
(v / s)_i Volume / Saturation Flow Rate	0.04	0.09	0.03	0.06	0.17	0.03	0.31
s, saturation flow rate [veh/h]	1602	1774	1588	1774	1858	1774	1704
c, Capacity [veh/h]	91	223	199	132	926	96	815
d1, Uniform Delay [s]	27.93	25.37	23.76	27.35	9.10	27.89	11.90
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.12	4.50	0.60	8.02	0.97	5.99	3.99
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.73	0.24	0.74	0.33	0.60	0.65
d, Delay for Lane Group [s/veh]	37.05	29.87	24.36	35.36	10.07	33.87	15.89
Lane Group LOS	D	C	C	D	B	C	B
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	1.13	2.37	0.60	1.58	2.19	0.92	5.17
50th-Percentile Queue Length [ft]	28.37	59.29	15.05	39.42	54.67	23.05	129.34
95th-Percentile Queue Length [veh]	2.04	4.27	1.08	2.84	3.94	1.66	8.90
95th-Percentile Queue Length [ft]	51.06	106.72	27.09	70.95	98.41	41.48	222.59

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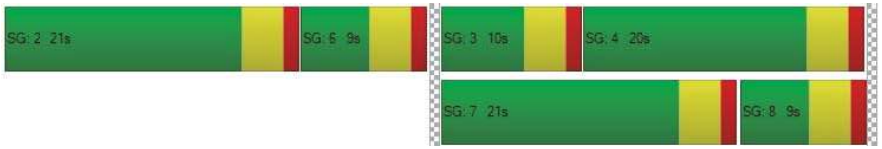
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	37.05	37.05	37.05	29.87	24.36	24.36	35.36	10.07	10.07	33.87	15.89	15.89
Movement LOS	D	D	D	C	C	C	D	B	B	C	B	B
d_A, Approach Delay [s/veh]	37.05			28.63			16.16			17.67		
Approach LOS	D			C			B			B		
d_I, Intersection Delay [s/veh]	19.96											
Intersection LOS	B											
Intersection V/C	0.620											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report

Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	21.1
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.676

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	4	20	252	2	65	45	316	7	10	264	171
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	42	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	4	63	252	2	65	45	316	9	52	264	171
Peak Hour Factor	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	17	68	1	17	12	85	2	14	71	46
Total Analysis Volume [veh/h]	4	4	68	271	2	70	48	339	10	56	284	184
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	9	0	0	26	0	9	16	0	9	16	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	11	11	3	26	3	26
g / C, Green / Cycle	0.06	0.19	0.19	0.05	0.43	0.05	0.44
(v / s)_i Volume / Saturation Flow Rate	0.05	0.15	0.05	0.03	0.19	0.03	0.27
s, saturation flow rate [veh/h]	1605	1774	1590	1774	1853	1774	1742
c, Capacity [veh/h]	98	340	304	83	796	92	757
d1, Uniform Delay [s]	27.82	23.21	20.59	28.08	12.06	27.92	13.15
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.10	4.31	0.40	6.17	1.75	6.34	3.77
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.77	0.80	0.24	0.58	0.44	0.61	0.62
d, Delay for Lane Group [s/veh]	39.92	27.52	20.99	34.25	13.82	34.25	16.93
Lane Group LOS	D	C	C	C	B	C	B
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	1.42	3.80	0.83	0.77	3.13	0.90	4.83
50th-Percentile Queue Length [ft]	35.56	95.08	20.85	19.36	78.32	22.44	120.68
95th-Percentile Queue Length [veh]	2.56	6.85	1.50	1.39	5.64	1.62	8.43
95th-Percentile Queue Length [ft]	64.01	171.15	37.54	34.84	140.98	40.39	210.77

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	39.92	39.92	39.92	27.52	20.99	20.99	34.25	13.82	13.82	34.25	16.93	16.93
Movement LOS	D	D	D	C	C	C	C	B	B	C	B	B
d_A, Approach Delay [s/veh]	39.92			26.15			16.29			18.78		
Approach LOS	D			C			B			B		
d_I, Intersection Delay [s/veh]	21.13											
Intersection LOS	C											
Intersection V/C	0.676											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	135.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.998

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	2	17	150	1	43	91	283	3	19	232	259
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	43	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	2	60	150	1	43	91	283	5	62	232	259
Peak Hour Factor	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	16	40	0	12	25	76	1	17	63	70
Total Analysis Volume [veh/h]	5	2	65	162	1	46	98	305	5	67	250	279
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.01	0.09	1.00	0.00	0.07	0.09	0.00	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	27.26	27.65	10.89	135.92	131.72	119.20	8.83	0.00	0.00	8.04	0.00	0.00
Movement LOS	D	D	B	F	F	F	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.45	0.45	0.45	9.66	9.66	9.66	0.31	0.00	0.00	0.17	0.00	0.00
95th-Percentile Queue Length [ft]	11.16	11.16	11.16	241.44	241.44	241.44	7.80	0.00	0.00	4.24	0.00	0.00
d_A, Approach Delay [s/veh]	12.49			132.22			2.12			0.90		
Approach LOS	B			F			A			A		
d_I, Intersection Delay [s/veh]	23.30											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	74.8
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.784

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	124	30	12	482	501	143
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	2	41	41	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	124	32	14	523	542	143
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	9	4	145	151	40
Total Analysis Volume [veh/h]	138	36	16	581	602	159
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane						
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.78	0.08	0.02	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	74.83	13.69	9.31	0.00	0.00	0.00
Movement LOS	F	B	A	A	A	A
95th-Percentile Queue Length [veh]	5.20	0.26	0.06	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	130.11	6.49	1.44	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	62.18		0.25		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	7.16					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	310.2
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.440

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	4	25	252	2	65	45	316	7	15	264	171
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	43	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	4	68	252	2	65	45	316	9	58	264	171
Peak Hour Factor	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	18	68	1	17	12	85	2	16	71	46
Total Analysis Volume [veh/h]	4	4	73	271	2	70	48	339	10	62	284	184
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.02	0.10	1.44	0.01	0.10	0.04	0.00	0.00	0.05	0.00	0.00
d_M, Delay for Movement [s/veh]	24.98	23.13	11.23	310.21	306.24	296.45	8.44	0.00	0.00	8.14	0.00	0.00
Movement LOS	C	C	B	F	F	F	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.50	0.50	0.50	21.23	21.23	21.23	0.14	0.00	0.00	0.16	0.00	0.00
95th-Percentile Queue Length [ft]	12.55	12.55	12.55	530.82	530.82	530.82	3.44	0.00	0.00	4.05	0.00	0.00
d_A, Approach Delay [s/veh]	12.50			307.38			1.02			0.95		
Approach LOS	B			F			A			A		
d_I, Intersection Delay [s/veh]	79.46											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	136.6
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.012

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	142	30	40	611	433	189
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	2	41	41	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	142	32	42	652	474	189
Peak Hour Factor	0.9400	0.9400	0.9400	0.9400	0.9400	0.9400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	38	9	11	173	126	50
Total Analysis Volume [veh/h]	151	34	45	694	504	201
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane						
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	1.01	0.07	0.05	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	136.56	12.76	9.25	0.00	0.00	0.00
Movement LOS	F	B	A	A	A	A
95th-Percentile Queue Length [veh]	7.63	0.22	0.16	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	190.86	5.48	3.97	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	113.80		0.56		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	13.18					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	20.5
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.627

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	2	17	150	1	43	91	283	3	19	232	259
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	43	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	2	60	150	1	43	91	283	5	62	232	259
Peak Hour Factor	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280	0.9280
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	16	40	0	12	25	76	1	17	63	70
Total Analysis Volume [veh/h]	5	2	65	162	1	46	98	305	5	67	250	279
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	21	0	0	9	0	10	9	0	21	20	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	7	7	4	30	3	29
g / C, Green / Cycle	0.06	0.12	0.12	0.07	0.49	0.06	0.48
(v / s)_i Volume / Saturation Flow Rate	0.04	0.09	0.03	0.06	0.17	0.04	0.31
s, saturation flow rate [veh/h]	1602	1774	1588	1774	1857	1774	1704
c, Capacity [veh/h]	97	223	199	132	910	104	808
d1, Uniform Delay [s]	27.85	25.38	23.76	27.35	9.42	27.77	12.09
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	10.41	4.51	0.60	8.03	1.02	6.56	4.11
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.74	0.73	0.24	0.74	0.34	0.65	0.65
d, Delay for Lane Group [s/veh]	38.26	29.88	24.36	35.38	10.43	34.33	16.20
Lane Group LOS	D	C	C	D	B	C	B
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	1.32	2.37	0.60	1.58	2.25	1.07	5.25
50th-Percentile Queue Length [ft]	32.91	59.31	15.05	39.43	56.37	26.73	131.15
95th-Percentile Queue Length [veh]	2.37	4.27	1.08	2.84	4.06	1.92	9.00
95th-Percentile Queue Length [ft]	59.25	106.75	27.09	70.97	101.47	48.11	225.05

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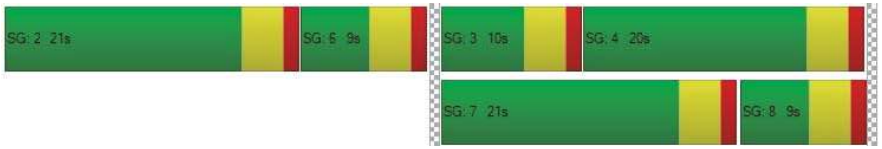
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	38.26	38.26	38.26	29.88	24.36	24.36	35.38	10.43	10.43	34.33	16.20	16.20
Movement LOS	D	D	D	C	C	C	D	B	B	C	B	B
d_A, Approach Delay [s/veh]	38.26			28.64			16.42			18.24		
Approach LOS	D			C			B			B		
d_I, Intersection Delay [s/veh]	20.48											
Intersection LOS	C											
Intersection V/C	0.627											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	21.5
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.680

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	2	4	25	252	2	65	45	316	7	15	264	171
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	43	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	4	68	252	2	65	45	316	9	58	264	171
Peak Hour Factor	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	18	68	1	17	12	85	2	16	71	46
Total Analysis Volume [veh/h]	4	4	73	271	2	70	48	339	10	62	284	184
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	9	0	0	26	0	9	16	0	9	16	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	60	60	60	60	60	60	60
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	4	11	11	3	26	3	26
g / C, Green / Cycle	0.06	0.19	0.19	0.05	0.43	0.05	0.43
(v / s)_i Volume / Saturation Flow Rate	0.05	0.15	0.05	0.03	0.19	0.03	0.27
s, saturation flow rate [veh/h]	1604	1774	1590	1774	1853	1774	1742
c, Capacity [veh/h]	101	340	304	83	786	98	753
d1, Uniform Delay [s]	27.79	23.21	20.60	28.08	12.28	27.83	13.25
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	13.24	4.32	0.40	6.17	1.81	6.68	3.84
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.80	0.80	0.24	0.58	0.44	0.64	0.62
d, Delay for Lane Group [s/veh]	41.04	27.53	20.99	34.25	14.09	34.51	17.08
Lane Group LOS	D	C	C	C	B	C	B
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	1.54	3.80	0.83	0.77	3.18	0.99	4.86
50th-Percentile Queue Length [ft]	38.46	95.10	20.86	19.36	79.44	24.87	121.43
95th-Percentile Queue Length [veh]	2.77	6.85	1.50	1.39	5.72	1.79	8.47
95th-Percentile Queue Length [ft]	69.23	171.18	37.54	34.84	142.98	44.77	211.79

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	41.04	41.04	41.04	27.53	20.99	20.99	34.25	14.09	14.09	34.51	17.08	17.08
Movement LOS	D	D	D	C	C	C	C	B	B	C	B	B
d_A, Approach Delay [s/veh]	41.04			26.16			16.53			19.12		
Approach LOS	D			C			B			B		
d_I, Intersection Delay [s/veh]	21.46											
Intersection LOS	C											
Intersection V/C	0.680											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Intersection Level Of Service Report

Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	1,098.3
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	3.047

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	2	24	226	1	74	148	404	3	26	394	435
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	42	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	2	67	226	1	74	148	404	5	68	394	435
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	17	57	0	19	37	101	1	17	99	109
Total Analysis Volume [veh/h]	5	2	67	226	1	74	148	404	5	68	394	435
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.03	0.10	3.05	0.01	0.15	0.18	0.00	0.00	0.06	0.00	0.00
d_M, Delay for Movement [s/veh]	58.21	56.15	13.04	1098.33	1085.78	1057.10	10.50	0.00	0.00	8.33	0.00	0.00
Movement LOS	F	F	B	F	F	F	B	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.74	0.74	0.74	29.69	29.69	29.69	0.67	0.00	0.00	0.19	0.00	0.00
95th-Percentile Queue Length [ft]	18.55	18.55	18.55	742.13	742.13	742.13	16.82	0.00	0.00	4.71	0.00	0.00
d_A, Approach Delay [s/veh]	17.26			1088.15			2.79			0.63		
Approach LOS	C			F			A			A		
d_I, Intersection Delay [s/veh]	180.94											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	93.8
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.539

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	43	111	118	570	765	163
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	2	41	40	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	43	113	120	611	805	163
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	11	28	30	153	201	41
Total Analysis Volume [veh/h]	43	113	120	611	805	163
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.54	0.33	0.17	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	93.76	20.55	11.08	0.00	0.00	0.00
Movement LOS	F	C	B	A	A	A
95th-Percentile Queue Length [veh]	2.33	1.40	0.60	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	58.22	35.09	15.09	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	40.73		1.82		0.00	
Approach LOS	E		A		A	
d_I, Intersection Delay [s/veh]	4.14					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Two-way stop	Delay (sec / veh):	1,943.5
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	4.721

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	4	34	438	2	199	108	350	8	24	443	355
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	42	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	4	77	438	2	199	108	350	10	66	443	355
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	19	110	1	50	27	88	3	17	111	89
Total Analysis Volume [veh/h]	5	4	77	438	2	199	108	350	10	66	443	355
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	Yes		
Storage Area [veh]	0	1	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.04	0.11	4.72	0.02	0.41	0.13	0.00	0.00	0.06	0.00	0.00
d_M, Delay for Movement [s/veh]	71.04	44.10	13.34	1943.47	1932.95	1912.05	10.02	0.00	0.00	8.18	0.00	0.00
Movement LOS	F	E	B	F	F	F	B	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.92	0.92	0.92	67.87	67.87	67.87	0.45	0.00	0.00	0.17	0.00	0.00
95th-Percentile Queue Length [ft]	22.96	22.96	22.96	1696.87	1696.87	1696.87	11.25	0.00	0.00	4.36	0.00	0.00
d_A, Approach Delay [s/veh]	18.13			1933.65			2.31			0.62		
Approach LOS	C			F			A			A		
d_I, Intersection Delay [s/veh]	602.23											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Todd Rd/Moorland Ave

Control Type:	Two-way stop	Delay (sec / veh):	304.7
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.303

Intersection Setup

Name	Moorland Ave		Todd Rd		Todd Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	1	0
Pocket Length [ft]	100.00	50.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Moorland Ave		Todd Rd		Todd Rd	
Base Volume Input [veh/h]	96	186	139	739	647	89
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	2	41	40	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	96	188	141	780	687	89
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	47	35	195	172	22
Total Analysis Volume [veh/h]	96	188	141	780	687	89
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	1.30	0.45	0.17	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	304.70	20.24	10.15	0.00	0.00	0.00
Movement LOS	F	C	B	A	A	A
95th-Percentile Queue Length [veh]	7.56	2.24	0.60	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	188.93	56.09	15.02	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	116.40		1.55		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	17.41					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	36.6
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.858

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	2	24	226	1	74	148	404	3	26	394	435
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	42	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	2	67	226	1	74	148	404	5	68	394	435
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	17	57	0	19	37	101	1	17	99	109
Total Analysis Volume [veh/h]	5	2	67	226	1	74	148	404	5	68	394	435
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	12.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	9	0	0	15	0	13	57	0	9	53	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	90	90	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	5	11	11	9	54	5	49
g / C, Green / Cycle	0.06	0.12	0.12	0.10	0.59	0.05	0.54
(v / s)_i Volume / Saturation Flow Rate	0.05	0.13	0.05	0.08	0.22	0.04	0.49
s, saturation flow rate [veh/h]	1601	1774	1587	1774	1859	1774	1705
c, Capacity [veh/h]	89	214	192	180	1107	89	928
d1, Uniform Delay [s]	42.08	39.57	36.52	39.64	9.44	42.21	18.20
k, delay calibration	0.11	0.11	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	17.35	44.01	1.30	8.96	0.95	12.49	12.83
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.83	1.05	0.39	0.82	0.37	0.76	0.89
d, Delay for Lane Group [s/veh]	59.43	83.58	37.82	48.60	10.39	54.70	31.03
Lane Group LOS	E	F	D	D	B	D	C
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	2.11	7.27	1.57	3.57	3.97	1.77	16.69
50th-Percentile Queue Length [ft]	52.69	181.82	39.28	89.35	99.29	44.22	417.34
95th-Percentile Queue Length [veh]	3.79	11.95	2.83	6.43	7.15	3.18	23.39
95th-Percentile Queue Length [ft]	94.85	298.70	70.71	160.82	178.72	79.60	584.86

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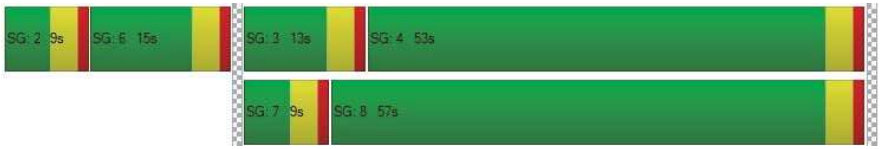
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	59.43	59.43	59.43	83.58	37.82	37.82	48.60	10.39	10.39	54.70	31.03	31.03
Movement LOS	E	E	E	F	D	D	D	B	B	D	C	C
d_A, Approach Delay [s/veh]	59.43			72.18			20.55			32.82		
Approach LOS	E			E			C			C		
d_I, Intersection Delay [s/veh]	36.64											
Intersection LOS	D											
Intersection V/C	0.858											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-	
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-	
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	



Intersection Level Of Service Report
Intersection 1: Todd Rd/Ghilotti Ave-Standish Ave

Control Type:	Signalized	Delay (sec / veh):	44.1
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.942

Intersection Setup

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	150.00	100.00	100.00
Speed [mph]	10.00			30.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Ghilotti Ave			Standish Ave			Todd Rd			Todd Rd		
Base Volume Input [veh/h]	3	4	34	438	2	199	108	350	8	24	443	355
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	43	0	0	0	0	0	2	42	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	11	0	0	66	0	0	3	0	0	66
Total Hourly Volume [veh/h]	5	4	66	438	2	133	108	350	7	66	443	289
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	17	110	1	33	27	88	2	17	111	72
Total Analysis Volume [veh/h]	5	4	66	438	2	133	108	350	7	66	443	289
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

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Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	16.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	0	2	0	0	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	9	0	0	27	0	9	45	0	9	45	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall		No			No		No	No		No	No	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	L	C	L	C	L	C
C, Cycle Length [s]	90	90	90	90	90	90	90
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	5	23	23	5	42	4	41
g / C, Green / Cycle	0.06	0.26	0.26	0.06	0.46	0.05	0.45
(v / s)_i Volume / Saturation Flow Rate	0.05	0.25	0.09	0.06	0.19	0.04	0.42
s, saturation flow rate [veh/h]	1608	1774	1587	1774	1856	1774	1741
c, Capacity [veh/h]	89	453	405	102	859	87	790
d1, Uniform Delay [s]	42.10	33.14	27.28	42.41	16.09	42.29	23.16
k, delay calibration	0.11	0.26	0.11	0.11	0.50	0.11	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	18.20	23.56	0.48	57.16	1.48	12.87	18.40
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.84	0.97	0.33	1.06	0.42	0.76	0.93
d, Delay for Lane Group [s/veh]	60.30	56.71	27.76	99.57	17.57	55.16	41.56
Lane Group LOS	E	E	C	F	B	E	D
Critical Lane Group	Yes	Yes	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	2.15	12.11	2.38	3.84	4.92	1.73	17.33
50th-Percentile Queue Length [ft]	53.82	302.82	59.38	96.07	122.96	43.16	433.30
95th-Percentile Queue Length [veh]	3.88	17.82	4.28	6.92	8.56	3.11	24.16
95th-Percentile Queue Length [ft]	96.88	445.51	106.88	172.93	213.89	77.69	603.99

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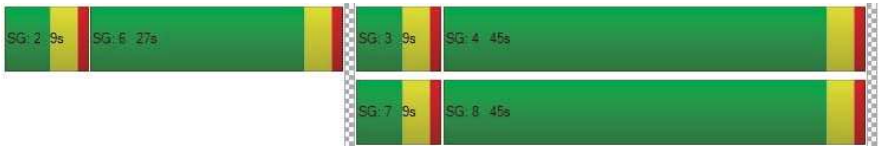
Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	60.30	60.30	60.30	56.71	27.76	27.76	99.57	17.57	17.57	55.16	41.56	41.56
Movement LOS	E	E	E	E	C	C	F	B	B	E	D	D
d_A, Approach Delay [s/veh]	60.30			49.89			36.62			42.68		
Approach LOS	E			D			D			D		
d_I, Intersection Delay [s/veh]	44.06											
Intersection LOS	D											
Intersection V/C	0.942											

Sequence

Ring 1	2	6	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Appendix C

Signalized Intersection Level of Service Calculations

SimTraffic Performance Report
AM Existing 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Del/Veh (s)	12.1	21.6	20.4	17.8

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.3	0.0	0.0	0.7
Total Del/Veh (s)	5.4	8.4	7.5	7.4

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	1.1	1.5	1.7	1.1
Total Del/Veh (s)	10.2	23.7	11.0	10.2	10.9

Total Zone Performance

Denied Del/Veh (s)	1.9
Total Del/Veh (s)	240.3

SimTraffic Performance Report
PM Existing 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	14.6	31.5	25.5	22.7

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.1	0.0	0.0	0.5
Total Del/Veh (s)	6.9	6.9	5.6	6.3

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	1.3	1.0	1.3	0.9
Total Del/Veh (s)	16.5	30.3	18.7	17.0	18.6

Total Zone Performance

Denied Del/Veh (s)	1.3
Total Del/Veh (s)	277.6

SimTraffic Performance Report
AM Baseline 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Del/Veh (s)	13.4	19.4	18.3	16.9

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.4	0.0	0.0	0.8
Total Del/Veh (s)	5.7	8.2	6.9	7.1

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	1.3	1.3	1.8	1.0
Total Del/Veh (s)	10.1	26.2	10.9	10.4	10.9

Total Zone Performance

Denied Del/Veh (s)	1.8
Total Del/Veh (s)	244.4

SimTraffic Performance Report
PM Baseline 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.7	25.5	19.9	17.9

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.1	0.0	0.0	0.5
Total Del/Veh (s)	7.5	8.3	6.2	7.2

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	1.3	1.1	1.2	0.9
Total Del/Veh (s)	14.2	30.4	22.4	18.0	19.8

Total Zone Performance

Denied Del/Veh (s)	1.4
Total Del/Veh (s)	277.5

SimTraffic Performance Report
AM Future 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	13.5	21.0	24.1	19.6

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.5	0.0	0.0	0.8
Total Del/Veh (s)	5.5	7.9	8.5	7.6

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	2.6	1.2	0.8	1.0
Total Del/Veh (s)	11.3	33.4	98.7	19.6	63.8

Total Zone Performance

Denied Del/Veh (s)	1.5
Total Del/Veh (s)	291.8

SimTraffic Performance Report
PM Future 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.7	21.9	20.3	17.5

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.7	0.0	0.0	0.4
Total Del/Veh (s)	6.4	6.8	7.9	7.4

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	1.9	2.7	2.5	0.4	1.9
Total Del/Veh (s)	20.9	45.0	110.8	37.5	77.2

Total Zone Performance

Denied Del/Veh (s)	2.2
Total Del/Veh (s)	328.6

SimTraffic Performance Report
AM Future plus Mitigation 09/28/2017

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.5	1.7	0.4	0.8	0.5
Total Del/Veh (s)	11.1	30.9	29.6	20.3	24.1

SimTraffic Performance Report
PM Future plus Mitigation 09/28/2017

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	1.2	3.0	0.7	0.4	0.8
Total Del/Veh (s)	20.0	54.8	42.3	45.5	40.8

SimTraffic Performance Report
AM Existing plus Project 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	12.1	21.0	22.7	18.5

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.2	0.0	0.0	0.8
Total Del/Veh (s)	6.0	7.5	6.8	6.9

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	1.1	1.5	1.8	1.1
Total Del/Veh (s)	10.3	19.7	12.6	12.3	12.1

Total Zone Performance

Denied Del/Veh (s)	1.9
Total Del/Veh (s)	271.3

SimTraffic Performance Report
PM Existing plus Project 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	13.7	33.2	24.7	22.2

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.0	0.0	0.0	0.5
Total Del/Veh (s)	7.0	8.3	6.2	7.1

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	1.3	0.9	1.3	0.8
Total Del/Veh (s)	15.5	30.9	20.8	18.5	19.6

Total Zone Performance

Denied Del/Veh (s)	1.3
Total Del/Veh (s)	289.3

SimTraffic Performance Report
AM Baseline + Project 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.3	0.1
Total Del/Veh (s)	13.6	21.2	23.9	19.4

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.3	0.0	0.1	0.8
Total Del/Veh (s)	6.1	8.1	7.6	7.4

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	1.1	1.4	1.6	1.1
Total Del/Veh (s)	10.6	24.1	12.2	11.7	12.1

Total Zone Performance

Denied Del/Veh (s)	1.9
Total Del/Veh (s)	257.7

SimTraffic Performance Report
PM Baseline + Project 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.7	0.2
Total Del/Veh (s)	15.2	30.3	25.2	22.4

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.2	0.0	0.1	0.6
Total Del/Veh (s)	7.0	8.8	6.3	7.4

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	1.3	1.1	1.3	0.9
Total Del/Veh (s)	15.9	26.6	19.9	17.1	18.8

Total Zone Performance

Denied Del/Veh (s)	1.5
Total Del/Veh (s)	299.4

SimTraffic Performance Report
AM Future plus Project 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0
Total Del/Veh (s)	14.8	22.1	26.9	21.4

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.5	0.0	0.0	0.8

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.3	2.1	4.1	0.8	2.6
Total Del/Veh (s)	11.5	29.7	102.9	18.6	63.9

Total Zone Performance

Denied Del/Veh (s)	3.1
Total Del/Veh (s)	305.3

SimTraffic Performance Report
PM Future plus Project 11/13/2017

3: S Moorland Ave & Todd Rd/US 101 South Ramps Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.5	20.2	18.9	16.4

4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd Performance by approach

Approach	EB	WB	NB	All
Denied Del/Veh (s)	3.9	0.0	0.0	0.4
Total Del/Veh (s)	5.5	6.8	8.2	7.4

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.4	3.1	2.2	0.5	1.5
Total Del/Veh (s)	18.2	49.4	115.3	37.7	80.4

Total Zone Performance

Denied Del/Veh (s)	1.9
Total Del/Veh (s)	314.2

SimTraffic Performance Report
AM Future plus Project and Mitigation 09/28/2017

5: Santa Rosa Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.3	2.2	0.4	0.9	0.5
Total Del/Veh (s)	12.6	27.4	24.4	19.8	21.2

SimTraffic Performance Report
PM Future plus Project and Mitigation 09/28/2017

1: Ghillotti Ave/Standish Ave & Todd Rd Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	1.3	0.0	0.1	10.5	3.9
Total Del/Veh (s)	30.7	30.7	15.5	55.1	38.2

Appendix D

Signal Warrants Analysis & Equitable Share Calculations

Warrant 3: Peak-Hour Volumes and Delay

Sonoma County
Todd Rd & Standish-Ghilotti Ave

304 Todd Road CUP

	Major Street	Minor Street
Street Name	Todd Rd	Standish-Ghilotti Ave
Direction	E-W	N-S
Number of Lanes	1	1
Approach Speed	35	30

Population less than 10,000? No
Date of Count: Tuesday, October 04, 2016
Scenario: PM Existing

Warrant 3 Met?: Met when either Condition A or B is met — **Yes**

Condition A: Met when conditions A1, A2, and A3 are met — Met

Condition A1 — Met

The total delay experienced by traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds four vehicle-hours for a one lane approach, or five vehicle-hours for a two-lane approach

Minor Approach Delay: 15.92 vehicle-hours

Condition A2 — Met

The volume on the same minor street approach (one direction only) equals or exceeds 100 vph for one moving lane of traffic of 150 vph for two moving lanes

Minor Approach Volume: 319 vph

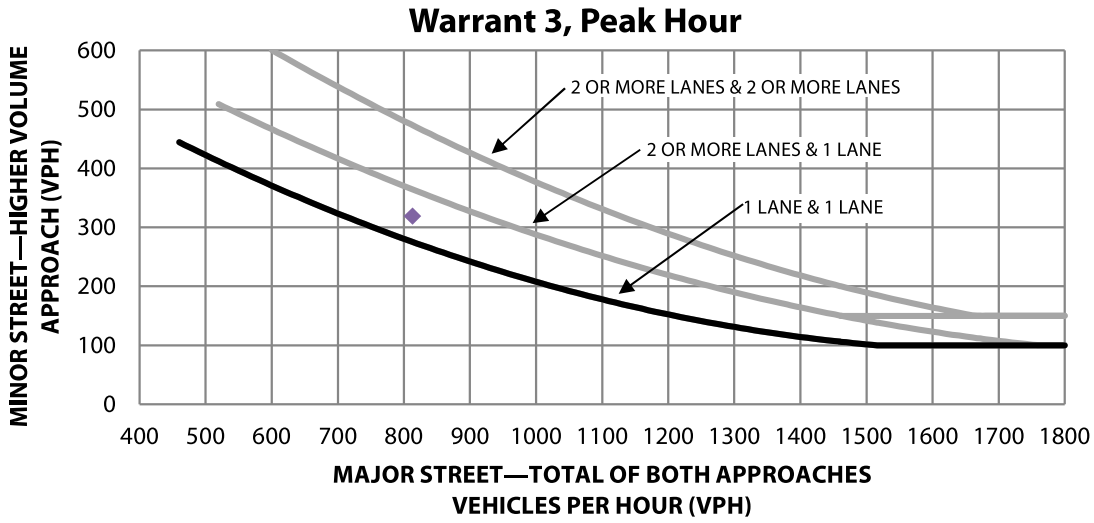
Condition A3 — Met

The total entering volume serviced during the hour equals or exceeds 800 vph for intersections with four or more appraches or 650 vph for intersections with three approaches

Total Entering Volume: 1158 vph

Condition B — Met

The plotted point falls above the curve



Equitable Share Calculations
304 Todd Road CUP Traffic Study

		Total Volume Entering the Intersection of	
		Todd Rd/Standish Ave-Ghilotti Ave	
	PM		PM
		Existing	1158
Project Trips (T)*	90	Future Year	1968

Description of Project Improvement:

Install a traffic signal and restripe southbound approach to provide a left-turn lane.

Calculation of Project Share

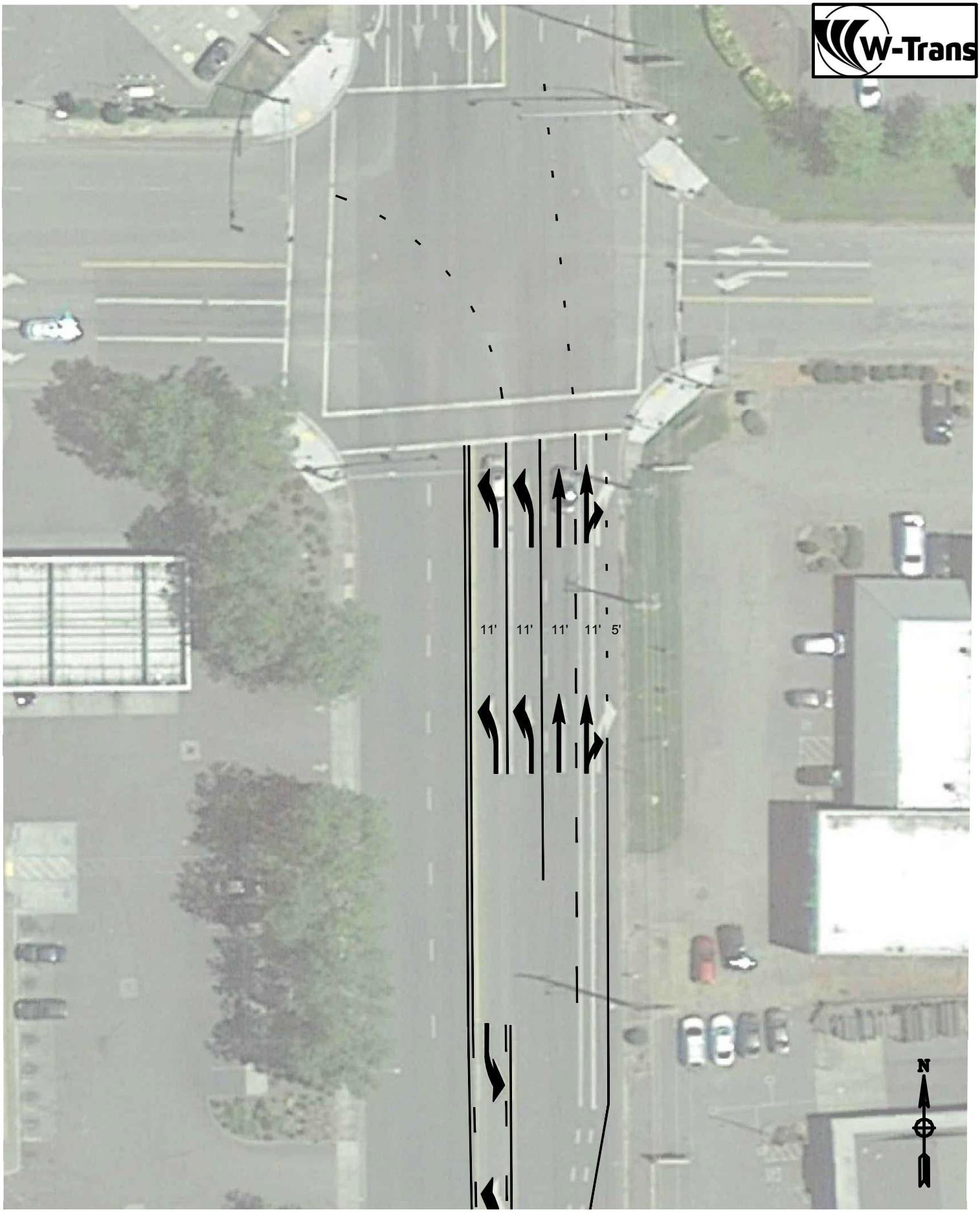
P = T / (TB - TE)
where:
P = Equitable Share
T = Project trips during the affected peak hour
TB = Build-out volumes
TE = Existing volumes

T	90	* Trips are PCE (1 truck =
TB	1968	3 passenger cars)
TE	1158	
P	**11.1%**	

Equitable Share (per Caltrans "Guide for the Preparation of Traffic Impact Studies")

Appendix E

Concept Striping Plan



GHILOTTI CONSTRUCTION YARD TIS

Concept Striping Plan

Santa Rosa Avenue/Todd Road NB Approach

March 2018

Appendix F

Queuing Calculations

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	38	8	7	24	98	55
Average Queue (ft)	20	2	1	11	67	39
95th Queue (ft)	46	11	12	34	134	71
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)					26	3
Queuing Penalty (veh)					11	4

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	17	2	3	84	56
Average Queue (ft)	6	0	1	53	31
95th Queue (ft)	23	5	7	97	67
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)				16	1
Queuing Penalty (veh)				5	1

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	129	68	125	143	255	140	17
Average Queue (ft)	94	49	76	94	205	54	5
95th Queue (ft)	148	73	132	157	298	173	25
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	1				6	1	
Queuing Penalty (veh)	3				17	4	
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	57						
Queuing Penalty (veh)	0						

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	LT	T	L	R	R
Maximum Queue (ft)	35	34	83	120	87	72	112	68	79
Average Queue (ft)	16	17	55	79	46	46	78	30	45
95th Queue (ft)	43	46	89	136	106	82	133	79	93
Link Distance (ft)	566			211	211	211		264	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		180	180				100		100
Storage Blk Time (%)							4		0
Queuing Penalty (veh)							16		0

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	77	81	63	23	59	136	104	54	14	21	75	43
Average Queue (ft)	49	55	41	8	24	102	53	28	5	6	54	25
95th Queue (ft)	85	87	72	27	61	155	114	60	17	25	90	58
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)					2							
Queuing Penalty (veh)					0							

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	70
Average Queue (ft)	46
95th Queue (ft)	76
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 62

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	24	6	1	39	180	60
Average Queue (ft)	9	1	0	19	115	44
95th Queue (ft)	29	9	1	47	213	78
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)					47	3
Queuing Penalty (veh)					31	9

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	31	80	7	148	62
Average Queue (ft)	13	20	2	108	30
95th Queue (ft)	37	103	16	204	82
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)		1	0	54	1
Queuing Penalty (veh)		0	0	16	1

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	142	119	212	126	251	68	15
Average Queue (ft)	105	84	153	70	211	34	3
95th Queue (ft)	169	145	259	144	304	94	18
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	4	2	0		9	0	
Queuing Penalty (veh)	14	8	0		24	1	
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	57		1	0			
Queuing Penalty (veh)	0		1	0			

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	LT	T	L	R	R
Maximum Queue (ft)	47	32	59	127	86	77	95	44	81
Average Queue (ft)	28	17	43	82	49	50	65	30	54
95th Queue (ft)	60	43	67	143	102	88	110	55	96
Link Distance (ft)	566			211	211	211		264	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		180	180				100		100
Storage Blk Time (%)							2		0
Queuing Penalty (veh)							14		2

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	108	121	89	76	131	231	201	159	20	35	164	119
Average Queue (ft)	71	88	55	38	75	161	134	109	11	14	117	70
95th Queue (ft)	116	132	105	86	157	264	246	193	26	39	174	135
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				2	17	2	0	0				
Queuing Penalty (veh)				3	8	7	0	0				

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	83
Average Queue (ft)	54
95th Queue (ft)	93
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 141

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	62	92	21	193	20	99	56
Average Queue (ft)	36	49	8	123	10	65	28
95th Queue (ft)	74	100	27	223	33	112	73
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)	0	0		4		3	
Queuing Penalty (veh)	0	0		1		1	

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	49	108	53	170	33	115	104
Average Queue (ft)	23	65	13	108	15	91	38
95th Queue (ft)	56	126	79	192	42	132	119
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)		1		3		6	
Queuing Penalty (veh)		0		0		4	

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	34	8	7	38	95	54
Average Queue (ft)	21	2	2	14	59	35
95th Queue (ft)	43	11	9	44	106	70
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)					20	2
Queuing Penalty (veh)					9	4

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	15	25	5	99	51
Average Queue (ft)	3	6	1	59	27
95th Queue (ft)	17	35	13	124	69
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)			0	20	0
Queuing Penalty (veh)			0	6	1

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	152	71	125	142	243	69	16
Average Queue (ft)	108	51	84	96	193	35	3
95th Queue (ft)	168	77	148	163	278	93	21
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	2				3	0	
Queuing Penalty (veh)	7				8	0	
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	55						
Queuing Penalty (veh)	0						

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	LT	T	L	R	R
Maximum Queue (ft)	34	46	70	119	68	57	99	45	67
Average Queue (ft)	14	22	49	76	36	38	69	26	44
95th Queue (ft)	43	55	79	129	83	68	111	52	79
Link Distance (ft)	566			211	211	211		264	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		180	180				100		100
Storage Blk Time (%)							2		0
Queuing Penalty (veh)							9		0

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	85	98	70	22	35	155	88	59	12	14	72	45
Average Queue (ft)	54	64	40	7	21	92	45	30	3	5	52	23
95th Queue (ft)	92	109	77	26	42	169	90	65	14	17	89	54
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)					0							
Queuing Penalty (veh)					0							

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	65
Average Queue (ft)	44
95th Queue (ft)	72
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 43

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	NB	SB	SB
Directions Served	L	L	LTR	LT	R
Maximum Queue (ft)	23	9	36	196	59
Average Queue (ft)	11	3	18	122	48
95th Queue (ft)	30	14	45	208	78
Link Distance (ft)			265	442	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	120	150			40
Storage Blk Time (%)				52	4
Queuing Penalty (veh)				34	10

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	25	4	6	111	65
Average Queue (ft)	13	1	1	79	32
95th Queue (ft)	33	10	9	137	77
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)				36	1
Queuing Penalty (veh)				11	1

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	132	113	217	120	226	39	21
Average Queue (ft)	97	78	145	53	175	29	6
95th Queue (ft)	152	122	249	147	263	51	25
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	1	0	0	0	4		
Queuing Penalty (veh)	3	0	0	0	11		
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	52		1	0			
Queuing Penalty (veh)	0		2	1			

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	LT	T	L	R	R
Maximum Queue (ft)	48	51	59	119	86	87	106	45	78
Average Queue (ft)	28	32	43	84	54	55	70	29	52
95th Queue (ft)	59	64	66	138	98	91	117	55	90
Link Distance (ft)	566			211	211	211		264	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		180	180				100		100
Storage Blk Time (%)							3		0
Queuing Penalty (veh)							16		1

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	109	130	91	54	103	239	295	260	48	34	147	121
Average Queue (ft)	74	91	59	29	62	173	171	145	16	14	110	76
95th Queue (ft)	123	145	104	62	119	305	366	306	75	39	166	142
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)							1					
Queuing Penalty (veh)							0					
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				0	11	5	0	2				0
Queuing Penalty (veh)				0	5	22	1	1				0

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	67
Average Queue (ft)	47
95th Queue (ft)	75
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 117

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	63	100	28	178	30	92	54
Average Queue (ft)	38	56	11	117	15	63	26
95th Queue (ft)	72	108	34	194	39	108	66
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)	0	0		3		2	
Queuing Penalty (veh)	0	0		1		1	

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	55	135	17	180	43	113	81
Average Queue (ft)	29	78	6	117	20	85	38
95th Queue (ft)	62	157	21	202	52	121	103
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)		1		3		5	
Queuing Penalty (veh)		1		0		3	

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	64	13	17	36	433	60
Average Queue (ft)	42	4	4	19	315	44
95th Queue (ft)	75	18	20	45	529	86
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)					23	
Queuing Penalty (veh)					0	
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)					91	3
Queuing Penalty (veh)					67	6

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	61	38	10	59	66
Average Queue (ft)	35	8	2	37	45
95th Queue (ft)	65	56	15	72	76
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)	0	0	0	5	7
Queuing Penalty (veh)	0	0	0	6	3

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	145	67	179	182	267	113	30
Average Queue (ft)	108	48	120	118	213	52	8
95th Queue (ft)	169	72	200	203	300	155	32
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	3				8	1	
Queuing Penalty (veh)	8				30	5	
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	59		0	0			
Queuing Penalty (veh)	0		0	0			

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	LT	T	L	R	R
Maximum Queue (ft)	21	54	75	133	85	88	145	73	85
Average Queue (ft)	6	32	54	95	55	60	95	26	50
95th Queue (ft)	28	64	83	149	100	103	158	122	98
Link Distance (ft)	566			211	211	211		264	
Upstream Blk Time (%)								0	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)		180	180				100		100
Storage Blk Time (%)							7		1
Queuing Penalty (veh)							24		2

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	48	41	160	40	47	340	606	534	23	8	176	148
Average Queue (ft)	26	24	109	22	20	340	587	345	9	2	134	94
95th Queue (ft)	54	55	183	48	53	342	636	685	27	11	207	171
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)			0				83	0				
Queuing Penalty (veh)			0				0	0				
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				1	2	81		0			0	0
Queuing Penalty (veh)				0	1	269		0			0	0

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	61
Average Queue (ft)	38
95th Queue (ft)	68
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 422

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	53	11	16	50	469	60
Average Queue (ft)	31	3	4	30	441	54
95th Queue (ft)	63	14	23	61	541	84
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)					74	
Queuing Penalty (veh)					0	
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)					94	8
Queuing Penalty (veh)					187	34

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	47	8	4	188	75
Average Queue (ft)	29	2	1	113	63
95th Queue (ft)	57	17	7	277	91
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)				33	12
Queuing Penalty (veh)				62	11

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	123	116	192	136	199	35	3
Average Queue (ft)	81	71	133	70	145	22	1
95th Queue (ft)	137	123	205	158	230	47	8
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	1	1			0		
Queuing Penalty (veh)	3	4			1		
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	48		0	0			
Queuing Penalty (veh)	0		0	1			

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	LT	T	L	R	R
Maximum Queue (ft)	12	41	54	113	63	71	141	24	96
Average Queue (ft)	2	19	36	72	31	38	99	9	60
95th Queue (ft)	16	51	58	132	78	83	154	30	117
Link Distance (ft)	566			211	211	211		264	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		180	180				100		100
Storage Blk Time (%)							6		2
Queuing Penalty (veh)							37		12

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	40	36	203	86	138	340	602	555	51	17	321	301
Average Queue (ft)	24	14	157	65	66	339	592	497	16	5	264	234
95th Queue (ft)	45	41	236	104	169	340	606	677	78	19	386	356
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)			2				92	0				
Queuing Penalty (veh)			5				0	0				
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				31	5	88		3			22	13
Queuing Penalty (veh)				16	6	611		3			2	10

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	108
Average Queue (ft)	43
95th Queue (ft)	154
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 1005

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	145	204	53	328	39	120	139
Average Queue (ft)	99	124	18	247	17	96	58
95th Queue (ft)	164	243	70	398	46	134	159
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)	9	4		23		11	
Queuing Penalty (veh)	37	6		6		9	

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	TR	L	T	T
Maximum Queue (ft)	51	55	154	47	40	284	356	253	153	6	174	139
Average Queue (ft)	29	29	114	29	20	191	242	147	51	2	126	81
95th Queue (ft)	60	60	185	54	50	337	480	370	168	9	193	158
Link Distance (ft)	211	211	211		707		573	573			1108	1108
Upstream Blk Time (%)			0				1	0				
Queuing Penalty (veh)			0				0	0				
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				1	0	3	11	1	0		1	
Queuing Penalty (veh)				0	0	12	43	6	0		0	

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	57
Average Queue (ft)	35
95th Queue (ft)	60
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 119

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	129	175	67	438	50	124	421
Average Queue (ft)	85	106	21	311	27	122	340
95th Queue (ft)	166	215	89	531	59	131	565
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							20
Queuing Penalty (veh)							0
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)	8	5		29		53	3
Queuing Penalty (veh)	29	5		7		106	13

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	TR	L	T	T
Maximum Queue (ft)	36	38	208	87	132	320	590	598	260	16	343	314
Average Queue (ft)	19	24	172	67	62	273	507	570	247	4	256	226
95th Queue (ft)	45	51	246	100	146	389	755	675	314	18	374	349
Link Distance (ft)	211	211	211		707		573	573			1108	1108
Upstream Blk Time (%)			4				13	19				
Queuing Penalty (veh)			8				0	0				
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				20	8	23	28	28	5		19	9
Queuing Penalty (veh)				10	10	90	109	224	32		2	7

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	112
Average Queue (ft)	48
95th Queue (ft)	156
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 652

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	34	25	3	49	97	57
Average Queue (ft)	19	9	1	30	65	34
95th Queue (ft)	43	28	4	56	111	73
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)					24	2
Queuing Penalty (veh)					10	3

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	SB	SB
Directions Served	L	TR	L	TR
Maximum Queue (ft)	17	28	120	67
Average Queue (ft)	4	6	71	29
95th Queue (ft)	20	38	139	74
Link Distance (ft)		1164	516	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	100			50
Storage Blk Time (%)		0	27	0
Queuing Penalty (veh)		0	9	0

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	131	78	116	166	256	41	9
Average Queue (ft)	95	55	75	113	208	30	2
95th Queue (ft)	147	86	141	185	290	52	15
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	1				6		
Queuing Penalty (veh)	4				19		
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	53						
Queuing Penalty (veh)	0						

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	B26	B26
Directions Served	T	T	R	L	LT	T	L	R	R	T	
Maximum Queue (ft)	36	42	77	107	67	61	124	37	71	8	6
Average Queue (ft)	20	18	55	73	42	40	82	21	40	2	1
95th Queue (ft)	48	48	83	126	87	70	137	47	82	19	15
Link Distance (ft)	566			211	211	211		264		127	127
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)		180	180				100		100		
Storage Blk Time (%)							3		0		
Queuing Penalty (veh)							11		1		

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	71	98	70	32	37	147	104	68	15	15	92	62
Average Queue (ft)	47	63	41	12	20	98	56	37	5	6	57	28
95th Queue (ft)	82	109	78	37	46	158	112	82	18	20	103	71
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)					1							
Queuing Penalty (veh)					0							

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	61
Average Queue (ft)	43
95th Queue (ft)	68
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 57

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	17	18	1	44	230	59
Average Queue (ft)	10	8	0	29	142	48
95th Queue (ft)	28	24	2	52	269	78
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)					56	4
Queuing Penalty (veh)					36	10

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	29	37	2	269	75
Average Queue (ft)	13	8	0	186	39
95th Queue (ft)	35	60	5	387	95
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)				4	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)		1		74	0
Queuing Penalty (veh)		0		24	1

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	B24	NB	NB	NB
Directions Served	T	R	L	TR	T	L	R	R
Maximum Queue (ft)	135	111	219	139	50	249	83	14
Average Queue (ft)	105	83	156	89	16	219	42	3
95th Queue (ft)	160	140	284	271	131	292	135	20
Link Distance (ft)	151	151		318	411	251	251	
Upstream Blk Time (%)	3	2	1	4	1	8	1	
Queuing Penalty (veh)	11	7	0	0	0	25	2	
Storage Bay Dist (ft)			260					150
Storage Blk Time (%)	56		7	2				
Queuing Penalty (veh)	0		11	6				

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	B26
Directions Served	T	T	R	L	LT	T	L	R	R	
Maximum Queue (ft)	54	58	70	113	100	82	105	47	85	5
Average Queue (ft)	28	22	46	78	52	54	71	30	56	1
95th Queue (ft)	64	63	75	134	111	91	118	57	94	13
Link Distance (ft)	566			211	211	211		264		127
Upstream Blk Time (%)				0						
Queuing Penalty (veh)				0						
Storage Bay Dist (ft)		180	180				100		100	
Storage Blk Time (%)							3		0	
Queuing Penalty (veh)							17		1	

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	120	137	92	75	117	214	250	234	50	48	169	142
Average Queue (ft)	79	93	59	38	64	167	161	133	16	22	123	80
95th Queue (ft)	136	159	102	82	135	268	296	257	77	60	186	156
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				3	14	2	0	1			0	
Queuing Penalty (veh)				4	7	12	1	1			0	

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	79
Average Queue (ft)	53
95th Queue (ft)	88
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 176

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	90	104	97	216	51	82	39
Average Queue (ft)	51	60	41	148	30	53	20
95th Queue (ft)	99	119	128	253	58	91	47
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)	1	0		9		1	
Queuing Penalty (veh)	2	0		5		0	

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	49	157	61	169	53	114	93
Average Queue (ft)	25	104	30	109	35	85	42
95th Queue (ft)	54	174	80	207	60	129	113
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)		5		4		7	
Queuing Penalty (veh)		2		2		5	

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	32	23	2	59	125	57
Average Queue (ft)	17	12	0	35	71	36
95th Queue (ft)	39	30	4	68	147	71
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)					27	2
Queuing Penalty (veh)					12	3

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	19	50	2	115	61
Average Queue (ft)	6	15	0	73	31
95th Queue (ft)	25	86	5	137	73
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)		1		29	1
Queuing Penalty (veh)		0		9	1

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	149	68	127	193	262	74	24
Average Queue (ft)	112	49	86	116	212	36	6
95th Queue (ft)	177	75	146	212	307	105	26
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	4				11	0	
Queuing Penalty (veh)	14				31	0	
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	57			0			
Queuing Penalty (veh)	0			1			

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	LT	T	L	R	R
Maximum Queue (ft)	38	44	86	111	76	65	123	76	62
Average Queue (ft)	21	20	54	82	42	42	85	32	41
95th Queue (ft)	49	53	92	124	90	79	139	103	74
Link Distance (ft)	566			211	211	211		264	
Upstream Blk Time (%)								0	
Queuing Penalty (veh)								1	
Storage Bay Dist (ft)		180	180				100		100
Storage Blk Time (%)							5		
Queuing Penalty (veh)							20		

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	92	91	79	29	51	145	86	54	13	20	87	42
Average Queue (ft)	55	56	48	10	29	107	49	31	4	6	59	22
95th Queue (ft)	99	105	86	33	58	171	97	64	17	22	97	49
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)					1							
Queuing Penalty (veh)					0							

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	65
Average Queue (ft)	42
95th Queue (ft)	71
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 92

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	22	20	3	51	219	60
Average Queue (ft)	9	8	1	35	132	48
95th Queue (ft)	29	25	5	61	270	81
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)					53	4
Queuing Penalty (veh)					35	10

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	45	136	6	191	65
Average Queue (ft)	16	43	1	118	29
95th Queue (ft)	52	197	14	254	77
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)		5	0	52	0
Queuing Penalty (veh)		2	0	17	0

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	B24	NB	NB	NB
Directions Served	T	R	L	TR	T	L	R	R
Maximum Queue (ft)	143	116	198	115	22	254	91	21
Average Queue (ft)	112	90	150	69	7	205	40	5
95th Queue (ft)	166	145	259	186	69	293	122	22
Link Distance (ft)	151	151		318	411	251	251	
Upstream Blk Time (%)	4	3	1	3		9	1	
Queuing Penalty (veh)	17	14	0	0		26	1	
Storage Bay Dist (ft)			260					150
Storage Blk Time (%)	55		4					
Queuing Penalty (veh)	0		6					

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	LT	T	L	R	R
Maximum Queue (ft)	50	42	63	153	86	88	111	72	84
Average Queue (ft)	29	26	45	99	52	58	77	36	51
95th Queue (ft)	68	54	74	175	93	97	130	86	98
Link Distance (ft)	566			211	211	211		264	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		180	180				100		100
Storage Blk Time (%)							3		0
Queuing Penalty (veh)							20		0

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	120	138	75	69	104	238	220	204	22	39	148	116
Average Queue (ft)	80	98	50	34	64	174	157	129	10	19	111	71
95th Queue (ft)	141	168	83	73	119	292	343	290	28	48	170	142
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)	0	0					1					
Queuing Penalty (veh)	0	0					0					
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				2	11	5		0			0	
Queuing Penalty (veh)				3	5	22		0			0	

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	81
Average Queue (ft)	54
95th Queue (ft)	89
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 179

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	59	108	53	180	55	88	43
Average Queue (ft)	41	65	31	126	34	62	24
95th Queue (ft)	65	122	61	208	67	105	53
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)		1		5		2	
Queuing Penalty (veh)		1		3		1	

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	66	125	58	171	61	118	135
Average Queue (ft)	31	80	32	108	36	97	59
95th Queue (ft)	77	146	65	198	69	141	170
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)		2		3		10	
Queuing Penalty (veh)		1		2		7	

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Maximum Queue (ft)	74	23	9	53	409	60
Average Queue (ft)	42	10	3	37	306	43
95th Queue (ft)	83	28	15	63	520	85
Link Distance (ft)			1164	265	442	
Upstream Blk Time (%)					19	
Queuing Penalty (veh)					0	
Storage Bay Dist (ft)	120	150				40
Storage Blk Time (%)	0				91	3
Queuing Penalty (veh)	0				67	7

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	74	79	17	105	71
Average Queue (ft)	41	29	4	49	49
95th Queue (ft)	86	142	17	140	81
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)	1	2		14	8
Queuing Penalty (veh)	3	3		16	4

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	154	71	192	205	266	114	23
Average Queue (ft)	121	49	124	141	234	49	7
95th Queue (ft)	177	82	216	227	296	140	28
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	7				12	1	
Queuing Penalty (veh)	23				46	5	
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	62		0	0			
Queuing Penalty (veh)	0		1	1			

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB
Directions Served	T	T	R	L	LT	T	L	R	R
Maximum Queue (ft)	19	48	66	138	96	85	136	46	75
Average Queue (ft)	4	27	50	93	56	60	96	12	46
95th Queue (ft)	25	56	77	152	108	102	153	63	84
Link Distance (ft)	566			211	211	211		264	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		180	180				100		100
Storage Blk Time (%)							7		0
Queuing Penalty (veh)							25		1

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	44	38	154	46	52	340	615	517	31	14	169	129
Average Queue (ft)	29	21	109	24	21	337	581	300	10	6	126	85
95th Queue (ft)	54	46	170	53	66	365	698	646	35	19	185	162
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)			0				80	0				
Queuing Penalty (veh)			0				0	0				
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				1	2	79		0				
Queuing Penalty (veh)				0	1	260		0				

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	57
Average Queue (ft)	39
95th Queue (ft)	64
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 463

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	TR	LTR	LT	R
Average Queue (ft)	32	10	1	37	462	54
Link Distance (ft)			1164	265	442	
Queuing Penalty (veh)					0	
Storage Blk Time (%)	0				96	9

Intersection: 2: Todd Rd & Moorland Ave

Movement	EB	EB	WB	SB	SB
Directions Served	L	TR	TR	L	TR
Maximum Queue (ft)	50	16	12	184	74
Average Queue (ft)	28	3	2	99	63
95th Queue (ft)	58	37	16	230	86
Link Distance (ft)		1164	151	516	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				50
Storage Blk Time (%)		0	0	33	9
Queuing Penalty (veh)		1	0	61	9

Intersection: 3: S Moorland Ave & Todd Rd/US 101 South Ramps

Movement	EB	EB	WB	WB	NB	NB	NB
Directions Served	T	R	L	TR	L	R	R
Maximum Queue (ft)	136	106	221	149	222	39	17
Average Queue (ft)	92	73	169	75	146	28	3
95th Queue (ft)	150	119	248	161	238	48	19
Link Distance (ft)	151	151		318	251	251	
Upstream Blk Time (%)	2	0			1		
Queuing Penalty (veh)	7	1			3		
Storage Bay Dist (ft)			260				150
Storage Blk Time (%)	54		0	0			
Queuing Penalty (veh)	0		0	0			

Intersection: 4: Todd Rd Overcrossing & US 101 North Off-ramp/Todd Rd

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	B26
Directions Served	T	T	R	L	LT	T	L	R	R	
Maximum Queue (ft)	6	39	52	114	74	64	136	73	121	5
Average Queue (ft)	2	19	36	70	37	38	102	23	72	1
95th Queue (ft)	12	49	57	131	85	74	156	111	138	14
Link Distance (ft)	566			211	211	211		264		127
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		180	180				100		100	
Storage Blk Time (%)							8		3	
Queuing Penalty (veh)							49		21	

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	39	38	217	89	141	340	598	562	91	12	377	348
Average Queue (ft)	21	17	176	73	84	337	583	472	23	3	297	266
95th Queue (ft)	46	44	249	104	197	370	667	720	120	13	420	396
Link Distance (ft)	211	211	211		701		573	573			1108	1108
Upstream Blk Time (%)			6				91	0				
Queuing Penalty (veh)			12				0	0				
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				42	5	86		5			30	18
Queuing Penalty (veh)				22	6	596		5			3	14

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	218
Average Queue (ft)	94
95th Queue (ft)	269
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 1040

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	134	190	176	392	55	116	158
Average Queue (ft)	96	123	82	263	32	96	69
95th Queue (ft)	153	229	216	432	66	135	193
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)	7	8		27		14	0
Queuing Penalty (veh)	28	11		18		10	0

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	TR	L	T	T
Maximum Queue (ft)	55	57	161	42	55	281	355	217	170	12	168	136
Average Queue (ft)	30	31	106	26	23	207	235	135	65	4	129	86
95th Queue (ft)	65	70	181	53	63	336	407	257	190	16	196	159
Link Distance (ft)	211	211	211		707		573	573			1108	1108
Upstream Blk Time (%)			0									
Queuing Penalty (veh)			0									
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				1	2	2	7	2	0		0	0
Queuing Penalty (veh)				0	1	7	28	8	1		0	0

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	60
Average Queue (ft)	41
95th Queue (ft)	69
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 112

Intersection: 1: Ghillotti Ave/Standish Ave & Todd Rd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	LTR	L	TR
Maximum Queue (ft)	143	247	164	447	78	124	440
Average Queue (ft)	94	155	66	315	47	123	341
95th Queue (ft)	177	286	175	568	86	127	553
Link Distance (ft)		590		1159	265		442
Upstream Blk Time (%)							16
Queuing Penalty (veh)							0
Storage Bay Dist (ft)	120		150			100	
Storage Blk Time (%)	13	11		29		54	2
Queuing Penalty (veh)	46	12		19		109	10

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	TR	L	L	T	TR	L	T	T
Maximum Queue (ft)	34	48	212	89	164	335	592	597	260	44	344	305
Average Queue (ft)	17	21	170	78	97	285	524	553	245	11	276	238
95th Queue (ft)	41	54	251	101	204	392	737	708	325	80	385	363
Link Distance (ft)	211	211	211		707		573	573			1108	1108
Upstream Blk Time (%)			5				14	25				
Queuing Penalty (veh)			10				0	0				
Storage Bay Dist (ft)				65		280			200	205		
Storage Blk Time (%)				38	7	17	31	30	7		24	13
Queuing Penalty (veh)				20	9	64	121	241	47		2	10

Intersection: 5: Santa Rosa Ave & Todd Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	174
Average Queue (ft)	58
95th Queue (ft)	195
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	205
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 721

Appendix G

Speed Survey Data

SPEED SURVEY CALCULATIONS Ghilotti Construction Yard		
Roadway:	**Todd Rd**	
Direction of Travel:	**EB**	**WB**
Speed Samples:	27	23
	33	26
	36	24
	30	23
	33	26
	33	20
	32	30
	29	27
	27	30
	26	24
	21	28
	32	23
	41	28
	32	25
	30	22
	31	20
	30	23
	41	22
	31	28
	27	30
	28	29
	35	22
	29	26
	31	29
	36	23
Average Speed:	31.2	25.2
85th Percentile Speed:	**35.4**	**29.0**
High Speed:	41.0	30.0

*Note: All speeds in miles per hour (mph).