
Draft Initial Study/Mitigated Negative Declaration
for the
**Manuel T. Freitas Parkway and Las Gallinas Avenue
Intersection Improvements Project**

SAN RAFAEL, MARIN COUNTY
CALIFORNIA

Prepared For:

City of San Rafael
Department of Public Works
111 Morpew Street
San Rafael, California 94901

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Date:

January 2016



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City of San Rafael

Initial Study/Mitigated Negative Declaration

BACKGROUND

1. **Project Title:** Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements Project
2. **Lead Agency and Project Applicant:** City of San Rafael
Department of Public Works
111 Morphew Street
San Rafael, California 94901
3. **Contact Person and Phone Number:** Jeff Stutsman, P.E., Assistant Civil Engineer
Tel: (415) 485-3342
Email: Jeffrey.stutsman@cityofsanrafael.org
4. **Project Location:** Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection in the City of San Rafael, Marin County, California (see Figures 1-4)

5. Surrounding Land Uses and Setting:

The project site is located at the Manuel T. Freitas Parkway and Las Gallinas Avenue intersection in the City of San Rafael. Existing land uses near the project site consist of single-family residential homes, recreational uses (i.e., Arbor Park Parquette), commercial retail uses (i.e., Safeway shopping center) and commercial office uses. Gallinas Creek, a concrete-lined channel in the project area, flows through the center of the project site. Figures 5 through 7 provide photographs of the project site and surrounding land uses.

The existing land use designations in the project vicinity are as follows:

North of the Project Site:

Residential – Low Density, 2-6.5 units/acre

South of the Project Site:

Residential – Low Density, 2-6.5 units/acre

Park: Arbor Park

West of Project Site:

Residential – Low Density, 2-6.5 units/acre

East of the Project Site

General Commercial, 15-32 units/acre

6. Description of Project:

The Manuel T. Freitas Parkway and Las Gallinas Avenue intersection currently experiences excessive delay from several of its approaches. The high number of vehicle trips from U.S. 101 to Terra Linda High School, Vallecito Elementary School, Kaiser Hospital Emergency Room, as well as nearby residential and commercial areas causes the queue on westbound Manuel T. Freitas Parkway to extend beyond the available turn pocket for much of the day. In addition, due to the current geometry of the intersection, the eastbound and westbound protected left turn

phases are unable to operate simultaneously and must utilize a lead/lag operation further adding to delay and intersection congestion.

The City recently installed Class II bicycle lanes on Las Gallinas Avenue. These lanes terminate 180 feet south of the intersection with Freitas Parkway and start up again approximately 220 feet north of the intersection, resulting in a 400-foot gap on this heavily travelled bike route. In addition, the Class II bike lanes on Freitas Parkway end approximately 400 feet west of the intersection with Las Gallinas Avenue.

Project constraints include lead-lag left turns from Freitas Parkway, small queue in the left turn lane on westbound Freitas Parkway, and unsafe pedestrian island medians. The large island adjacent to westbound Freitas Parkway contains multiple utility cabinets and utility poles and the island allows right turn movements onto Las Gallinas Avenue at potential high speeds.

The project will improve vehicular, bicycle, and pedestrian circulation safety of the intersection with the proposed improvements described below. Additionally, adding bike lanes and replacing the traffic signal system to accommodate a new geometric configuration will help improve the multiple modal transit during peak traffic periods during school and weekend events. See Figure 1 for a location map and Figure 2 for an aerial view of the project site and vicinity. Figures 3-6 show the existing conditions of the project site. Figures 6-11 show the proposed improvements within the project site.

Project Description

As illustrated in Figures 6-10, to improve safety and operation of the intersection, proposed project improvements include:

- Increasing the left turn queue on westbound Freitas Parkway;
- Allowing a simultaneous left turn phase from Freitas Parkway to northbound and southbound Las Gallinas Avenue by expanding the intersection by approximately 30 feet over Gallinas Creek on each side of Las Gallinas Avenue;
- Providing new American Disabilities Act (ADA) compliant ramps at all entries to the intersection and connecting the island adjacent to westbound Freitas Parkway;
- Providing new pathways along eastbound Freitas Parkway and the island adjacent to westbound Freitas Parkway;
- Providing bicycle lanes along Las Gallinas Avenue and Freitas Parkway;
- Removing pedestrian “Pork chop” islands;
- Upgrading the traffic signal system and signage;
- Improving intersection geometry;
- Extending right and left turn pocket on eastbound Freitas Parkway;
- Improvements to curb ramps on Los Gamos Street;
- Paving and storm drain improvements on Las Gallinas Avenue and Freitas Parkway; and
- Increasing the pervious area by 530 square feet by shortening the crossing distance at Los Gamos Street and installing new curb ramps.

Construction

Construction of the proposed project would last for approximately 10 weeks. All improvements will be made within existing City right-of-way. At least one week prior to the commencement of work, the Contractor will provide project information signs to notify drivers of the upcoming project and potential traffic delays; in addition, the City will provide notice to school, bus service providers, emergency services and local businesses. Construction equipment would be those that area commonly used for minor excavation, grinding and paving, retaining, and bridge installation.

Staging

The City of San Rafael construction contract specifications will contractually require the construction Contractor to locate the construction staging area on-site. The specifications for this staging area will include, at the minimum, the following requirements:

- The staging area will be included in the Contractor's Stormwater Pollution Prevent Plan (SWPPP).
- The staging area will not be located in an environmentally or culturally sensitive area and/or impact water resources (rivers, streams, bays, inlet, lakes, drainage sloughs).
- The staging area will not be located in a regulatory floodway or within the base floodplain (100-year).
- The staging area will not affect access to properties or roadways.

Parking

Construction of the proposed project will not require the use of any on-street parking, as there is none within the project site. The proposed project does not add any new parking on-site.

Traffic

Lane closure and traffic control will conform to the California Manual on Uniform Traffic Control Devices (CAMUTCD), and City standard specifications. The Contractor will install advance warning signs to alert pedestrians, bicyclists, and motorists of the work zone and lane closures. Advance warning signs may be reflective signs, changeable message boards, cones, and barricades. Street traffic will allow for movement through intersections. Flagging and other means of traffic control will be required to allow for the safe movement of traffic through the work zone. The Contractor will provide flaggers to temporarily hold traffic for staging equipment or construction. The work will be limited to 7:00 A.M. to 5:00 P.M., Monday through Friday, unless otherwise approved in writing by the Director of Public Works. Night work for possible paving, rock wheeling, and signal switch overs may occur between the hours of 8:00 P.M. and 5:00 A.M. Work shall be performed in a manner that is least disruptive to the public. Lane closures will be confined to 9:00 A.M. to 3:00 P.M., unless otherwise approved in writing by the Director of Public Works.

Utilities

The island adjacent to westbound Freitas Parkway currently has a joint utility pole for overhead utility lines. Utility boxes located on this island would remain in place with implementation of the project. The proposed project would alter existing stormwater drainage facilities within the project site. Improvements include replacing of storm drains, drainage pipes, and curbs and gutters. Several bio-retention facilities are proposed throughout the project site. AT&T is responsible for relocating their facilities across Las Gallinas Avenue.

Tree Loss

The project has been designed to avoid tree loss and tree trimming to the maximum degree possible. Standard avoidance and minimization measures would be implemented to ensure the project complies with all applicable City regulations regarding tree removal, and the Migratory Bird Treaty Act (MBTA).

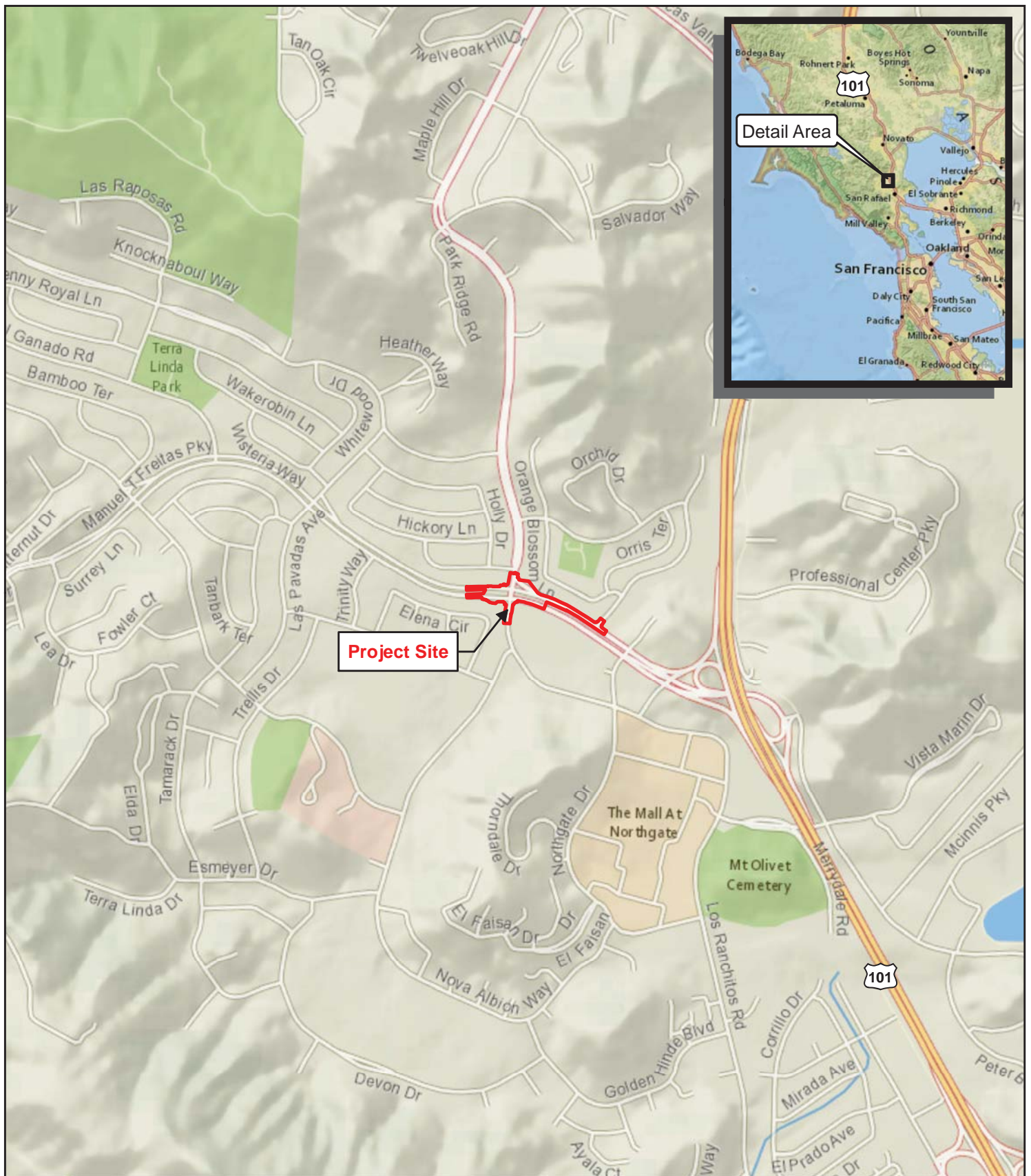


Figure 1. Project Site Location Map

Manuel T. Freitas Parkway and Las Gallinas Avenue
Intersection Improvements
Marin County, California



Map Prepared Date: 9/30/2015
Map Prepared By: fhourigan
Base Source: ESRI/National Geographic
Data Source(s): WRA

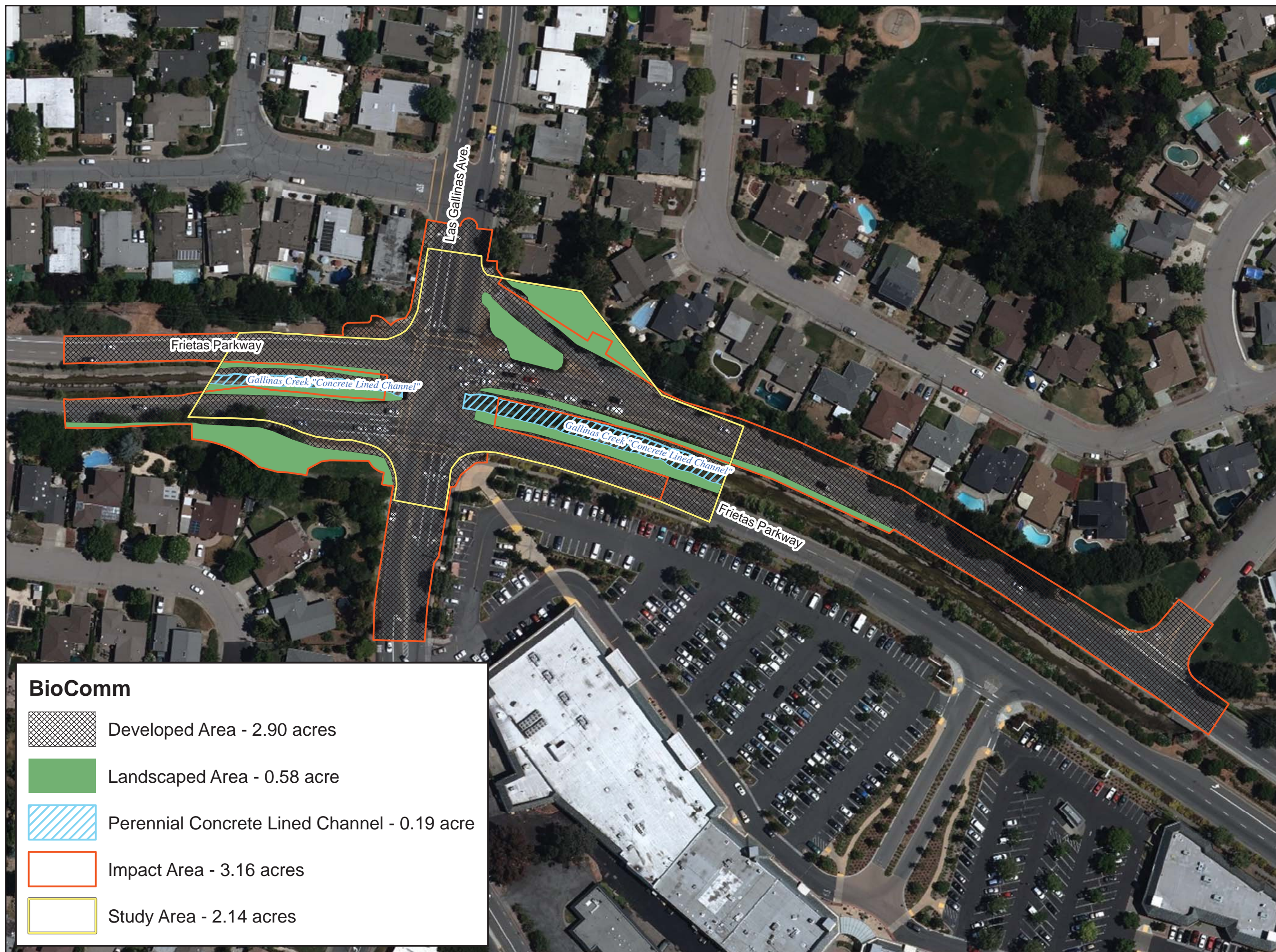
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Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements

Marin County,
California

Figure 2.

Biological Communities
within the Study Area



BioComm



Developed Area - 2.90 acres



Landscaped Area - 0.58 acre



Perennial Concrete Lined Channel - 0.19 acre



Impact Area - 3.16 acres



Study Area - 2.14 acres



0 25 50 100 150 200
Feet

Map Prepared Date: 9/30/2015
Map Prepared By: fhourigan
Base Source: ESRI World Imagery (2010)
Data Source(s): WRA

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View 1. View of the project site looking northwest from Las Gallinas Avenue.



View 2. View of the project site looking northeast from Las Gallinas Avenue.



View 3. View of the project site looking east from Las Gallinas Avenue.



View 4. View of the project site looking south from Las Gallinas Avenue.

Figure 3. Views of the Project Site

Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements Project
San Rafael, California



View 1. View of the project site looking west from Manuel T. Freitas Pkwy.



View 2. View of the project site looking west from Manuel T. Freitas Pkwy.



View 3. View of the project site looking east from Las Gallinas Avenue.



View 4. View of the project site looking west from Las Gallinas Avenue.

Figure 4. Views of the Project Site

Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements Project
San Rafael, California



View 1. View looking south from Las Gallinas Avenue.



View 2. View looking west from Manuel T. Freitas Pkwy.



View 3. View looking north from Las Gallinas Avenue.



View 4. View looking west from Las Gallinas Avenue.

Figure 5. Views of Surrounding Land Uses

Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements Project
San Rafael, California

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Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements

San Rafael, California

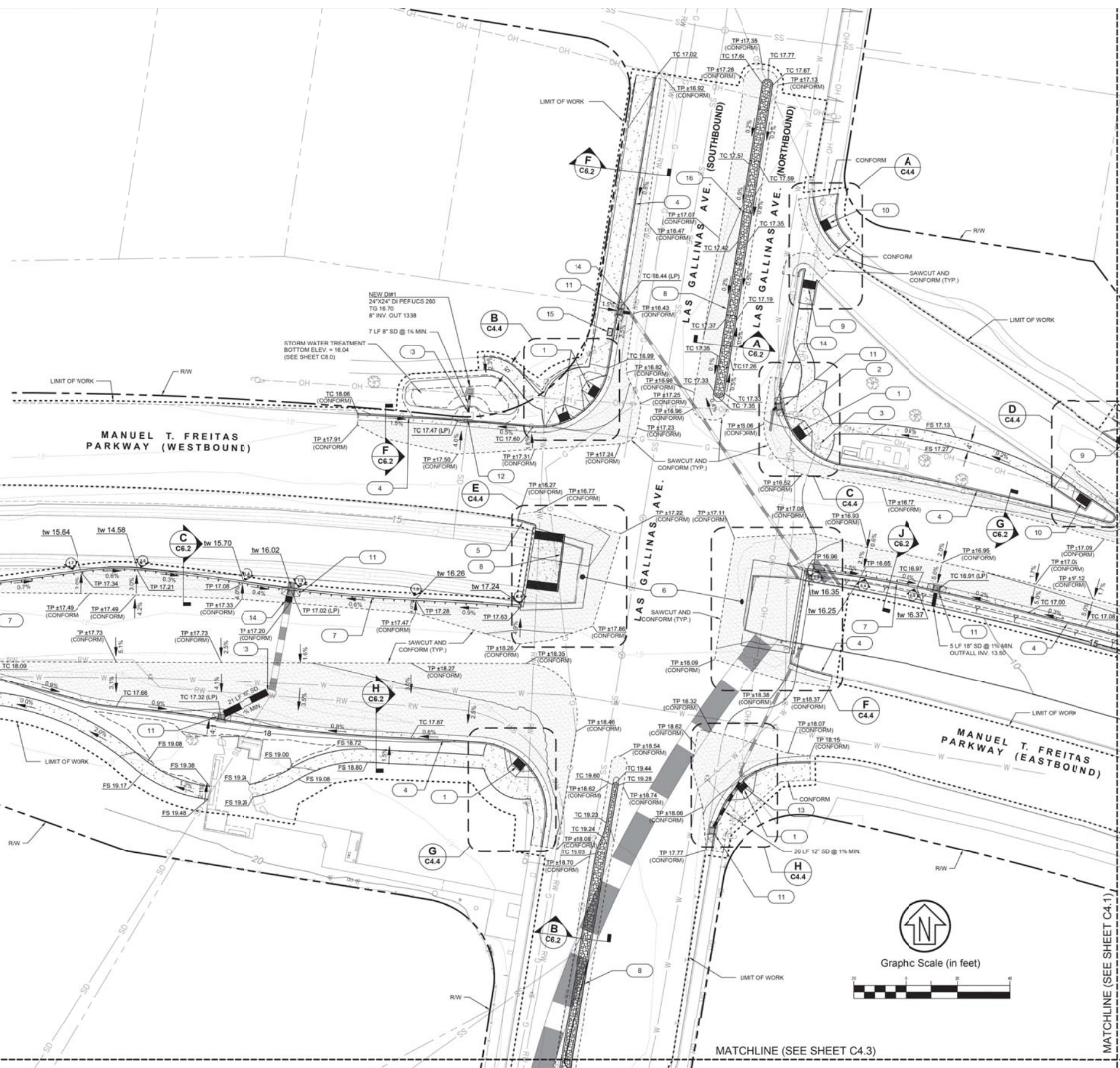
Figure 6.

Project Site Plan
(1 of 5)

Date: October 2015
Source: CWS | ST2.

GRADING & DRAINAGE KEYNOTES

- 1 NEW CASE "A" CURB RAMP PER REVISED STANDARD PLAN A88A. SEE DETAIL 15 ON SHEET C6.0.
 - 2 PROTECT IN PLACE EXISTING JOINT POLE.
 - 3 PROTECT IN PLACE EXISTING UTILITY STRUCTURE AND ADJUST TO FINISH GRADE AS NEEDED.
 - 4 NEW TYPE "A" CURB AND GUTTER PER MARIN COUNTY UCS DWG. NO. 105. SEE DETAIL 7 ON SHEET C6.0.
 - 5 2' WIDE CURB CUT, SEE DETAIL 16 ON SHEET C6.0.
 - 6 NEW CULVERT BRIDGE BELOW SURFACE IMPROVEMENTS, SEE STRUCTURAL PLANS.
 - 7 NEW WALL, SEE STRUCTURAL PLANS.
 - 8 DENOTES RETAINED WALL HEIGHT AND SIDE.
 - 9 NEW TYPE "E" CURB PER MARIN COUNTY UCS DWG. NO. 105. SEE DETAIL 8 ON SHEET C6.0 FOR MODIFICATIONS.
 - 10 NEW CASE "F" CURB RAMP, SEE DETAIL 15 ON SHEET C6.0.
 - 11 NEW CASE "C" CURB RAMP, SEE DETAIL 15 ON SHEET C6.0.
 - 12 NEW TYPE "C" CATCH BASIN PER MARIN COUNTY UCS 235.
 - 13 COVER EXISTING SIDE OPENING ON INLET AND RAISE GRADE TO MATCH EX. BACK OF CURB AND TOP OF TREATMENT BASIN.
 - 14 CONNECT NEW STORM DRAIN PIPE TO EXISTING STORM DRAIN STRUCTURE. STORM DRAIN PIPE INVERT IN TO MATCH INVERT OUT.
 - 15 CONNECT NEW CATCH BASIN TO EXISTING STORM PIPE. CONTRACTOR TO MATCH EXISTING STORM PIPE MATERIAL AND INVERT AND EXTEND OR CUT AS NEEDED.
 - 16 RELOCATED WATER BOX.
 - 17 SIDEWALK UNDERDRAIN PER UCS STD. 145, 20 FEET ON CENTER.
- NEW AC PAVEMENT AND SAWCUT LIMITS. SEE PLANS FOR EXTENTS.
- NEW PEDESTRIAN WALK PER MARIN COUNTY UCS DWG. NO. 105 TYPE "A" OR TYPE "B". SEE DETAIL 2 ON SHEET C6.0. WIDTH VARIES.



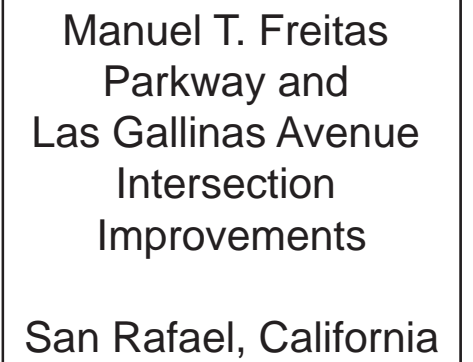
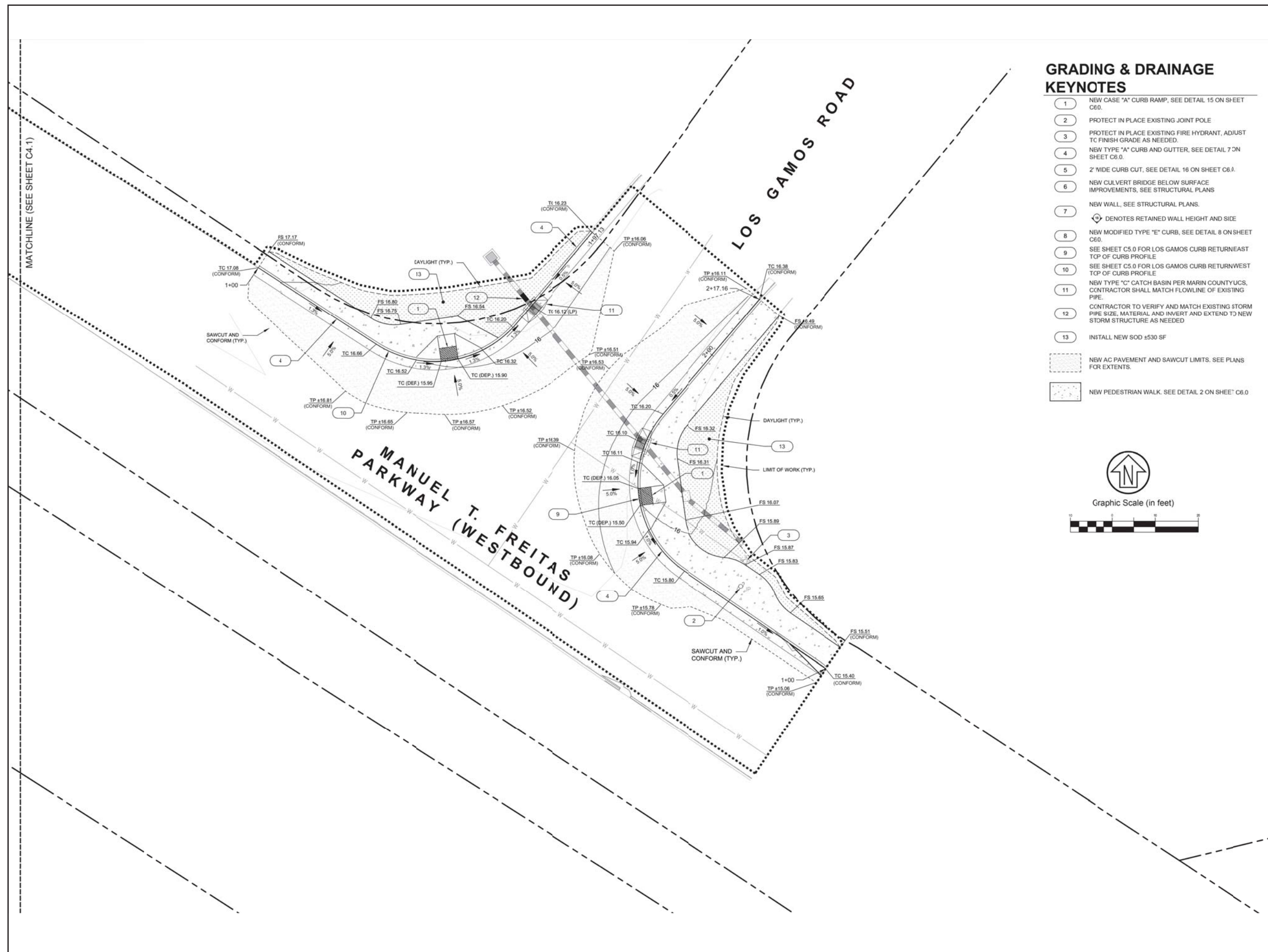


Figure 8.

Project Site Plan
(3 of 5)

Date: October 2015
Source: CWS | ST2.



Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements




San Rafael, California

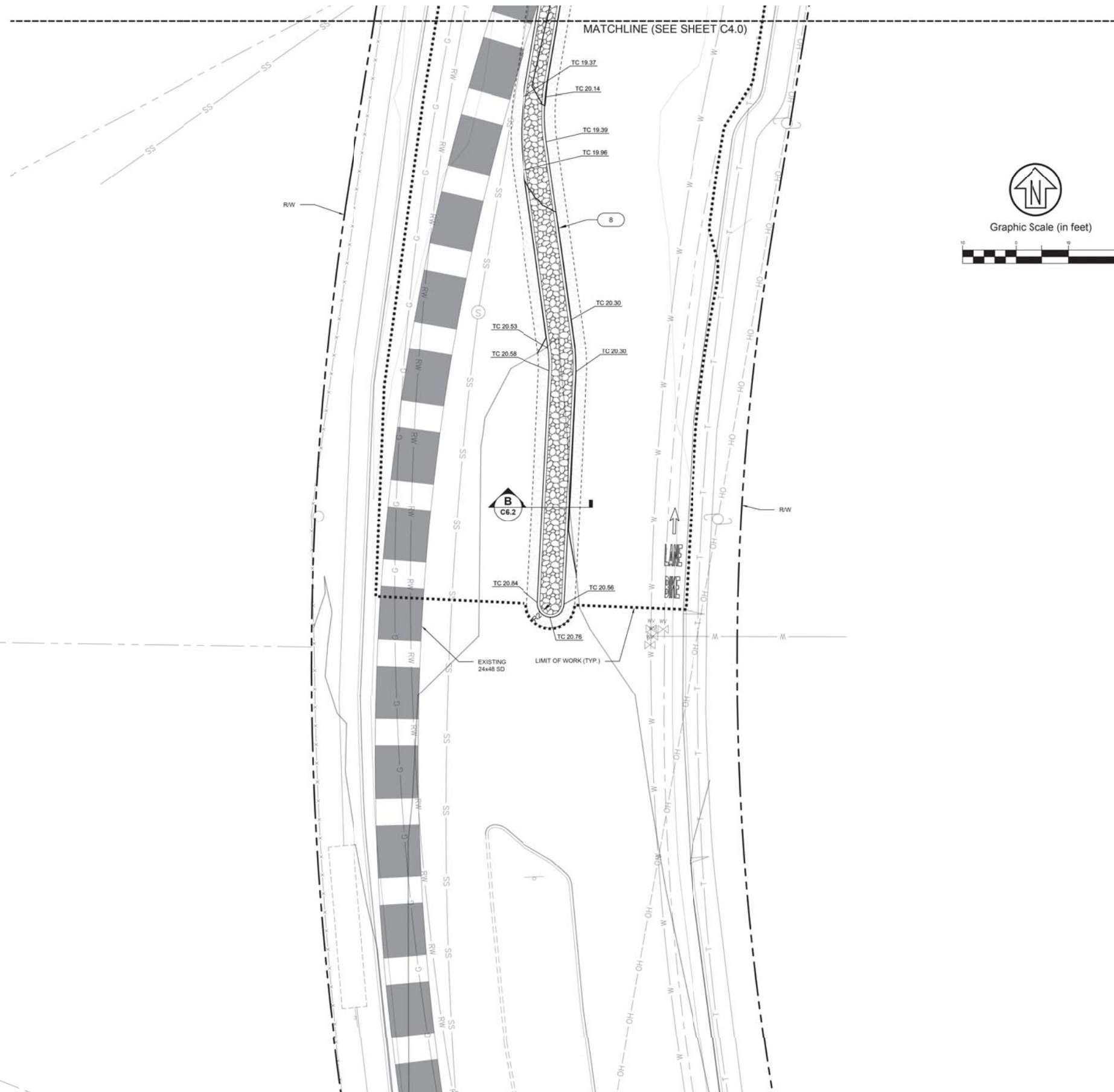
Figure 9.

Project Site Plan
(4 of 5)

Date: October 2015
Source: CWS | ST2.

GRADING & DRAINAGE KEYNOTES

- 1 NEW CASE "A" CURB RAMP, SEE DETAIL 15 ON SHEET C6.0.
- 2 PROTECT IN PLACE EXISTING JOINT POLE
- 3 PROTECT IN PLACE EXISTING FIRE HYDRANT, ADJUST TO FINISH GRADE AS NEEDED.
- 4 NEW TYPE "A" CURB AND GUTTER, SEE DETAIL 7 ON SHEET C6.0.
- 5 2' WIDE CURB CUT, SEE DETAIL 16 ON SHEET C6.0.
- 6 NEW CULVERT BRIDGE BELOW SURFACE IMPROVEMENTS, SEE STRUCTURAL PLANS
- 7 NEW WALL, SEE STRUCTURAL PLANS.
- 8  DENOTES RETAINED WALL HEIGHT AND SIDE
- 8 NEW MODIFIED TYPE "E" CURB, SEE DETAIL 8 ON SHEET C6.0.
-  NEW AC PAVEMENT AND SAWCUT LIMITS, SEE PLANS FOR EXTENTS.
-  NEW PEDESTRIAN WALK, SEE DETAIL 2 ON SHEET C6.0



Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements

San Rafael, California

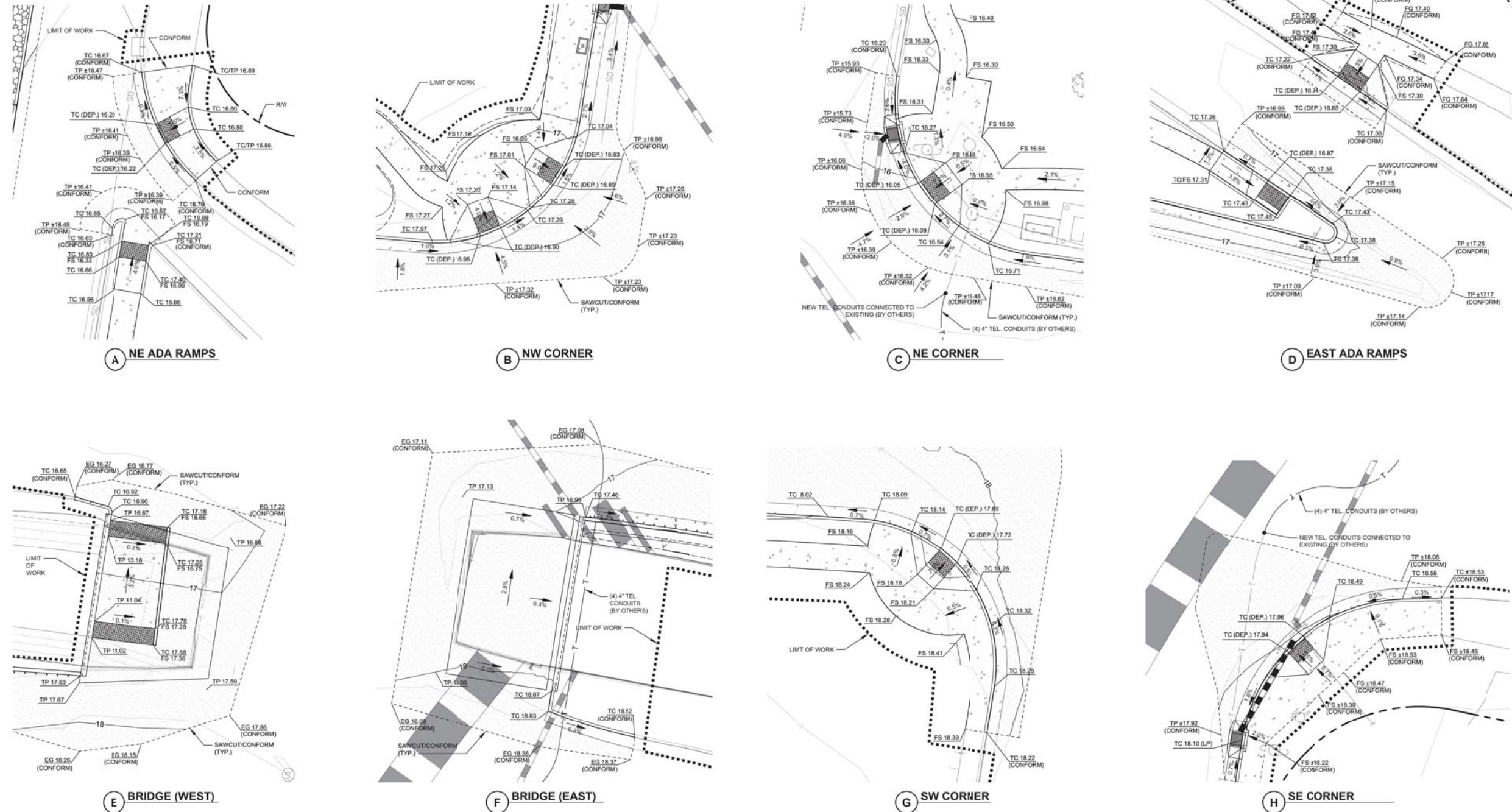


Figure 10.

Project Site Plan
(5 of 5)

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7. Project BMPs.

It is anticipated that construction of the proposed project would require approximately ten weeks. Project construction would occur from approximately 7:00 A.M. to 5:00 P.M., Monday through Friday.

The construction contractor will be responsible for complying with all terms of the contract specifications and drawings. Measures to be identified in the contract specifications and drawings include, but are not limited to:

- Identify locations of other existing underground utilities in the proposed alignment and take necessary precautions to avoid damaging the utilities or interfering with their service.
- Minimize discharge of materials in storm water in accordance with the Regional Water Quality Control Board's (RWQCB) Storm Water Management and Discharge Rules and Regulations.
- Use traffic cones, signs, lighted barricades, lights, and flagmen as described and specified in the Manual of Uniform Traffic Control Devices, current edition, California Supplement, Part 6 Temporary Traffic Control to provide for public safety and convenience during construction.
- Maintain convenient access to driveways and streets near the work area unless otherwise approved by the City in advance.
- Lane closure or traffic detours on City streets require prior approval of the City. Any excavation that would be required would be covered by contract.
- Cover, fence, and guard, as appropriate, open excavation and ditches across roadways in such a manner as to permit safe traffic flow during hours when no work is being performed and to prevent accidents from people or animals falling into the trenches.
- Restore street/surface improvements to pre-disturbance conditions or better.

The contractor will also implement measures during construction to maintain safety, minimize impacts from hazardous materials spills, maintain emergency access, protect water quality, cultural and biological resources, and prevent fires, including:

- Follow all safety and health requirements set forth by the Occupational Safety and Health Administration.
- Hazardous materials will not be stored or used, such as for equipment maintenance, where they could affect nearby properties, or where they might enter the storm drain system.
- All spills of oil and other hazardous materials will be immediately cleaned up and contained. Any hazardous materials cleaned up or used on-site will be properly disposed of at an approved disposal facility.
- The City or its contractor will notify and coordinate with law enforcement and emergency service providers prior to the start of construction to ensure minimal disruption to service during construction.
- Detours will be readily available at all times to allow emergency vehicles access around the work area.
- Prepare a Storm Water Pollution Prevention Plan (SWPPP) to limit erosion and protect water quality surrounding the project site.

The Bay Area Air Quality Management District (BAAQMD) recommends basic construction measures to ensure minimal impacts on regional air quality. The contractor will be responsible for implementing the following basic measures during construction:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas) will be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off-site will be covered.
- All visible mud or dirt track-out onto adjacent public roads will be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All roadways, driveways, and sidewalks to be paved will be completed as soon as possible.
- Idling times will be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations).
- Clear signage will be provided for construction workers at all access points.
- All construction equipment will be maintained and properly tuned in accordance with manufacturer's specifications, and all equipment will be checked by a certified visible emissions evaluator.
- A publicly visible sign with the telephone number and person to contact at the lead agency regarding any dust complaints will be posted in or near the project site. The contact person will respond to complaints and take corrective action within 48 hours. The Air District's phone number will also be visible to ensure compliance with applicable regulations.

8. Other Public Agencies Whose Approval May Be Required:

The information contained in this Initial Study will be used by the City of San Rafael (the California Environmental Quality Act [CEQA] Lead Agency) as it considers whether or not to approve the proposed project. If the project is approved, the Initial Study, as well as the associated Mitigated Negative Declaration (MND) would be used by the City and responsible and trustee agencies in conjunction with various approvals and permits. These actions include, but may not be limited to, the following approvals by the agencies indicated:

California Department of Fish and Wildlife (CDFW)

- Section 1602 Lake and Streambed Alteration Agreement

Regional Water Quality Control Board (RWQCB)

- Clean Water Act, Section 401 Waste Discharge Report

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is potentially significant unless mitigation is incorporated, as indicated by the checklist on the following pages.

<input type="checkbox"/> Aesthetics	<input type="checkbox"/> Mineral Resources
<input type="checkbox"/> Agricultural Resources	<input checked="" type="checkbox"/> Noise
<input type="checkbox"/> Air Quality	<input type="checkbox"/> Population and Housing
<input checked="" type="checkbox"/> Biological Resources	<input checked="" type="checkbox"/> Public Services
<input checked="" type="checkbox"/> Cultural Resources	<input type="checkbox"/> Recreation
<input type="checkbox"/> Geology and Soils	<input checked="" type="checkbox"/> Transportation/Traffic
<input checked="" type="checkbox"/> Hazards and Hazardous Materials	<input type="checkbox"/> Utilities
<input type="checkbox"/> Hydrology and Water Quality	<input checked="" type="checkbox"/> Mandatory Findings of Significance
<input type="checkbox"/> Land Use/Planning	

Determination

On the basis of this initial evaluation:

- ☐ I find that the project COULD NOT have a significant effect on the environment and a NEGATIVE DECLARATION will be prepared.
- ☒ I find that although the project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- ☐ I find that the project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- ☐ I find that the project MAY have a "Potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
- ☐ I find that although the project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature 
Name and Title: Dean Allison, Public Works Director

1/27/2016
Date:

INITIAL STUDY CHECKLIST

This section describes the existing environmental conditions in and near the project area and evaluates environmental impacts associated with the proposed project. The environmental checklist, as recommended in the CEQA Guidelines (Appendix G), was used to identify environmental impacts that could occur if the proposed project is implemented. The right-hand column in the checklist lists the source(s) for the answer to each question. The cited sources are identified at the end of this section.

Each of the environmental categories was fully evaluated, and one of the following four determinations was made for each checklist question:

- **“No Impact”** means that no impact to the resource would occur as a result of implementing the project.
- **“Less than Significant Impact”** means that implementation of the project would not result in a substantial and/or adverse change to the resource, and no mitigation measures are required.
- **“Less than Significant with Mitigation Incorporated”** means that the incorporation of one or more mitigation measures is necessary to reduce the impact from potentially significant to less than significant.
- **“Potentially Significant Impact”** means that there is either substantial evidence that a project-related effect may be significant, or, due to a lack of existing information, could have the potential to be significant.

I. AESTHETICS — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,2
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,2,3
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

Environmental Setting

The project site is not located along any designated or eligible scenic highways and is not visible from designated portions of I-101 or SR-37, which are the nearest designated scenic highways located more than six miles north of the project site (California Department of Transportation, 2012). The project site is not within a City-designated scenic road, corridor or scenic vista. Existing land uses adjacent to the project site consist of various residential properties, a park, and commercial uses near the intersection. These uses have direct views of the proposed project site. The other primary viewer group in the project area is motorists using the roads in and near the project site. Views are limited to the road corridor and immediately adjacent uses because the nearby buildings form barriers that prevent more distant views. Existing sources of nighttime light in the project area include vehicle headlights, commercial development lighting, parking lot lights and residential security lighting. Existing sources of glare are mainly limited to automobile windshields and reflective building materials associated with residential and commercial uses.

Discussion of Impacts

- a, b) **No Impact.** No scenic vistas exist in or near the project site. Furthermore, there is no state or locally designated scenic highway, road or corridor within the vicinity of the project site. The project also would not result in impacts within a state scenic highway, such as the removal of trees, rock outcroppings, or historic buildings.
- c) **Less than Significant Impact.** There is the potential for temporary impacts to the existing visual quality of the surrounding area during construction. Temporary visual impacts resulting from the presence of construction vehicles or ground disturbance may result during project construction activities. However, construction activities would be temporary. The permanent development of the site would be consistent with the existing conditions of the site. Realignment and removal of certain intersection elements would not substantially alter the aesthetic value of the project site. No new element of the project would be different from what is to be expected at an intersection. Impacts would be less than significant.

- d) **No Impact.** Construction of the proposed project would not create a significant source of light or glare during daytime. The long-term operation of the project would not result in the addition of new sources of light and glare. Upon completion of construction the light and glare conditions at the project site would be nearly identical to existing conditions. The proposed project would not create a new source of substantial light or glare which adversely affect day or nighttime views in the area.

II. AGRICULTURAL AND FORESTRY RESOURCES — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	4
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2
d) Result in the loss of forest land or conversion of forest land to non-forest use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use??	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,4

Environmental Setting

The project site does not contain any farmland or forestry land and is not designated for agricultural or forestry uses or Prime, Statewide, or Locally Important Farmland (California Department of Conservation, 2010). The proposed project is located in residential and commercial areas and follows existing roads. Surrounding land is developed with residential, educational, and commercial uses.

Discussion of Impacts

- a-e) **No Impact.** There are no agricultural or forestry resources within the project site. There are no Prime, Unique, Statewide or Locally Important farmlands in the area. The project site is not under a Williamson Act Contract, nor is the project zoned as forest land or timber production. The project would be confined to existing right-of-ways and therefore no impacts to agricultural or forestry resources would occur.

III. AIR QUALITY — Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:		<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a)	Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,14
b)	Violate any air quality standard or contribute to an existing or projected air quality violation?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,14
c)	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,14
d)	Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,14
e)	Create objectionable odors affecting a substantial number of people?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,14

Environmental Setting

The project site is in the San Francisco Bay Area air basin, where air quality is monitored and regulated by the Bay Area Air Quality Management District (BAAQMD). Ambient concentrations of key air pollutants have decreased considerably over the course of the last several decades. Air pollution is generated by anything that burns fuel (including but not limited to cars and trucks, construction equipment, backup generators, boilers and hot water heaters, barbeques and broilers, gas-fired cooking ranges and ovens, fireplaces, and wood-burning stoves), almost any evaporative emissions (including the evaporation of gasoline from service stations and vehicles, emissions from food as it is cooked, emissions from paints, cleaning solvents, and adhesives, etc.), and other processes (fugitive dust generated from roadways and construction activities, etc.).

A sensitive receptor is generally defined as a location where human populations, especially children, seniors, and sick persons, are located where there is a reasonable expectation of continuous human exposure to air pollutants. These typically include residences, hospitals, and schools. The site is surrounded by residential and commercial land uses.

The Bay Area is currently classified as “attainment” or “unclassifiable” with respect to every National Ambient Air Quality Standard (NAAQS) except ozone and fine particulate matter (PM_{2.5}), for which it is still classified as “nonattainment.” Ozone concentrations in the Bay Area have also decreased considerably over the last several decades, but NAAQS are required to be set to be protective of public health “allowing an adequate margin of safety” and have also become more stringent. Prior to 2008, attaining the ozone NAAQS required that the “design value”—i.e., the peak 8-hour average concentration on the 4th-worst day of the year (averaged over three consecutive years)—be below 0.08 parts per million (ppm); the Bay Area was classified as “marginal” nonattainment with respect to that standard.¹ The Bay Area’s current ozone design value (based on 2008-2010 data) is 0.080 ppm,² but in 2008, the ozone NAAQS was revised to 0.075 ppm. Therefore, while EPA has not yet finalized its attainment designations for the 2008 ozone standard, it is proposing to designate the Bay Area as “marginal nonattainment” (0.076 - 0.086 ppm) with respect to that standard.³

The State of California also has its own ambient air quality standards (CAAQS) which are equivalent to or more stringent than the NAAQS; the Bay Area is currently classified as nonattainment with respect to the CAAQS for ozone, particulate matter smaller than 10 microns (PM₁₀), and “fine” particulate matter smaller than 2.5 microns (PM_{2.5}).

Discussion of Impacts

- a, b) **Less Than Significant Impact.** Construction activities would result in short-term increases in emissions from the use of heavy equipment that generates dust, exhaust, and tire-wear emissions; soil disturbance; materials used in construction; and construction traffic. Project construction would produce fugitive dust (PM₁₀ and PM_{2.5}) during ground disturbance and would generate carbon monoxide, ozone precursors, and other emissions from vehicle and equipment operation. Best management practices (BMPs) recommended by BAAQMD and identified above in the project description would be implemented during construction to minimize fugitive dust. All roadway improvement activities would take place within existing roads in a developed community. Construction emissions would be temporary, lasting approximately ten weeks, and would not have long-term effects on air quality in the Bay Area. Because of the small area of disturbance, temporary nature of the emissions, and implementation of construction measures, impacts on air quality would be less than significant and would comply with the Bay Area 2010 Clean Air Plan.
- c) **Less Than Significant Impact.** As discussed under items a) b), the project would result in minor construction-related emissions. It would not result in a cumulatively considerable net increase of any criteria pollutant. The project would cause short-term air quality impacts as a result of construction activities; however, it would not result in long-term or cumulatively considerable increases in air quality pollutant emissions for which the Bay Area is currently in non-attainment (ozone and

¹ The Bay Area Air Quality Management reported that the maximum 8-hour ozone concentration only exceeded the standard once in 2005 and once in 2007, but exceeded the standard on 12 days in 2006.

² Lynn Terry (California Air Resources Board Deputy Executive Officer), letter to Deborah Jordan (U.S. EPA Region 9 Air Division Director), October 12, 2011, available from http://www.epa.gov/ozonedesignations/2008standards/rec/letters/09_CA_rec2.pdf.

³ EPA’s proposed criterion for the “marginal” classification was proposed in the Federal Register on February 14, 2012.

particulate matter). Implementation of the BMPs included in the project description would ensure that the temporary increase in air pollutant emissions associated with construction activities would result in less than significant contributions to cumulative pollutant levels in the region.

- d) ***Less Than Significant Impact.*** The primary sensitive receptors in the vicinity are residents, which may include children, elderly people, or people with respiratory illnesses. Sensitive receptors located in close proximity to several locations adjacent to the construction area could be exposed to temporary air pollutants from construction activities, such as fugitive dust, ozone precursors, and carbon monoxide. The duration of construction activities would be limited. Basic construction measures recommended by BAAQMD, listed in the project description, would be implemented during construction to minimize air pollutants. New construction equipment has been subject to increasingly stringent emissions requirements at the Federal level (e.g., 40 CFR 89 and 1039), designated “Tier 1”, “Tier 2”, “Tier 3”, etc.; older construction equipment is subject to potential retrofit requirements required by the State of California (13 CCR 2449, 13 CCR 2450-2466, and 17 CCR 93116). As a result, sensitive receptors in the vicinity of the project would not be exposed to substantial pollutant concentrations, and impacts would be less than significant.
- e) ***Less Than Significant Impact.*** Construction activities would involve the use of gasoline or diesel-powered equipment that emits exhaust fumes and would involve asphalt paving, which has a distinctive odor during application. Asphalt would conform to BAAQMD regulations governing asphalt (Regulation 8, Rule 15). These activities would take place intermittently throughout the workday, and the associated odors are expected to dissipate within the immediate vicinity of the work area. Persons near the construction work area may find these odors objectionable. However, the proposed project would not include uses that have been identified by BAAQMD as potential sources of objectionable odors, such as restaurants, manufacturing plants, landfills, and agricultural and industrial operations. The infrequency of the emissions, rapid dissipation of the exhaust and other odors into the air, and short-term nature of the construction activities would result in less-than-significant odor impacts.

IV. BIOLOGICAL RESOURCES — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1,5,9
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,5,9
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,9
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,9
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,2,9
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

The following discussion related to biological resources is based on a Biological Reconnaissance Memorandum prepared by WRA, Inc. and is provided in Appendix A.

Regulatory Setting

Sensitive Biological Communities

Sensitive biological communities include habitats that fulfill special functions or have special values, such as wetlands, streams, or riparian habitat. These habitats are protected under federal regulations such as the Clean Water Act; state regulations such as the Porter-Cologne Act, the CDFW Streambed Alteration Program, and CEQA; or local ordinances or policies such as city or county tree ordinances, Special Habitat Management Areas, and General Plan Elements.

Waters of the United States

The U.S. Army Corps of Engineers (Corps) regulates "Waters of the United States" under Section 404 of the Clean Water Act. Waters of the U.S. are defined in the Code of Federal Regulations (CFR) as waters susceptible to use in commerce, including interstate waters and wetlands, all other waters (intrastate waterbodies, including wetlands), and their tributaries (33 CFR 328.3). Potential wetland areas, according to the three criteria used to delineate wetlands as defined in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), are identified by the presence of (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Areas that are inundated at a sufficient depth and for a sufficient duration to exclude growth of hydrophytic vegetation are subject to Section 404 jurisdiction as "other waters" and are often characterized by an ordinary high water mark (OHWM). Other waters, for example, generally include lakes, rivers, and streams. The placement of fill material into Waters of the U.S generally requires an individual or nationwide permit from the Corps under Section 404 of the Clean Water Act.

Waters of the State

The term "Waters of the State" is defined by the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state." The Regional Water Quality Control Board (RWQCB) protects all waters in its regulatory scope and has special responsibility for wetlands, riparian areas, and headwaters. These waterbodies have high resource value, are vulnerable to filling, and are not systematically protected by other programs. RWQCB jurisdiction includes "isolated" wetlands and waters that may not be regulated by the Corps under Section 404. Waters of the State are regulated by the RWQCB under the State Water Quality Certification Program which regulates discharges of fill and dredged material under Section 401 of the Clean Water Act and the Porter-Cologne Water Quality Control Act. Projects that require a Corps permit, or fall under other federal jurisdiction, and have the potential to impact Waters of the State, are required to comply with the terms of the Water Quality Certification determination. If a proposed project does not require a federal permit, but does involve dredge or fill activities that may result in a discharge to Waters of the State, the RWQCB has the option to regulate the dredge and fill activities under its state authority in the form of Waste Discharge Requirements.

Other Sensitive Biological Communities

Other sensitive biological communities not discussed above include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the CDFW; formerly the California Department of Fish and Game [CDFG]). The CDFW ranks sensitive communities as "threatened" or "very threatened" and keeps records of their occurrences in its California Natural

Diversity Database (CNDDDB) (CDFW 2013). Sensitive plant communities are also identified by CDFW (CDFG 2003, 2007, 2009). CNDDDB vegetation alliances are ranked 1 through 5 based on NatureServe's (2010) methodology, with those alliances ranked globally (G) or statewide (S) as 1 through 3 considered sensitive. Impacts to sensitive natural communities identified in local or regional plans, policies, or regulations or those identified by the CDFW or U.S. Fish and Wildlife Service (USFWS) must be considered and evaluated under CEQA (CCR Title 14, Div. 6, Chap. 3, Appendix G). Specific habitats may also be identified as sensitive in city or county general plans or ordinances.

Environmental Setting

Vegetation Communities

The project site supports only managed landscaped areas that divide impervious paved roadways and sidewalks. Landscaped areas exist as a barrier between Manuel T. Freitas Parkway and the interior concrete channel, within the central portion of the project site. Additionally, landscaped areas occur northeast of the project site intersection, in adjacent unpaved surfaces to the turnoff from Manuel T. Freitas Parkway to northbound Las Gallinas Avenue. Landscaped areas contain an array of planted ornamental shrubs and trees as well as invasive species. Site hydrology is managed via a storm water drainage system that drains into the concrete channel.

Dominant vegetation includes ornamental species such as juniper (*Juniperus* sp.), oleander (*Nerium oleander*), firethorn (*Pyracantha* sp.), and crimson bottlebrush (*Callistemon citrinus*). Ornamental trees were scattered throughout landscaped areas and include sweetgum (*Liquidambar styraciflua*), and coast live oak (*Quercus agrifolia*). Additionally, the northern-most landscaped area in the project site includes a redwood (*Sequoia sempervirens*), Monterey pine (*Pinus radiata*), and blue gum (*Eucalyptus globulus*), with ground cover dominated by English ivy (*Hedera helix*).


Aquatic communities within the project site include open waters associated with the concrete channel of Gallinas Creek, discussed in detail below.

Wetlands and Waters of the U.S.

Wetlands are not present in the project site. However, approximately 0.19 acre (530 linear feet) of non-wetland waters were observed within the project site, associated with Gallinas Creek. The channel of Gallinas Creek is a concrete trapezoidal flood control and storm drainage channel, comprised of a concrete bed and banks with no natural substrates. It is lined with ornamental shrubs to provide a visual barrier to surrounding traffic lanes. This perennial channel is fed by many storm drain outlets of varying sizes along its length and contained water flowing from the west during the site visit. Las Gallinas Avenue crosses the creek via a box culvert style bridge that spans and shades a portion of Gallinas Creek. To the east of this bridge, along the southern bank of the concrete channel, a large culvert feeds additional stormwater flows into Gallinas Creek.

Because the concrete channel of Gallinas Creek contains an identifiable ordinary high water mark and carries water from a perennial stream to the San Francisco Bay, the channel was determined to be potentially jurisdictional under Section 404 of the Clean Water Act based on current U.S. Army Corps of Engineers (Corps) guidance. Waters in the channel within the project site are not tidal and occur approximately 3.5 river-miles from the San Francisco Bay.

Figure 12. Gallinas Creek

	
<p>Photograph facing east toward trapezoidal channel of Gallinas Creek, carrying potential waters of the U.S., with subject intersection bridge in distance.</p>	<p>Photograph facing east toward concrete flood control channel of Gallinas Creek, east of subject intersection, carrying potential waters of the U.S.</p>

Special-Status Plant Species

Sixty-six special-status plant species are known to occur in the vicinity of the project site (CDFW 2014, CNPS 2014). No rare plant species were observed during the site visit. Current conditions in the project site do not contain suitable habitat for special-status plant species known to occur in the vicinity, based on the highly disturbed and developed conditions of the site. There is no potential for the project site to support special-status plant species.

Special-Status Wildlife Species

No special-status wildlife species have the potential to occur within the project site due to disturbed and developed site conditions. The project site does not contain suitable habitat for any special-status wildlife species. California black rail (*Laterallus jamaicensis coturniculus*) and San Pablo song sparrow (*Melospiza melodia samuelis*) have been documented within 1.5 miles to the north of the project site in marsh areas connected to San Francisco Bay. However, the project site does not contain salt marsh habitat and it is separated from San Francisco Bay by urban development. Further, the channel within the project site is a cemented stormwater drainage that lacks natural substrate and vegetation. Therefore, there is no potential for special-status fish species to occur, nor is essential fish habitat (EFH) present within the concrete channel.

Non-Special-Status Birds and Bats

Nesting birds have potential to occur within some areas of the project site including in trees, shrubs, and along existing structures. No trees, structures, or culverts observed within the project site provide suitable roost habitat for bat species; therefore, there is no potential for bats to roost within the project site.

Discussion of Impacts

- a) ***Less than Significant with Mitigation Incorporated.*** Special-status plant species would not be affected by project construction activities. The project site is primarily developed and landscaped or is surrounded by disturbed, residential and commercial area and thus does not support suitable habitat for special-status plant species known to occur in the vicinity of the project site. Impacts on developed, urban landscapes would be limited to near the roadway and include trimming and the potential removal of landscaping trees in accordance with the City's tree ordinance. Impacts to special-status plant species would be less than significant.

Common and special-status wildlife, particularly birds, may be exposed to noise and other disturbance during construction, but these activities are typical of urban environments and these species are usually acclimated to these types of disturbance. In addition to regulations for special-status species, most birds in the United States, including non-special-status species, are protected by the MBTA and the CFGC. Under this legislation, destroying active nests, eggs, and young is illegal. The primary potential for impacts to birds (both special-status and non-) would be direct disturbances (including physical impacts) to active bird nests during the breeding bird season (defined generally as February 1 to August 31). Such disturbances could result in the abandonment of the nest and/or the destruction or injury of eggs and/or young. However, implementation of Mitigation Measure BIO-1 would reduce such impacts to a less-than-significant level.

Mitigation Measure BIO-1:

To the extent feasible, vegetation removal and initial ground disturbance shall occur outside of the general breeding bird season (September 1 to January 31). If these activities must occur during the general bird breeding season (February 1 to August 31), then a pre-construction breeding bird survey shall be conducted by a qualified biologist within seven days prior to the initiation of these activities. The survey shall cover project impact areas and surrounding areas within 250 feet. Any active bird nests of species protected by the MBTA and/or CFGC found during the survey shall be protected by a suitable work exclusion buffer until all young in the nest have fledged or the nest otherwise becomes inactive. The size of the buffer shall be determined by the qualified biologist and based on factors such as bird species, nest location, level of ambient visual and acoustic disturbances in the immediate area, and other factors. Such buffers may be as small as 25 feet for common species, and up to 250 feet for raptors.

- b) ***No Impact.*** The project site supports only managed landscaped areas that divide impervious paved roadways and sidewalks. Landscaped areas exist as a barrier between Manuel T. Freitas Parkway and the interior concrete channel, within the central portion of the project site. Additionally, landscaped areas occur northeast of the project site intersection, in adjacent unpaved surfaces to the turnoff from Manuel T. Freitas Parkway to northbound Las Gallinas Avenue. Therefore, the project would have no impact on riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

- c) **Less than Significant.** Wetlands are not present in the project site. However, approximately 0.19 acre (530 linear feet) of non-wetland waters were observed within the project site, associated with Gallinas Creek. The channel of Gallinas Creek is a concrete trapezoidal flood control and storm drainage channel, comprised of a concrete bed and banks with no natural substrates. It is lined with ornamental shrubs to provide a visual barrier to surrounding traffic lanes. This perennial channel is fed by many storm drain outlets of varying sizes along its length and contained water flowing from the west during the site visit. Las Gallinas Avenue crosses the creek via a box culvert style bridge that spans and shades a portion of Gallinas Creek. To the east of this bridge, along the southern bank of the concrete channel, a large culvert feeds additional stormwater flows into Gallinas Creek.

Because the concrete channel of Gallinas Creek contains an identifiable ordinary high water mark and carries water from a perennial stream to the San Francisco Bay, the channel was determined to be potentially jurisdictional under Section 404 of the Clean Water Act based on current U.S. Army Corps of Engineers (Corps) guidance. Waters in the channel within the Study Area are not tidal and occur approximately 3.5 river-miles from the San Francisco Bay. However, the flood control channel is altered to the extent that it provides no habitat value for biological resources. Because of this state of alteration, minor impacts to the channel from a proposed bridge expansion, which will result in expanding the bridge without conducting work below OHWM, are considered less than significant.

- d) **No Impact.** The flood control channel is altered to the extent that it provides no habitat value for biological resources. Furthermore, the project would not conduct work below OHWM.
- e) **Less than Significant.** The City of San Rafael provides for the protection of street trees along any public street, sidewalk or walkway in the city (Ord. 972 § 2, 1970; Ord. 865 § 2, 1966; Ord. 609). Landscape trees along the roads at the project site may require removal or trimming during construction, but measures would be taken to avoid trees where possible. The project is not expected to impact or require the removal of any protected trees, but if a protected tree must be removed or impacted, it would be replaced in accordance with the municipal code. Tree removal as a result of project implementation would not conflict with any local provisions for tree protection, and no significant impacts are anticipated.
- f) **No Impact.** No state, regional, or federal habitat conservation plans or Natural Community Conservation Plans have been adopted for the project site.

V. CULTURAL RESOURCES — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Cause a substantial adverse change in the significance of a historical resource as identified in Section 15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,2
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1,2

V. CULTURAL RESOURCES — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,2
d) Disturb any human remains, including those interred outside of formal cemeteries?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,2

Discussion of Impacts

- a) **No Impact.** Pursuant to State CEQA guideline 15064.5, the City's General Plan (Culture and Arts Chapter, Exhibit 24) was consulted to identify any National, State or Local historical landmarks with the project site. The project site does not contain any resource listed in, or determined to be eligible by, the State Historical Resource Commission and does not contain a resource included in a local register of historic resources or identified as significant in a historical resource survey. Additionally, the project site does not contain any object, building, structure, site, area, place, record, or manuscript that a lead agency determined to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California. Historical buildings would not be affected by the project because all disturbances would take place within the road rights-of-way, and intersection improvements would not change the visual character of the roads. Therefore, no impact would occur.
- b) **Less than Significant with Mitigation Incorporated.** All proposed project improvements would occur within existing rights-of-way and no improvements would require additional large-scale excavation. Furthermore, the areas within the rights-of-way have already been disturbed as a result of the original construction of the roads and other improvements. The previous construction activity would likely have reduced or eliminated the significance of archaeological resources if they were encountered. The City of San Rafael implements specific adopted archeological resource measures in the event resources are encountered during grading. Impacts would be less than significant with implementation of the following mitigation measure:

Mitigation Measure CULT-1:

Prior to the start of construction, an agreement shall be executed between the City and a qualified archaeologist and cultural monitor designated by the Federated Indians of Graton Rancheria to monitor all project construction activities, if deemed necessary by the tribe.

In addition, the following note shall be included on the final site plans: If any archaeological artifacts, exotic rock (non-native), or unusual amounts of shell or bone are uncovered during any onsite construction activities, all work must stop immediately in the area and the City of San Rafael Public Works Department must be notified. A qualified archaeologist and cultural monitor designated by the

Federated Indians of Graton Rancheria must evaluate the deposit. Work in the area may only proceed after authorization is granted by the City and the development of a tribal treatment plan in consultation with the Federated Indians of Graton Rancheria as outlined below:

1) Avoidance and preservation of the resources in place, pursuant to Public Resources Code section 21084.3, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks or other open space, to incorporate the resources with culturally appropriate protection and management criteria;

2) Treating the resources with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resources, including but not limited to the following:

a. Protecting the cultural character and integrity of the resource;

b. Protection the traditional use of the resource; and

c. Protecting the confidentiality of the resource.

3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

4) Protecting the resource.

If the discovery consists of human remains, the Marin County Coroner and Native American Heritage Commission must also be contacted. In the event that previously unknown human remains are discovered in the project area during construction, the procedures required by California Health and Safety Code Sections 7050.5 and 7052, as well as California Public Resources Code Section 5097, would be implemented. These procedures include inspection of the remains by the county coroner and a qualified archaeologist, as well as the treatment of the remains if they are determined to be Native American in origin.c)

c) **No Impact.** The project site follows existing road rights-of-ways in a developed portion of the City and does not contain any undisturbed land. No unique paleontological or geologic resources are located in the project site.

d) **Less Than Significant.** There are no formal cemeteries on the site, nor are human remains likely to exist on the site. However, the possibility remains that a resource of cultural significance may be encountered. Per Public Resources Code 5097.98 and Health and Human Safety Code 7050.5, if human remains are encountered, excavation or disturbance of the location shall be halted in the vicinity of the find, and the county coroner contacted. If the coroner determines the remains are Native American, the coroner shall contact the Native American Heritage Commission. The Native American Heritage Commission shall identify the person or persons believed to be most likely descended from the deceased Native American. The most likely descendent makes recommendations regarding the treatment of the remains with

appropriate dignity. With the compliance of State law, a less-than-significant impact would result.

VI. GEOLOGY AND SOILS — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:					2,13, 16
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2,13
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2,13
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2,13
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2,13
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2,6
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2,6
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

Environmental Setting

Regional Geologic Setting

The project site, like all properties in the San Francisco Bay area, is situated in a seismically active area. The regional seismic setting is dominated by stress associated with the oblique collision of the Pacific tectonic plate with the North American tectonic plate. The boundary between the two tectonic plates is the San Andreas fault system, which extends nearly 700 miles along a northwest trend from Mexico to offshore northern California. In the San Francisco

Bay Area, the San Andreas fault system includes the San Andreas, Hayward, Calaveras, and other related faults in the San Francisco Bay area. According to the U.S. Geological Survey (Working Group on California Earthquake Probabilities 2003), there is a 62% chance of at least a magnitude 6.7 (or greater) earthquake in the San Francisco Bay region between 2003 and 2032.

The study area is not located within a State of California Earthquake Fault Zone for active faulting and no active faults are mapped on the property. The nearest active faults are the San Andreas Fault, located approximately 11 miles to the west of the project site at its closest point, and the Hayward (9 Miles).

Discussion of Impacts

- a-i,) **No Impact.** The project site is not located within a State of California designated Alquist-Priolo Earthquake Fault Zone (California Department of Conservation, 1974). Earthquake fault zones are regulatory zones that encompass surface traces of active faults that have a potential for future surface fault rupture. The closest active faults to the site are the San Andreas Fault, located approximately 11 miles to the west of the project site at its closest point, and the Hayward (9 Miles). No faults cross through the project site, and surface rupture associated with a fault is not anticipated in the City.
- a-ii, iii, iv) **Less than Significant Impact.** The potential for landslides or liquefaction from seismic activity is considered moderate in the project site based on the geologic units and flat topography. Seismic-related ground failure is not anticipated in the project site, and the project would not expose people to these hazards. Seismic activity associated with nearby faults could cause ground shaking in the project site and could create a risk for construction workers, if an earthquake happens during construction. Occasional ground shaking is common in the Bay Area, and construction workers would take the necessary precautions to maintain worker safety in the event of an earthquake. In addition, the project is subject to all Federal, State, and local regulations and standards for seismic conditions including the California Building Code (CBC) and would be designed to conform to all building requirements. Impacts associated with seismic ground shaking, liquefaction and landslides would be less than significant.
- b) **Less than Significant Impact.** Construction would involve limited soil disturbance, which could temporarily expose soils to wind and water erosion. However, no native topsoil would be disturbed because the activities would take place within existing paved roads. Construction measures included in the project description would be implemented to minimize the potential for erosion and indirect effects associated with soil erosion (i.e., water quality impacts, fugitive dust). Impacts on soil would be less than significant.

- c, d) **Less than Significant Impact.** The potential for geologic and soil hazards from unstable or expansive soils in the project site is considered low based on the geologic units, soil types, and flat topography. The ground disturbance associated with the proposed project would cause soil disturbance but these actions would not result in substantial changes in topography to ground surface relief features, geologic substructures or unstable soil conditions, unique geologic or physical features. The project is subject to all Federal, State, and local regulations and standards for seismic conditions including the California Building Code (CBC) and would be designed to conform to all building requirements. Therefore, the proposed projects impacts would not expose human life to hazards and be less than significant.
- e) **No Impact.** The project does not involve construction of septic tanks or alternative wastewater disposal systems.

VII. GREENHOUSE GAS EMISSIONS — Would the project:		<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a)	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
b)	Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,14

Environmental Setting

Assembly Bill 32, adopted in 2006, established the Global Warming Solutions Act of 2006 which requires the State to reduce greenhouse gas (GHG) emissions to 1990 levels by 2020. Senate Bill 97, adopted in 2007, required the Governor's Office of Planning and Research to develop CEQA guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions," and the Resources Agency certified and adopted the amendments to the guidelines on December 30, 2009.

GHGs are recognized by wide consensus among the scientific community to contribute to global warming/climate change and associated environmental impacts. The major GHGs released from human activity are carbon dioxide, methane, and nitrous oxide (Governor's Office of Planning and Research, 2008). The primary sources of GHGs are vehicles (including planes and trains), energy plants, and industrial and agricultural activities (such as dairies and hog farms).

Discussion of Impacts

- a) **Less Than Significant Impact.** GHG emissions from the project would be produced from construction-related equipment emissions. Based on the nature of the project and short duration of construction, GHG emissions resulting from construction activities will be both minor and temporary. While the project would have an

incremental contribution to GHG emissions within the context of the City and region, the individual impact is considered less than significant.

- b) **Less Than Significant Impact.** The proposed project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. GHG emissions from off-road equipment and utility electrical usage are identified and planned for in the BAAQMD's 2010 Clean Air Plan as well as the BAAQMD's Source Inventory of Bay Area Greenhouse Gas Emissions (BAAQMD 2010a and 2010b). A primary objective of the 2010 Clean Air Plan is to reduce greenhouse gas emissions to 1990 levels by 2020 and 40% below 1990 levels by 2035. The project would generate emissions similar to existing conditions and, therefore, would not conflict with any applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions. Therefore, a less-than-significant impact would occur.

VIII. HAZARDS AND HAZARDOUS MATERIALS — Would the project:		<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a)	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
b)	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
c)	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,7
d)	Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7
e)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
f)	For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

VIII. HAZARDS AND HAZARDOUS MATERIALS — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,13

Environmental Setting

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, state, or local agency or if it has characteristics defined as hazardous by such an agency. A hazardous material is defined in Title 22 of the California Code of Regulations as follows:

A substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed. (California Code of Regulations, Title 22, Section 66261.10)

Chemical and physical properties cause a substance to be considered hazardous. Such properties include toxicity, ignitability, corrosivity, and reactivity (as defined in California Code of Regulations, Title 22, Sections 66261.20-66261.24). The accidental release of hazardous materials into the environment could potentially contaminate soils, surface water, and groundwater supplies. Under Government Code Section 65962.5, the California Department of Toxic Substances Control (DTSC) maintains a list of hazardous substance sites. This list, referred to as the "Cortese List," includes CALSITE hazardous material sites, sites with leaking underground storage tanks, and landfills with evidence of groundwater contamination.

No hazardous substance sites from the Cortese List have been identified within the project site. No hazardous material sites monitored by DTSC on the agency's Envirostor database have been reported within one-quarter of a mile of the project site (Department of Toxic Substances Control, 2011).

Discussion of Impacts

- a, b) ***Less than Significant Impact.*** Small amounts of hazardous materials would be used during construction activities for equipment maintenance (e.g., fuel and solvents) and re-paving the roads. Use of hazardous materials would be limited to the construction phase and would comply with applicable local, state, and federal standards associated with the handling and storage of hazardous materials.

Hazardous materials would not be stored or used, such as for equipment maintenance, where they could affect nearby land uses. Standard construction measures included in the project description will be implemented to contain any accidental spills of oil and other hazardous materials, and the contractor will be required to ensure that adequate materials are on hand to clean up any accidental spill that may occur. With implementation of these standard measures included in the project description, impacts associated with the use or accidental spill of hazardous materials would be less than significant.

- c) ***Less than Significant Impact.*** The project site is within 0.25-mile of a private school (St. Isabella) and two public schools (Mark Day and Vallecito Elementary)). Although some hazardous materials would be used during construction, given required compliance with applicable state and federal regulations regarding the transport, use and storage of hazardous materials, a spill or accident would have a low potential to affect people at the schools. Any spills will be cleaned up immediately, and all wastes and used spill control materials will be properly disposed of at approved disposal facilities. Impacts would be less than significant.
- d) ***Less than Significant Impact.*** The project site has not been identified as a hazardous material or clean-up site. If potentially contaminated soil or groundwater is encountered during project excavation work, standard construction measures included in the project description shall be implemented to handle and properly dispose of such materials, and the contractor will be required to ensure that adequate materials are on hand to manage and dispose of any potentially contaminated materials encountered during excavation. Any contaminated soil or groundwater encountered during excavation will be properly disposed of at approved disposal facilities. With implementation of these standard measures, potential impacts associated with encountering contaminated soil or groundwater, if any are encountered, would be less than significant.
- e) ***No Impact.*** The project site is not located near a public airport. The nearest airport is the Marin County Airport (Gnoss Field) of located approximately nine miles from the project site.
- f) ***No Impact.*** The project site is located near the private San Rafael airport, located approximately 1.5 miles from the project site. However, the project does not contain any element that could alter air traffic patterns. Therefore, no impact would occur.
- g) ***Less than Significant Impact with Mitigation Incorporated.*** Construction activities would require temporary lane closures and detours around the work area. Emergency access to or evacuation from surrounding areas would not be restricted during construction because of the availability of detours, but minor delays may be experienced for access to or evacuation from the land uses adjacent to the work area. All excavated areas could be quickly covered in the event of an emergency to allow vehicles to drive through the work area, which would ensure the project does not prevent emergency access to the residences or conflict with an emergency response or evacuation plan. Detours will be readily available at all times to allow emergency vehicles access around the work area. With implementation of Mitigation Measures TRAFFIC-1 and traffic control measures included in the project description, impacts would be less than significant.

- h) **Less than Significant Impact.** According to the Association of Bay Area Governments (ABAG) Wildland Urban Interface (WUI) Fire Threat map, portions of the project site are located within and adjacent to an area subject to a moderate threat of wildland fires. However, the project involves the short-term construction of intersection infrastructure and the long-term operation of the project would not increase the risk of wildfire near an urban area. Impacts would be less than significant.

IX. HYDROLOGY AND WATER QUALITY — Would the project:		<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a)	Violate any water quality standards or waste discharge requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
b)	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
c)	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
d)	Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
e)	Create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
f)	Otherwise substantially degrade water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1

IX. HYDROLOGY AND WATER QUALITY — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2,14
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
j) Inundation of seiche, tsunami, or mudflow?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2,14

Environmental Setting

According to the RWQCB's Water Quality Control Plan for the San Francisco Basin, the project site is located in the Marin Coastal Basin. The project site is covered with pervious surfaces, with drainage flowing into existing street culverts and into Gallinas Creek. According to the Federal Emergency Management Agency (FEMA) Federal Insurance Rate Maps (FIRM), the majority of the project site is in flood zone X, which is outside the 100-year floodplain (FEMA, 2011). Portions of the project site adjacent to the Gallinas Creek are with flood zone AE. Zone AE is defined as an area within the 100-year flood zone where a base flood elevation has been determined. All work within the channel would be performed above the top of bank.

Pursuant to Section 402 of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act, municipal stormwater discharges in the City of San Rafael (the City is part of the Marin Countywide Stormwater Pollution Prevention Program) are regulated under the San Francisco Bay Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit, Order No. R2-2009-0074, NPDES Permit No. CAS612008, adopted October 14, 2009 (MRP). The MRP is overseen by the San Francisco Bay Regional Water Quality Control Board (Water Board).

Discussion of Impacts

- a) ***Less than Significant Impact.*** Construction activities would require ground disturbance for minor excavation, grinding and paving, retaining, and bridge extension installation. Soil removed would be temporarily stockpiled within the project site, and, if not properly controlled, soil particles and other materials could be carried in stormwater runoff to drainage facilities, which could degrade water quality in the Gallinas Creek. If necessary, standard construction measures identified in the project description and recommended by the Marin Countywide Water Pollution Prevention Program would be implemented during periods of rain to minimize pollutants carried from the project site in runoff. The project would comply with terms

of the San Francisco Bay Region Municipal Regional Stormwater National Pollutant Discharge Elimination System Permit. Water quality impacts during construction would be less than significant.

- b, c, d, e) **Less than Significant Impact.** The project would not require use of groundwater supplies or affect groundwater recharge in the area. Virtually the entire project site is paved and therefore implementation of the project would not result in a considerable increase in impermeable surfaces or an increase in runoff compared to existing conditions. Nor would the project cause a substantial change to the erosion and accretion patterns.

The project would repair or replace storm drains, drainage pipes, and curb and gutter within the project site. The project would also include the installation of new bio-retention facilities within the project site. These improvements would increase the ability for the project site to handle flood events, a net benefit. Impacts would be less than significant.

- f g, h, i, j) **Less than Significant Impact.** The project would not have other water quality impacts beyond those discussed under item (a) above. Construction would take place above top of bank. No housing is proposed as part of the project. Gallinas Creek is identified as being within the 100-year flood zone. However, upon completion of construction, conditions would be similar to existing conditions and would not impede or redirect flood flows. The project site is not located downstream of any levee or dam. In addition, it is located well inland from San Francisco Bay and is not located in a tsunami hazard zone according to the ABAG Hazard Maps. Impacts would be less than significant.

X. LAND USE AND PLANNING – Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

Environmental Setting

The project site is in a residential community/commercial portion of the City of San Rafael. Existing land uses adjacent to the project site consist of single-family residential homes, recreational uses, institutional uses (i.e., schools,), and commercial retail uses. The project site is within existing roads and their associated rights-of-way. The City of San Rafael General Plan, adopted in 2004 with various subsequent chapter amendments, provides policies and implementation strategies for management of the resources and land uses in the City, and the City Codes provide restrictions and requirements to protect resources and comply with local, state, and federal laws. Applicable General Plan policies are listed below. No habitat conservation plans have been adopted for the area.

Regulatory Setting

San Rafael General Plan

Land Use Element

LU-1. Planning Area and Growth to 2020. Plan the circulation system and infrastructure to provide capacity for the total development expected by 2020.

Safety Element

S-2. Location of Public Improvements. Avoid locating public improvements and utilities in areas with identified flood, geologic and/or soil hazards to avoid any extraordinary maintenance and operating expenses. When the location of public improvements and utilities in such areas cannot be avoided, effective mitigation measures will be implemented.

S-10. Location of Public Improvements. To minimize threat to human health or any extraordinary construction and monitoring expenses, avoid locating improvements and utilities in areas with dangerous levels of identified hazardous materials. When the location of public improvements and utilities in such areas cannot feasibly be avoided, effective mitigation measures will be implemented.

S-18 Storm Drainage Improvements. Require new development to improve local storm drainage facilities to accommodate site runoff anticipated from a “100-year” storm.

S-25. Regional Water Quality Control Board (RWQCB) Requirements. Continue to work through the Marin County Stormwater Pollution Prevention Program to implement appropriate Watershed Management plans as dictated in the RWQCB general National Pollutant Discharge Elimination System permit for Marin County and the local stormwater plan.

C-4. Safe Roadway Design. Design of roadways should be safe and convenient for motor vehicles, transit, bicycles and pedestrians. Place highest priority on safety. In order to maximize safety and multimodal mobility, the City Council may determine that an intersection is exempt from the applicable intersection level of service standard where it is determined that a circulation improvement is needed for public safety considerations, including bicycle and pedestrian safety, and/or transit use improvements.

C-5. Traffic Level of Service Standards. A. Intersection LOS. In order to ensure an effective roadway network, maintain adequate traffic levels of service (LOS) consistent with standards for signalized intersections in the A.M. and P.M. peak hours as shown below, except as provided for under (B) Arterial LOS.

C-6. Proposed Improvements. The proposed circulation improvements in Exhibit 21 have been identified as potentially needed to improve safety and relieve congestion in San Rafael over the next 20 years. Major Proposed Circulation Improvements include those improvements deemed necessary to maintain City LOS standards. Other recommended roadway improvements, include additional improvements that may become necessary in the long-term and are desirable to enhance San Rafael's circulation system, but are not necessary to maintain LOS standards. Specific improvements will be implemented as conditions require, and will be refined during the design phase. Recognize that other feasible design solutions may become available and be more effective in achieving the same goals as the improvements listed in Exhibit 19, and allow for their implementation, consistent with the most recent engineering standards. As conditions change, planned roadway improvements may be amended, through the annual General Plan Review. Roadway improvements are implemented through the Capital Improvements Program, and are typically funded through a variety of sources, including Traffic Mitigation Fees. Environmental review is required.

C-11. Alternative Transportation Mode Users. Encourage and promote individuals to use alternative modes of transportation, such as regional and local transit, carpooling, bicycling, walking and use of low-impact alternative vehicles. Support development of programs that provide incentives for individuals to choose alternative modes

C-14. Transit Network. Encourage the continued development of a safe, efficient, and reliable regional and local transit network to provide convenient alternatives to driving

C-26. Bicycle Plan Implementation. Make bicycling and walking an integral part of daily life in San Rafael by implementing the San Rafael's Bicycle and Pedestrian Master Plan.

C-27. Pedestrian Plan Implementation. Promote walking as the transportation mode of choice for short trips by implementing the pedestrian element of the City's Bicycle and Pedestrian Master Plan. In addition to policies and programs outlined in the Bicycle and Pedestrian Plan, provide support for the following programs:

San Rafael Bicycle Master Plan

Goal 1 - Bicycle Transportation Make the bicycle an integral part of daily life in San Rafael, particularly for trips of less than five miles, by implementing and maintaining a bicycle facilities network, providing end-of-trip facilities, improving bicycle/transit integration, encouraging bicycle use, and making bicycling safer.

Goal 2 - Pedestrian Transportation Encourage walking as a daily form of transportation in San Rafael by completing a pedestrian network that accommodates short trips and transit, improves the quality.

Objective B – Bicycle Facilities Complete a network of bicycle facilities that provide bicycle-friendly connections through travel corridors and to important destinations, especially for travel to employment centers, schools, commercial districts, transit stations, parks, and institutions.

Discussion of Impacts

- a) **No Impact.** The project involves construction of intersection improvements within an existing road in a devolved community. The project would not physically divide an established community. No impact would occur.

- b) **Less than Significant Impact.** A proposed project would have a significant impact if it were to conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect. The proposed project is subject to several local policies, plans, and regulations, as described above. The primary objective of the proposed project is to improve intersection geometry for pedestrian and vehicle safety. General Plan Policy C-6 identifies the Freitas/Las Gallinas intersection to “Upgrade the traffic signal system and operation, improve intersection geometry, and cover portions of drainage ditch.” Furthermore, the project meets General Plan goals of improving safety and would not conflict with the City of San Rafael General Plan or other applicable plans or policies. Impacts would be less than significant.
- c) **No Impact.** No habitat conservation plans or natural community conservation plans have been adopted for the project site. No impact would occur.

XI. MINERAL RESOURCES — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2

Discussion of Impacts

- a, b) **No Impact.** The project site is not in or adjacent to any important mineral resource areas. Furthermore, the development of the proposed project would not preclude future excavation of oil or minerals should such extraction become viable. As such, there would be no loss of availability of known mineral resources and no impact to mineral resources.

XII. NOISE — Would the project result in:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact	Source
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1,2,12
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport of public use airport, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

Environmental Setting

The City of San Rafael Noise Ordinance limits construction hours to 7:00 A.M. to 5:00 P.M. Monday through Friday. The Director of Public Works/City Engineer may grant exemptions. Noise in the project site and vicinity is primarily from commercial development, residences, and vehicular traffic along roads. The nearest sensitive noise receptors are the businesses and homes along Manuel T. Freitas Parkway and Las Gallinas Avenue. The proposed project would not include construction generated noise from pile driving.

Discussion of Impacts

- a, c, d) **Less than Significant Impact with Mitigation Incorporated.** Sound is technically described in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB). The decibel scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound. The pitch of the sound is related to the frequency of the pressure vibration. Since the human ear is not equally sensitive to a given sound level at all frequencies, a special frequency-dependent rating scale has been devised

to relate noise to human sensitivity. The A-weighted decibel scale (dBA) provides this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Noise, on the other hand, is typically defined as unwanted sound. A typical noise environment consists of a base of steady “background” noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway.

Several rating scales have been developed to analyze the adverse effect of community noise on people. Since environmental noise fluctuates over time, these scales consider that the effect of noise upon people is largely dependent upon the total acoustical energy content of the noise, as well as the time of day when the noise occurs. Those that are applicable to this analysis are as follows:

- L_{eq} – A L_{eq} , or equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
- L_{max} – The maximum instantaneous noise level experienced during a given period of time.
- L_{min} – The minimum instantaneous noise level experienced during a given period of time.
- CNEL – The Community Noise Equivalent Level is a 24-hour average L_{eq} with a 5 dBA “weighting” during the hours of 7:00 P.M. to 10:00 P.M. and a 10 dBA “weighting” added to noise during the hours of 10:00 P.M. to 7:00 A.M. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24 hour L_{eq} would result in a measurement of 66.7 dBA CNEL.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day, night, or over a 24-hour period. For residential uses, environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60–70 dBA range, and high above 70 dBA.⁴ Noise levels greater than 85 dBA can cause temporary or permanent hearing loss. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet suburban residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate level noise environments are urban residential or semi-commercial areas (typically 55–60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with more noisy urban residential or residential-commercial areas (60–75 dBA) or dense urban or industrial areas (65–80 dBA).

⁴ Office of Planning and Research, State of California General Plan Guidelines, October 2003 (in coordination with the California Department of Health Services).

It is widely accepted that in the community noise environment the average healthy ear can barely perceive CNEL noise level changes of 3 dBA. CNEL changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dBA CNEL increase is readily noticeable, while the human ear perceives a 10 dBA CNEL increase as a doubling of sound.

Noise levels from a particular source generally decline as distance to the receptor increases. Other factors, such as the weather and reflecting or barriers, also help intensify or reduce the noise level at any given location. A commonly used rule of thumb for roadway noise is that for every doubling of distance from the source, the noise level is reduced by about 3 dBA at acoustically “hard” locations (i.e., the area between the noise source and the receptor is nearly complete asphalt, concrete, hard-packed soil, or other solid materials) and 4.5 dBA at acoustically “soft” locations (i.e., the area between the source and receptor is normal earth or has vegetation, including grass). Noise from stationary or point sources is reduced by about 6 to 7.5 dBA for every doubling of distance at acoustically hard and soft locations, respectively. Noise levels are also generally reduced by 1 dBA for each 1,000 feet of distance due to air absorption. Noise levels may also be reduced by intervening structures – generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The normal noise attenuation within residential structures with open windows is about 17 dBA, while the noise attenuation with closed windows is about 25 dBA.⁵

Table 1 lists the Federal Transit Administrations typical construction equipment noise levels at 50 feet.

⁵ *National Cooperative Highway Research Program Report 117, Highway Noise: A Design Guide for Highway Engineers, 1971.*

Table 1. Construction Equipment Noise Generation

Equipment	Typical Noise Level (dBA) 50 ft from Source
Air Compressor	81
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pile-driver (Impact)	101
Pile-driver (Sonic)	96
Pneumatic Tool	85
Pump	76
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike Driver	77
Truck	88
Source: Federal Transit Administration. <i>Transit Noise and Vibration Impact Assessment</i> , 2006	

Construction activities would generate temporary noise from equipment use; the most common noise generated would be from mobile diesel equipment such as excavators, dozers, trucks, front end loaders and compactors. The proposed project does not include pile driving for construction. Activities would be restricted to the hours of 7:00 A.M. to 5:00 P.M. Monday through Friday, unless otherwise approved in writing by the Director of Public Works.

Table 1 illustrates typical noise levels from construction equipment at a reference distance of 50 feet. Noise levels from construction equipment attenuate at a rate of six dBA per doubling of distance. Therefore, the noise levels at a distance of 100 feet would be 6 dBA less than those shown in Table 1. Construction equipment would generate maximum noise levels of approximately 89 decibels (dB) at 50 feet. Construction noise levels may periodically exceed noise standards in the existing Noise Ordinance. The temporary noise from construction would not cause a substantial increase in ambient noise or expose sensitive receptors to unacceptable noise levels for long periods of time. Impacts associated with construction noise would cause a significant, temporary increase in noise levels. Incorporation of Mitigation Measure NOISE-1 would reduce potentially significant noise impacts to a less-than-significant level.

Long-term operational noise impacts would be less than significant because the conditions would be similar to existing noise levels.

Mitigation Measure NOISE-1:

The City shall incorporate the following practices, in addition to those listed in the project description, into the construction documents to be implemented by the project contractor:

- Construction hours shall be limited to 7:00 A.M. to 5:00 P.M. Monday through Friday, unless otherwise approved in writing by the Director of Public Works.
- Notify businesses, residences, and noise-sensitive land uses adjacent to construction sites of the construction schedule in writing. Designate the City's construction manager as responsible for responding to any local complaints about construction noise. The construction manager shall determine the cause of the noise complaints (for example starting too early, or a bad muffler) and institute reasonable measures to correct the problem. Conspicuously post a telephone number for the construction manager at the construction site.
- Maximize the physical separation between noise generators and noise receptors. Such separation includes, but is not limited to, the following measures:
 - Use heavy-duty mufflers for stationary equipment and barriers around particularly noisy areas of the site or around the entire site;
 - Where feasible, use shields, impervious fences, or other physical sound barriers to inhibit transmission of noise to sensitive receptors;
 - Locate stationary equipment to minimize noise impacts on the community; and

- Minimize backing movements of equipment.
 - Use quiet construction equipment whenever possible.
 - Impact equipment (e.g., jack hammers and pavement breakers) shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically-powered tools. Compressed air exhaust silencers shall be used on other equipment. Other quieter procedures, such as drilling rather than using impact equipment, shall be used whenever feasible.
 - Prohibit unnecessary idling of internal combustion engines.
- b) ***Less than Significant Impact.*** Ground-borne vibration is typically associated with blasting operations, the use of pile drivers, and large-scale demolition activities, none of which are anticipated for the construction or operation of the proposed project. As such, no excessive ground-borne vibrations would be generated by the proposed project and these impacts would be less than significant.
- e) ***No Impact.*** The nearest public airport to the project site is the Marin County Airport, located approximately nine miles to the north. This distance precludes the possibility of the project site being adversely exposed to aviation noise. No impacts in this regard would occur.
- f) ***No Impact.*** The project site is located near the private San Rafael airport, located approximately 1.5 miles from the project site. However, the intersection would continue to be used in the same manner as existing conditions. No impacts in this regard would occur.

XIII. POPULATION AND HOUSING — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
c) Displace substantial numbers of people necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

Environmental Setting

The project site is in an urbanized portion of the City of San Rafael; however, no homes are located within the project site.

Discussion of Impacts

- a-c) **No Impact.** The project would improve vehicular, bicycle, and pedestrian circulation safety of the intersection. The project would be within existing road rights-of-way and would not displace people or housing. As the project does not include new housing, it would not result in a substantial increase in population or housing units in the City. No impacts would occur.

XIV. PUBLIC SERVICES — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:					
Fire protection?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
Police protection?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

XIV. PUBLIC SERVICES — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
Other public facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

Environmental Setting

San Rafael Fire Department

The San Rafael Fire Department provides life safety emergency and non-emergency services in the areas of fire protection, technical rescue, emergency medical services, and disaster response. The Department has operates 7 Fire Stations with 23 personnel 24/7 that provide these services within the City limits and other areas as defined through contracts and mutual aid agreements with bordering areas.

San Rafael Police Department

The San Rafael Police Department has been in existence since 1855. In its current configuration, the Chief of Police directs a staff of 65 sworn and 24 non-sworn employees. Patrol is the largest division led by a Captain and includes the Traffic Unit, SWAT team, and Foot-beat. The Support Services Captain oversees Investigations, which is comprised of one lieutenant, one sergeant and four detectives, one School Resource Officer, a one sergeant-two officer Directed Patrol Unit, Youth Services Counseling, Records, Property Evidence, Dispatch, Permits and Personnel and Training.

San Rafael City Schools

The San Rafael City Schools (SRCS) includes the San Rafael Elementary School District and the San Rafael High School District, with a total student population of nearly 7,000. The two districts are governed by one school board and one district office administration. The Elementary District is composed of nine schools. The High School District provides secondary education to students residing in two elementary districts: Dixie School District and San Rafael Elementary District. The High School District has two comprehensive 9-12 high schools and a continuation high school.

Parks and Recreational Facilities

The City of San Rafael has 25 City-owned parks totaling 140 acres, eight county parks totaling 532 acres, one State park with 1,640 acres and three community centers. There are 3,285 acres of open space within the city limits of San Rafael, or approximately 25 percent of the City's land area, which is owned or in part by the City of San Rafael. There is almost 7,300 acres of combined City and County open space within San Rafael's Sphere of Influence.

Discussion of Impacts

- a) **Less than Significant with Mitigation Incorporated.** Given the proposed project would not permanently increase the existing residential or employment population in the City, the project would not result in a long-term increase in the demand for public services or require construction of new governmental facilities. The purpose of the project is to improve vehicular, bicycle, and pedestrian circulation safety of the intersection. Therefore, no impacts related to schools, parks or other public facilities would occur. However, there is the potential for construction activities to slow emergency response times. Implementation of Mitigation Measure TRAFFIC-1 would reduce potentially significant impacts related to any potential Fire Department and Police Department delays to a less-than-significant level.

XV. RECREATION — Would the project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact	Source
a)	Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
b)	Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1

Environmental Setting

No parks or recreational facilities are located in the project site. The Arbor Park parquette is located adjacent to western edge of the project site.

Discussion of Impacts

- a, b) **No Impact.** Given the proposed project would not permanently increase the existing residential or employment population in the City, the project would not affect recreational facilities or increase the use of nearby recreational facilities. The purpose of the project is to improve vehicular, bicycle, and pedestrian circulation safety of the intersection and it does not include recreational facilities or require the construction or expansion of recreational facilities. No Impacts would occur.

XVI. TRANSPORTATION/TRAFFIC Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,2, 10
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,2, 10
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,2, 10
d) Substantially increase hazards to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,2, 10
e) Result in inadequate emergency access?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1,2, 10
f) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,2, 10

The following discussion related to transportation and traffic utilizes a Traffic Impact Analysis Memorandum prepared by Fehr and Peers in 2015 and is provided in Appendix B.

Environmental Setting

The project site is the Las Gallinas Avenue/Manual T. Freitas Parkway intersection. The intersection is frequently congested due to traffic from the adjacent shopping center and local schools, peak residential commute traffic destined to and from U.S. 101, and split-phase signal operations required by the tight intersection geometrics that are limited in part by a large drainage culvert in the median of Freitas Parkway. Further, pedestrian and bicycle access is limited due to geometry constraints.

Pedestrians

Pedestrian facilities in the project site include sidewalks, crosswalks, and pedestrian signals. At the Las Gallinas Avenue/ Manuel T. Freitas Parkway intersection, both streets provide sidewalks on all approaches to the intersection. Crosswalks, curb ramps, and pedestrian signals are provided on all legs of the intersection except for the east leg, crossing Freitas Parkway. Currently, pedestrians starting at the southeast corner of the intersection must cross three legs of traffic to get to northwest corner.

Bicyclists

Bicycle facilities are provided in the general vicinity of the project site. Class II bicycle lanes are provided leading up to the north, south, and west sides of the intersection. Approximately 180-feet before the intersection, the northbound Class II bicycle lane ends, dropping bicyclists into the vehicle travel way. Similarly, approximately 220 feet and 310 feet, southbound and eastbound, respectively, before the intersection, the Class II bicycle lanes end, dropping bicyclists into the vehicle travel way. Bicycle lanes are provided in the westbound and southbound exit approaches, just after the intersection.

Transit

Several transit routes are within proximity of the project intersection. A list of those routes and their stop location relative to the project intersection is shown in Appendix B, Table 1. Sidewalks are provided to the bus stop and bus shelters are provided at some of the nearby stops.

Vehicles

Las Gallinas Avenue is a two-lane north-south facility beginning at the Northgate Mall to the south and terminating in a residential neighborhood to the north. Freitas Parkway is a four-lane east-west facility connecting U.S.-101 to neighborhoods west of the freeway. The intersection is signalized with left turn and right turn pockets for each approach.

Discussion of Impacts

- a) ***Less than Significant Impact.*** Construction traffic (equipment and materials transport and daily worker traffic) would slightly increase traffic on local roads during the temporary construction phase of the proposed project. Temporary construction traffic would be limited to equipment delivery and material transport, and a few employee vehicles on a daily basis. The temporary construction-related traffic would not result in a noticeable increase in traffic on local roads and is not expected to reduce the level of service (LOS) for local intersections. Vehicles transporting equipment and materials to the project site could cause slight delays for travelers as the construction vehicles stop to unload. Temporary lane closures could also require motorists to detour around the project site or expect delays while traveling through the project site. Traffic control measures described in the project description would be in place during the construction phase to alert motorists to potential delays and identify detour routes, as described in the project description. With these measures and the temporary nature of construction-related traffic, impacts on traffic would be less than significant.

Under existing conditions, year 2015, results in a nominal increase to intersection delay. In the near term, year 2020, the no project conditions degrade such that the

project intersection operates at an unacceptable LOS during the A.M. peak hour. The Fehr and Peers memorandum concluded that the proposed project would result in better intersection operations with a decrease to intersection delay. In the P.M. peak hour, the intersection would operate at the same LOS as the no project condition. Therefore, operational impacts on traffic would be less than significant.

- b) ***Less than Significant Impact.*** A significant impact may occur if the adopted California Department of Transportation (Caltrans) and Marin County Congestion Management Agency (CMA) thresholds for a significant project impact would be exceeded. To address the increasing public concern that traffic congestion is impacting the quality of life and economic vitality of the State of California, the Congestion Management Program (CMP) was enacted by Proposition 111. The CMP designated a transportation network including all State highways and some arterials within the County to be monitored by local jurisdictions. If the LOS standard deteriorates on the CMP network, then local jurisdictions must prepare a deficiency plan to be in conformance with the CMP program.

As discussed above, the proposed project would not permanently increase traffic on local roads or highways to a level that would affect intersection LOS. The project would maintain at least one lane of traffic in one direction at all times during construction. The proposed project would not result in long-term traffic increases. Impacts would be less than significant.

- c) ***No Impact.*** This question would apply to the proposed project only if it were an aviation-related use. The project site does not contain any aviation-related uses, and the proposed project would not include the development of any aviation-related uses. Therefore, the proposed project would not affect air traffic patterns and would have no effect on air traffic levels or safety.
- d) ***Less than Significant Impact.*** A significant impact may occur if a project were to include a new roadway design, introduce a new land use or permanent project features into an area with specific transportation requirements and characteristics that have not been previously experienced in that area, or if project access or other features were designed in such a way as to create hazardous conditions. The memorandum prepared by Fehr and Peers found that the proposed project would provide benefits to pedestrian and bicycle safety by removing pork chops and slowing vehicles down, providing exclusive left turns and separating the pedestrian and vehicle conflicts, or a leading pedestrian interval to give pedestrians the right-of-way before vehicles. Adequate sight distance would be available for motorists to access and depart the project site. Impacts would be less than significant.
- e) ***Less than Significant with Mitigation Incorporated.*** Construction activities would require temporary lane closures and detours around the work area. Minor delays may be experienced for emergency access to the residences adjacent to the work area. Detours would be available throughout the construction period in the event of an emergency to allow vehicles to drive around the work area. The earthwork could be quickly covered in the event of an emergency to allow vehicles to drive through the work area. This is a short term construction related impact that would cease upon project completion. Implementation of Mitigation Measures TRAFFIC-1 and would reduce this impact to less than significant.

Mitigation Measure TRAFFIC-1:

- Local emergency services shall be notified prior to construction to inform them that traffic delays may occur, and also of the proposed construction schedule.
- The City shall require the contractor to provide for passage of emergency vehicles through the project site at all times.
- The City shall require the contractor to maintain access to all properties during project construction.

- f) ***Less than Significant Impact.*** The project's purpose is to improve pedestrian and bicycle safety by removing pork chop islands and slowing vehicles down, providing exclusive left turns and separating the pedestrian and vehicle conflicts. Upon completion of the project, the accessibility of pedestrian, bicycle and alternative forms of transit facilities would be improved over existing conditions.

XVII. UTILITIES AND SERVICE SYSTEMS — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1

XVII. UTILITIES AND SERVICE SYSTEMS — Would the project:	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
g) Comply with federal, state, and local statutes and regulations related to solid waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1

Discussion of Impacts

- a - e) ***Less than Significant Impact.*** Neither construction nor operation of the project would generate wastewater or consume potable water. The project would repair or replace storm drains, drainage pipes, and curb and gutter within the project site. The project would also include the installation of new bio-retention facilities within the project site. These improvements would increase the ability for the project site to handle flood events, a net benefit. As a result, the project would have less than significant impacts related to: 1) exceedance of wastewater treatment requirements; 2) physical impacts from new storm drainage facilities; 3) water supply; and 4) wastewater treatment capacity.
- f, g) ***Less than Significant Impact.*** The project would generate a small quantity of soil spoils and solid waste from removal of pavement within the intersection, but all generated waste would be properly disposed or recycled in a nearby landfill or approved disposal facility with capacity to receive the waste. Any materials used during construction would be properly disposed of in accordance with federal, state, and local regulations. Impacts related to solid waste facilities would be less than significant.

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE	<i>Potentially Significant Impact</i>	<i>Less than Significant with Mitigation Incorporated</i>	<i>Less than Significant Impact</i>	<i>No Impact</i>	<i>Source</i>
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1

Discussion

- a) ***Less than Significant with Mitigation Incorporation.*** The incorporation of the mitigation measures included in Section IV (Biological Resources) would reduce potential impacts to a less-than-significant level. The project site does not contain any resource listed in, or determined to be eligible by, the State Historical Resource Commission and does not contain a resource included in a local register of historic resources or identified as significant in a historical resource survey. Additionally, the project site does not contain any object, building, structure, site, area, place, record, or manuscript that a lead agency determined to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California. However, cultural resources could potentially be uncovered during construction. Mitigation measures included in Section V (Cultural Resources) would reduce potential impacts to a less-than-significant level.
- b) ***Less Than Significant Impact with Mitigation Incorporation.*** Cumulatively considerable means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. The analysis within this Initial Study demonstrates that the project would not have any individually

limited, but cumulatively considerable impacts. As presented in the analysis in Biological Resources, Cultural Resources, Hazards and Hazardous Materials, Noise, Public Services, and Transportation/Traffic sections, any potentially significant impacts would be less than significant after mitigation. Due to the limited scope of direct physical impacts to the environment associated with construction, the project's impacts are project-specific in nature. Compliance with the conditions of approval issued for the proposed development would further assure that project-level impacts would not be cumulatively considerable. Consequently, the project along with other cumulative projects will create a less than significant cumulative impact with respect to all environmental issues.

- c) ***Less Than Significant Impact.*** With implementation of the various construction measures and BMPs included in the proposed project description, the project would not result in substantial adverse effects to human beings, either directly or indirectly.

CHECKLIST INFORMATION SOURCES

1. Professional judgment and expertise of the environmental/technical specialists evaluating the project, based on a review of existing conditions and project details, including standard construction measures
2. City of San Rafael General Plan, 2004
3. California Department of Transportation, 2012
4. California Department of Conservation, 2010
5. U.S. Fish and Wildlife Service, California Department of Fish and Game, and California Native Plant Society species lists
6. Natural Resources Conservation Service, 2011
7. Department of Toxic Substances Control, 2011, and State Water Resources Control Board, 2011
8. Federal Emergency Management Agency, 2011
9. WRA, Inc., 2015
10. Fehr and Peers, 2015
11. California Department of Conservation, 2006
12. City of San Rafael Noise Ordinance
13. ABAG Hazards Mapping, 2014
14. Bay Area Air Quality Management District, 2010

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GIS Professional

MITIGATION MONITORING AND REPORTING PROGRAM

MITIGATION MONITORING AND REPORTING PROGRAM Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements Project					
Mitigation Measure	Implementation Procedure	Monitoring Responsibility	Monitoring / Reporting Action & Schedule	Non-Compliance Sanction/Activity	Monitoring Compliance Record (Name/Date)
IV. BIOLOGICAL RESOURCES					
<p>BIO-1 To the extent feasible, vegetation removal and initial ground disturbance shall occur outside of the general breeding bird season (September 1 to January 31). If these activities must occur during the general bird breeding season (February 1 to August 31), then a pre-construction breeding bird survey shall be conducted by a qualified biologist within seven days prior to the initiation of these activities. The survey shall cover project impact areas and surrounding areas within 250 feet. Any active bird nests of species protected by the MBTA and/or CFGC found during the survey shall be protected by a suitable work exclusion buffer until all young in the nest have fledged or the nest otherwise becomes inactive. The size of the buffer shall be determined by the qualified biologist and based on factors such as bird species, nest location, level of ambient visual and acoustic disturbances in the immediate area, and other factors. Such buffers may be as small as 25 feet</p>	<p>Require as a condition of approval</p> <p>Project sponsor obtains approvals from appropriate agencies prior to issuance of building permits</p>	<p>Planning Division</p> <p>Building Division</p>	<p>Incorporate as condition of project approval</p> <p>Building Division verifies appropriate approvals obtained prior to issuance of building permit</p>	<p>Deny project</p> <p>Deny issuance of building permit</p>	

MITIGATION MONITORING AND REPORTING PROGRAM
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for common species, and up to 250 feet for raptors.					
V. CULTURAL RESOURCES					
<p>CULT -1 Prior to the start of construction, an agreement shall be executed between the City and a qualified archaeologist and cultural monitor designated by the Federated Indians of Graton Rancheria to monitor all project construction activities, if deemed necessary by the tribe.</p> <p>In addition, the following note shall be included on the final site plans: If any archaeological artifacts, exotic rock (non-native), or unusual amounts of shell or bone are uncovered during any onsite construction activities, all work must stop immediately in the area and the City of San Rafael Public Works Department must be notified. A qualified archaeologist and cultural monitor designated by the Federated Indians of Graton Rancheria must evaluate the deposit. Work in the area may only proceed after authorization is granted by the City and the development of a tribal treatment plan in consultation with the Federated Indians of Graton Rancheria as outlined below:</p> <p>1) Avoidance and preservation of the resources in place, pursuant to Public Resources Code section 21084.3,</p>	<p>Require as a condition of approval</p> <p>Project sponsor obtains approvals from appropriate agencies prior to issuance of building permits</p>	<p>Planning Division</p> <p>Building Division</p>	<p>Incorporate as condition of project approval</p> <p>Building Division verifies appropriate approvals obtained prior to issuance of building permit</p>	<p>Deny project</p> <p>Deny issuance of building permit</p>	

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<p>including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks or other open space, to incorporate the resources with culturally appropriate protection and management criteria;</p> <p>2) Treating the resources with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resources, including but not limited to the following:</p> <p style="padding-left: 20px;">a. Protecting the cultural character and integrity of the resource;</p> <p style="padding-left: 20px;">b. Protection the traditional use of the resource; and</p> <p style="padding-left: 20px;">c. Protecting the confidentiality of the resource.</p> <p>3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.</p> <p>4) Protecting the resource.</p> <p>If the discovery consists of human remains, the Marin County Coroner and Native American Heritage Commission must also be contacted. In the event that previously unknown human remains are discovered in the project area</p>					

MITIGATION MONITORING AND REPORTING PROGRAM
Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements Project

Mitigation Measure	Implementation Procedure	Monitoring Responsibility	Monitoring / Reporting Action & Schedule	Non-Compliance Sanction/Activity	Monitoring Compliance Record (Name/Date)
during construction, the procedures required by California Health and Safety Code Sections 7050.5 and 7052, as well as California Public Resources Code Section 5097, would be implemented. These procedures include inspection of the remains by the county coroner and a qualified archaeologist, as well as the treatment of the remains if they are determined to be Native American in origin.					
XII. NOISE					
<p>NOISE-1 The City shall incorporate the following practices, in addition to those listed in the project description, into the construction documents to be implemented by the project contractor:</p> <ul style="list-style-type: none"> • Construction hours shall be limited to 7:00 A.M. to 5:00 P.M. Monday through Friday, unless otherwise approved in writing by the Director of Public Works. • Notify businesses, residences, and noise-sensitive land uses adjacent to construction sites of the construction schedule in writing. Designate the City's construction manager as responsible for responding to any local complaints about construction noise. The construction manager shall determine the cause of the 	<p>Require as a condition of approval</p> <p>Project sponsor obtains approvals from appropriate agencies prior to issuance of building permits</p>	<p>Planning Division</p> <p>Building Division</p>	<p>Incorporate as condition of project approval</p> <p>Building Division verifies appropriate approvals obtained prior to issuance of building permit</p>	<p>Deny project</p> <p>Deny issuance of building permit</p>	

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<p>noise complaints (for example starting too early, or a bad muffler) and institute reasonable measures to correct the problem. Conspicuously post a telephone number for the construction manager at the construction site.</p> <ul style="list-style-type: none"> • Maximize the physical separation between noise generators and noise receptors. Such separation includes, but is not limited to, the following measures: <ul style="list-style-type: none"> ▪ Use heavy-duty mufflers for stationary equipment and barriers around particularly noisy areas of the site or around the entire site; ▪ Where feasible, use shields, impervious fences, or other physical sound barriers to inhibit transmission of noise to sensitive receptors; ▪ Locate stationary equipment to minimize noise impacts on the community; and ▪ Minimize backing movements of equipment. • Use quiet construction equipment whenever possible. • Impact equipment (e.g., jack 					

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<p>hammers and pavement breakers) shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically-powered tools. Compressed air exhaust silencers shall be used on other equipment. Other quieter procedures, such as drilling rather than using impact equipment, shall be used whenever feasible.</p> <ul style="list-style-type: none"> • Prohibit unnecessary idling of internal combustion engines. 					
XVI. TRANSPORTATION AND TRAFFIC					
<p>TRAFFIC-1</p> <ul style="list-style-type: none"> • Local emergency services shall be notified prior to construction to inform them that traffic delays may occur, and also of the proposed construction schedule. • The City shall require the contractor to provide for passage of emergency vehicles through the project site at all times. • The City shall require the contractor to maintain access to all properties during project construction. 	<p>Require as a condition of approval</p> <p>Project sponsor obtains approvals from appropriate agencies prior to issuance of building permits</p>	<p>Planning Division</p> <p>Building Division</p>	<p>Incorporate as condition of project approval</p> <p>Building Division verifies appropriate approvals obtained prior to issuance of building permit</p>	<p>Deny project</p> <p>Deny issuance of building permit</p>	

Appendix A – Biological Reconnaissance Memorandum

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January 27, 2015

Rich Souza
CSW Stuber Stroeh
45 Leveroni Ct
Novato, California 94949

Re: Biological Reconnaissance: Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements, San Rafael, CA

Dear Mr. Souza,

The purpose of this letter is to inform you of the results of the biological resources site visit, biological resources assessment, and routine wetland delineation for the Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements (Project), located in San Rafael, Marin County, California (Figure 1, attached). The WRA site visit took place on November 21, 2014 and was conducted by a qualified biologist experienced in similar site inspections.

The Study Area (Figure 2, attached) is comprised of developed, paved parcels that include roadways, pedestrian crosswalks, landscaped areas, and a concrete channel carrying Gallinas Creek. The Study Area is bounded to the north, east, and west by existing single-family residences; and to the south by single-family residences and commercial facilities. In the greater landscape context, the Study Area occurs within a developed area of San Rafael and does not provide habitat connections to or from open space in the area.

Based on the site visit and review of background literature and databases, the Study Area does not currently support special-status plant or wildlife species; however, non-special-status nesting birds may be present during the breeding season. In addition, the concrete drainage channel centrally located in the median of Manuel T. Freitas Parkway meets the definition of unvegetated "Waters of the U.S.", as identified in Figure 3, attached.

Methods

Prior to the site visit, background literature was reviewed to determine potential presence of sensitive vegetation types, aquatic communities, and special-status plant and wildlife species. Resources reviewed for sensitive vegetation communities and aquatic features include aerial photography, mapped soil types, the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDDB), the USGS 7.5' quadrangle map of the vicinity. Background information regarding special-status plant and wildlife species was obtained through review of the CNDDDB, California Native Plant Society (CNPS) Online Database (2014), USFWS species list for Marin County and the USGS 7.5' quads surrounding the Study Area (Novato and San Rafael), as well as available aerial photography, and species habitat requirements as noted in available literature.

On November 21, 2014, WRA traversed the Study Area on foot to evaluate the potential presence of sensitive vegetation communities and aquatic features, and evaluate on-site habitat to determine the potential for occurrence of special-status plant and wildlife species. Observed plant communities, aquatic features, and plant and wildlife species were noted. Site conditions

were noted as they relate to habitat requirements of special-status plant and wildlife species known to occur in the vicinity as determined by the background literature research.

Results

Vegetation Communities

The Study Area supports only managed landscaped areas that divide impervious paved roadways and sidewalks. Landscaped areas exist as a barrier between Manuel T. Freitas Parkway and the interior concrete channel, within the central portion of the Study Area. Additionally, landscaped areas occur northeast of the Study Area intersection, in adjacent unpaved surfaces to the turnoff from Manuel T. Freitas Parkway to northbound Las Gallinas Avenue. Landscaped areas contained an array of planted ornamental shrubs and trees as well as invasive species. Site hydrology is managed via a storm water drainage system that drains into the concrete channel.

Dominant vegetation included ornamental species such as juniper (*Juniperus* sp.), oleander (*Nerium oleander*), firethorn (*Pyracantha* sp.), and crimson bottlebrush (*Callistemon citrinus*). Ornamental trees were scattered throughout landscaped areas and include sweetgum (*Liquidambar styraciflua*), and coast live oak (*Quercus agrifolia*). Additionally, the northern-most landscaped area in the Study Area included a redwood (*Sequoia sempervirens*), Monterey pine (*Pinus radiata*), and blue gum (*Eucalyptus globulus*), with ground cover dominated by English ivy (*Hedera helix*).

Aquatic communities within the Study Area include open waters associated with the concrete channel of Gallinas Creek, discussed in detail below.

Wetlands and Waters of the US

Wetlands are not present in the Study Area. However, approximately 0.19 acre (530 linear feet) of non-wetland waters were observed within the Study Area, associated with Gallinas Creek. The channel of Gallinas Creek is a concrete trapezoidal flood control and storm drainage channel, comprised of a concrete bed and banks with no natural substrates. It is lined with ornamental shrubs to provide a visual barrier to surrounding traffic lanes. This perennial channel is fed by many storm drain outlets of varying sizes along its length and contained water flowing from the west during the site visit. Las Gallinas Avenue crosses the creek via a box culvert style bridge that spans and shades a portion of Gallinas Creek. To the east of this bridge, along the southern bank of the concrete channel, a large culvert feeds additional stormwater flows into Gallinas Creek.

Because the concrete channel of Gallinas Creek contains an identifiable ordinary high water mark and carries water from a perennial stream to the San Francisco Bay, the channel was determined to be potentially jurisdictional under Section 404 of the Clean Water Act based on current U.S. Army Corps of Engineers (Corps) guidance. Waters in the channel within the Study Area are not tidal and occur approximately 3.5 river-miles from the San Francisco Bay.

	
<p>Photograph facing east toward trapezoidal channel of Gallinas Creek, carrying potential waters of the U.S., with subject intersection bridge in distance.</p>	<p>Photograph facing east toward concrete flood control channel of Gallinas Creek, east of subject intersection, carrying potential waters of the U.S.</p>

Special-Status Plant Species

Sixty-six special-status plant species are known to occur in the vicinity of the Study Area (CDFW 2014, CNPS 2014). No rare plant species were observed during the site visit. Current conditions in the Study Area do not contain suitable habitat for special-status plant species known to occur in the vicinity, based on the highly disturbed and developed conditions of the site. There is no potential for the Study Area to support special-status plant species.

Special-Status Wildlife Species

No special-status wildlife species have the potential to occur within the Study Area due to disturbed and developed site conditions. The Study Area does not contain suitable habitat for any special-status wildlife species. California black rail (*Laterallus jamaicensis coturniculus*) and San Pablo song sparrow (*Melospiza melodia samuelis*) have been documented within 1.5 miles to the north of the Study Area in marsh areas connected to San Francisco Bay. However, the Study Area does not contain salt marsh habitat and it is separated from San Francisco Bay by urban development. Further, the channel within the Study Area is a cemented stormwater drainage that lacks natural substrate and vegetation. Therefore, there is no potential for special-status fish species to occur, nor is essential fish habitat (EFH) present within the unnamed concrete channel.

Non-Special-Status Birds and Bats

Nesting birds have potential to occur within some areas of the Study Area including in trees, shrubs, and along existing structures. No trees, structures, or culverts observed within the Study Area provide suitable roost habitat for bat species; therefore, there is no potential for bats to roost within the Study Area.

Conclusions and Recommendations Summary

Based on the results of the site visit, the Study Area contains a concrete drainage channel that is potentially jurisdictional as "Waters of the U.S" by the U.S. Army Corps of Engineers, and as "waters of the State" by the Regional Water Quality Control Board (RWQCB). However, the flood control channel is altered to the extent that it provides no habitat value for biological resources. Because of this state of alteration, minor impacts to the channel from a proposed bridge expansion, which will result in expanding the bridge without conducting work below OHWM, are considered less than significant. This "less than significant" determination does not change the potential extent of Corps and RWQCB jurisdiction and associated permit requirements.

The Study Area does not have the potential to support special-status plant or wildlife species. However, trees and shrubs in the Study Area do have the potential to support nesting birds protected by the Migratory Bird Treaty Act. To comply with the Migratory Bird Treaty Act, pre-construction breeding bird surveys completed by a qualified biologist are recommended if construction activity is initiated or if trees and shrubs are removed between February 15 and August 31 (the dates of the breeding bird season in this vicinity). If nesting birds are observed during the preconstruction surveys, the biologist will set appropriate buffers surrounding active nests based on the species present, generally between 50 and 100 feet given the urban environment present. Construction and vegetation removal within those buffers would be allowed only if nests are monitored periodically by a qualified biologist. If nesting birds are showing signs of distress, construction may need to be stopped until appropriate measures are implemented to avoid disturbance or the young birds have fled the nest. Removing trees and shrubs and initiating construction between September 1 and February 14 (outside of the breeding bird season) would also avoid affecting nesting birds.

Please feel free to contact me should you have any questions or concerns.

Sincerely,



Justin Semion
Principal, Aquatic Ecologist

Enclosures: References Cited
 Figure 1. Study Area Location Map
 Figure 2. Biological Communities within the Study Area
 Figure 3. Wetlands and Non-Wetland Waters within the Study Area

References Cited

California Department of Fish and Wildlife (CDFW). 2014. California Natural Diversity Database. Wildlife and Habitat Data Analysis Branch, Sacramento, CA.

California Native Plant Society (CNPS). 2014. Inventory of Rare and Endangered Plants of California. California Native Plant Society, Sacramento, California. Online at: <http://www.rareplants.cnps.org>; accessed: December 2014.

United States Fish and Wildlife Service (USFWS). 2014. Species List for Marin County, Sacramento Fish and Wildlife Service.



Figure 1. Study Area Location Map

Manuel T. Freitas Parkway and Las Gallinas Avenue
Intersection Improvements
San Rafael, California

0 1,000 2,000
Feet



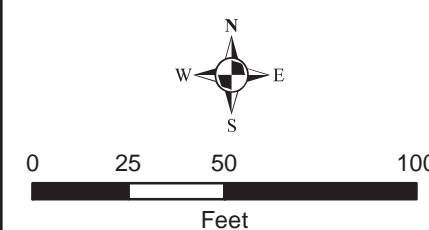
Map Prepared Date: 12/17/2014
Map Prepared By: dchan
Base Source: ESRI/National Geographic
Data Source(s): WRA

Manuel T. Freitas Parkway and Las Gallinas Avenue Intersection Improvements

San Rafael, California

Figure 2.

Biological Communities within the Study Area



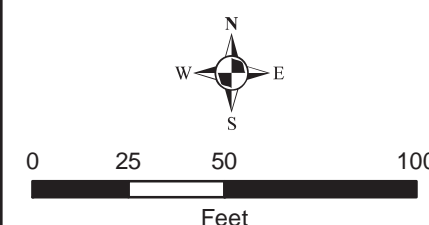
Map Prepared Date: 12/17/2014
 Map Prepared By: dchan
 Base Source: ESRI World Imagery (2010)
 Data Source(s): WRA

Manuel T. Freitas Parkway
and Las Gallinas Avenue
Intersection Improvements

San Rafael,
California

Figure 3.

Wetlands and
Non-Wetland Waters
within the Study Area



Map Prepared Date: 1/22/2015
Map Prepared By: dchan
Base Source: ESRI World Imagery (2010)
Data Source(s): WRA

Appendix B – Traffic-Multimodal Assessment Memorandum

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MEMORANDUM

Date: May 6, 2015

To: Leslie Blomquist and Jeff Stutsman, City of San Rafael

From: Sarah Nadiranto, PE and Bob Grandy, PE

Subject: Las Gallinas Avenue / Manuel T Freitas Parkway Intersection Improvement – Multimodal Assessment

SF14-0781

This memorandum documents our transportation assessment for the Las Gallinas Avenue / Manuel T Freitas Parkway (Las Gallinas / Freitas Parkway) Intersection Improvement Project (Project). The memorandum summarizes an evaluation of different treatments designed to improve pedestrian, bicycle, transit, and vehicle operations. Included are a description of the project purpose, existing conditions, future conditions, improvement alternatives, evaluation of alternatives, and a recommendation for the improvement project.

PROJECT PURPOSE

The purpose of this Project is to evaluate and redesign the Las Gallinas / Freitas Parkway intersection to provide efficient and safe travel paths for all modes, reduce delays for all travel modes, and reduce vehicle queues. The intersection is frequently congested due to traffic from the adjacent shopping center and local schools, peak residential commute traffic destined to and from Highway 101, and split-phase signal operations required by the tight intersection geometrics that are limited in part by a large drainage culvert in the median of Freitas Parkway. Further, pedestrian and bicycle access is limited due to geometry constraints, such that the Project has the opportunity to enhance facilities for all users.



EXISTING CONDITIONS

This section describes the existing transportation facilities in the Project Area, including the surrounding pedestrian, bicycle, transit and vehicle facilities. Existing intersection operations are also described.

PEDESTRIANS

Pedestrian facilities in the study area include sidewalks, crosswalks, and pedestrian signals. At the Las Gallinas Avenue / Freitas Parkway intersection, both streets provide sidewalks on all approaches to the intersection. Crosswalks, curb ramps, and pedestrian signals are provided on all legs of the intersection except for the east leg, crossing Freitas Parkway. Currently, pedestrians starting at the southeast corner of the intersection must cross three legs of traffic to get to northwest corner. Field observations noted a few pedestrians “jay-walking” to avoid the three-legged crossing.

BICYCLISTS

Bicycle facilities are provided in the general study area. Class II bicycle lanes are provided leading up to the north, south, and west sides of the intersection. Approximately 180-feet before the intersection, the northbound Class II bicycle lane ends, dropping bicyclists into the vehicle travel way. Similarly, approximately 220 feet and 310 feet, southbound and eastbound, respectively, before the intersection, the Class II bicycle lanes end, dropping bicyclists into the vehicle travel way. Bicycle lanes are provided in the westbound and southbound exit approaches, just after the intersection.

TRANSIT

Several transit routes are within proximity of the Project intersection. A list of those routes and their stop location relative to the Project intersection is shown in **Table 1**, below. Sidewalks are provided to the bus stop and bus shelters are provided at some of the nearby stops.



TABLE 1: GOLDEN GATE TRANSIT BUS ROUTES NEARBY

Route	Operator	Type of Bus Route	Hours of Operation	Headways	Closest Stop Location	
					Northbound	Southbound
38 – San Francisco to/from Terra Linda	Golden Gate Transit	Commute Bus	Monday – Friday 6:00 AM – 9:00 AM 4:00 PM – 7:00 PM	30 mins	Las Gallinas / Freitas Parkway	Las Gallinas / Nova Albion Way
45/45K – San Rafael to/from Kaiser Hospital/Northgate	Golden Gate Transit	Marin County Local	Monday – Sunday 6:00 AM to 9:00 PM 8:00 AM to 8:00 PM ¹	30 mins / 60 mins ¹	Las Gallinas / Nova Albion Way	Las Gallinas / Nova Albion Way
49 – San Rafael to/from Novato	Golden Gate Transit	Marin County Local	Monday – Friday 6:00 AM – 8:00 PM	60 mins	Las Gallinas / Nova Albion Way	Las Gallinas / Nova Albion Way
139 – Terra Linda High School to/from Marinwood	Marin Transit	Local Service – School	School days 7:00 AM – 8:00 AM 2:45 PM – 4:30 PM	1 bus for each peak period	Las Gallinas / Nova Albion Way	Las Gallinas / Freitas Parkway
257 – Ignacio to/from San Rafael	Marin Transit	Local Service / Community Shuttle	Monday – Friday 6:30 AM – 7:30 PM	60 mins	Las Gallinas / Nova Albion Way	Las Gallinas / Nova Albion Way
259 – Novato to/from San Rafael	Marin Transit	Local Service / Community Shuttle	Monday – Sunday 7:00 AM – 11:00 PM	60 mins	Las Gallinas / Oleander Drive	Las Gallinas / Freitas Parkway

Notes:

1. Reduced hours of operations and increased headways on the Saturdays, Sundays and holidays
 Fehr & Peers, 2015



VEHICLES

Las Gallinas Avenue is a two-lane north-south facility beginning at the Northgate Mall to the south and terminating in a residential neighborhood to the north. Freitas Parkway is a four-lane east-west facility connecting US-101 to neighborhoods west of the freeway. The intersection is signalized with left turn and right turn pockets for each approach. As part of this assessment, a simulation study was completed for the intersection as described below.

Operations Analysis

To accurately assess the operations of the intersection and understand the downstream and upstream effects on the Project intersection, adjacent study intersections were evaluated. The following intersections were reviewed as part of this study:

1. Las Gallinas / Freitas Parkway (signalized)
2. Las Gallinas / Nova Albion (signalized)
3. Northgate Drive / Freitas Parkway (signalized)

The traffic analysis software Synchro/SimTraffic 7.0 was used for this study. For purposes of modeling the entire network as one system, micro-simulation (SimTraffic) was used. The primary difference between SimTraffic and HCM is that the HCM analyzes intersections in isolation and does not include the effects of upstream or downstream intersections. SimTraffic analyzes intersections as a "system," with intersections directly affecting traffic flow through the entire project study area. SimTraffic provides measures of effectiveness that are consistent with the HCM such as movement delay and weighted average delay.

The operations of roadway facilities are described with the term "level of service" (LOS). LOS is a qualitative description of traffic flow from a vehicle driver's perspective based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels of service are defined ranging from LOS A (best operating conditions) to LOS F (worst operating conditions). LOS E corresponds to operations "at capacity." When volumes exceed capacity, stop-and-go conditions result and operations are designated to LOS F. The relationship between LOS and control delay is summarized in **Table 2**.



TABLE 2: SIGNALIZED INTERSECTION LOS CRITERIA		
Level of Service	Description	Delay in Seconds
A	Progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	< 10.0
B	Progression is good, cycle lengths are short, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10.0 to 20.0
C	Higher congestion may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, though many still pass through the intersection without stopping.	> 20.0 to 35.0
D	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35.0 to 55.0
E	This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 55.0 to 80.0
F	This level is considered unacceptable with oversaturation, which is when arrival flow rates exceed the capacity of the intersection. This level may also occur at high V/C ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be contributing factors to such delay levels.	> 80.0
Source: 2010 Highway Capacity Manual		

Data Collection / Field Observations

City of San Rafael staff furnished weekday AM and PM peak hour data at all locations, summarized in **Figure 2**. In addition, Fehr & Peers completed field observations. During the AM peak hour, the westbound left turn was observed to spillback beyond its provided pocket length to the traffic signal at the Los Gamos Road intersection due to the high demand of left turning vehicles to adjacent land uses such as the retail center and local schools. The southbound approach was also queued beyond the upstream intersection at Hyacinth Way. At the Las Gallinas



/ Nova Albion intersection, it was observed that the southbound queue would spillback to the Freitas Parkway intersection during peak demand conditions, though it cleared after each cycle.

Results

Existing operations were evaluated using the methods and data collection described above. Existing AM and PM weekday intersection delay and level of service is summarized in **Table 3** and queue summaries for critical movements at the Project intersection is summarized in **Table 4**. Detailed levels of service calculation worksheets are included in **Attachment A**.

As shown in Table 2, intersections operate at LOS C or better during the AM and PM peak hour/. At the Las Gallinas / Freitas Parkway intersection, queues spillback beyond the provided storage length in the westbound left and southbound left turn pocket, matching field observations. Similarly, at the Las Gallinas / Nova Albion intersection, the southbound queue on Las Gallinas spills back to the Freitas Parkway intersection, matching field observations.

TABLE 3: EXISTING LEVEL OF SERVICE				
Intersection	Control	Peak Hour	Existing	
			Delay	LOS
1. Las Gallinas Avenue / Manuel T Freitas Parkway	Signal	AM	35	C
		PM	24	C
2. Las Gallinas Avenue / Nova Albion Way	Signal	AM	22	C
		PM	19	B
3. Northgate Drive / Manuel T Freitas Parkway	Signal	AM	13	B
		PM	21	C
Fehr & Peers, 2015				



TABLE 4: EXISTING QUEUE LENGTH					
Intersection	Movement	Pocket Length	Existing		
			Average	95 th Percentile Queue	Max
AM Peak Hour					
1. Las Gallinas Avenue / Manuel T Freitas Parkway	WBL	150	190 ¹	250 ¹	210 ¹
	WBT	620	260	530	530
	SBL	120	160	220	180
	SBT	630	260	500	550
PM Peak Hour					
1. Las Gallinas Avenue / Manuel T Freitas Parkway	WBL	150	150 ¹	230 ¹	210 ¹
	WBT	620	130	260	290
	SBL	120	90	170	180
	SBT	630	90	170	230
Notes:					
Bold fields indicate queue is longer than available pocket length.					
1. Westbound left turn queue spills back to westbound through, such that left turn queue length should equate to the through queue length.					
Fehr & Peers, 2015					

FUTURE CONDITIONS

To assess the effects of the improvements for near-term benefits, a future year of 2020, consistent with the City of San Rafael General Plan, was assessed. Based on discussions with City staff, a growth rate of 2% was applied based on volumes forecasts from the General Plan. 2020 Near Term volumes are summarized in **Figure 3**.

PROJECT IMPROVEMENT ALTERNATIVES

The purpose of this assessment is to understand the existing conditions and identify treatment as the Las Gallinas / Freitas Parkway intersection to provide a safe and efficient intersection which caters to the needs of pedestrians, bicyclists, transit, and drivers. This section documents the treatments assessed and the effects on each mode of travel.



DESCRIPTION OF PROPOSED IMPROVEMENT ALTERNATIVES

A series of improvements were identified and tested as shown in **Table 5**. **Table 5** describes the treatment assessed in each alternative.

The four improvement alternatives have several common features as summarized below.

- Construct a new crosswalk on the east leg of the intersection
- Restripe to provide continuous bike lanes
- Remove pork chop islands

The unique features of the four alternatives are described as follows.

- Alternative 1
 - Provide dual westbound left turn lanes
- Alternative 2
 - Provide dual westbound left turn lanes
 - Provide protected left turn lane phasing
- Alternative 3
 - Provide Leading Pedestrian Interval (LPI)
 - Extend length of westbound left turn lane and eastbound right turn lane pockets
- Alternative 4
 - Extend length of westbound left turn lane and eastbound right turn lane pockets
 - Provide protected left turn lane phasing



TABLE 5: PROPOSED IMPROVEMENT ALTERNATIVES				
Treatment	Alternative 1	Alternative 2	Alternative 3	Alternative 4
<i>Pedestrian Improvements</i>				
Construct east leg crosswalk	x	x	x	x
Leading Pedestrian Interval (LPI)			x	
<i>Bicycle Improvements</i>				
Continue bicycle lanes	x	x	x	x
<i>Vehicle Operation Improvements</i>				
Westbound Left Turn Extension			x	x
Dual Westbound Left Turn Lanes	x	x		
Eastbound Right Turn Lane Extension			x	x
<i>Pedestrian + Vehicle Operation Improvements</i>				
Remove Pork Chop Islands	x	x	x	x
Protected Left Turn Phasing (8 Phase)		x		x
Fehr & Peers, 2015				



MULTI-MODAL EVALUATION OF ALTERNATIVES

Pedestrians

Alternatives 1 to 4 provide a pedestrian crossing on the east leg. The addition of the crosswalk would enhance the pedestrian facilities at the intersection by connecting all legs of the intersection, such that a pedestrian walking on the east side of Las Gallinas Avenue no longer needs to cross three legs of the intersection or illegally cross, as noted in field observations, to continue on the east side of Las Gallinas Avenue.

Alternatives 1 to 4 also removes the pork chops islands and channelized right turns. Pork chops islands allow vehicles to make right turns at higher speeds and requires pedestrians to cross multiple sections of a roadway which could introduce additional conflict points. Removing the pork chops and squaring the corners of the intersection, would lower the right turning vehicle speed and thereby create a safer pedestrian environment.

Alternatives 2 and 4 assumed an 8-phase traffic signal which would protect the left turning movements on Las Gallinas Avenue. Protecting the left turning vehicles would reduce the number of potential conflicts with pedestrians.

A leading pedestrian interval (LPI) was assessed in Alternative 3. A LPI typically gives a pedestrian a 3 to 7 second head start when entering an intersection with a corresponding green signal in the same direction. In this case, a LPI was assessed with alternatives that kept the existing 6-phase traffic signal (permitted left turns on Las Gallinas Avenue). The addition of the LPI would benefit pedestrians by enhancing their visibility in the intersection and give them priority over turning vehicles.

Bicyclists

Alternatives 1 to 4 connect the existing bicycle lanes to the intersection, thereby creating a connected bicycle facility. As noted above, existing bicycle lanes are provided leading up to the intersection, but stop short of the intersection by approximately 200 to 300 feet on the north, south, and west legs. By extending the bicycle facilities to the intersection, bicyclists are provided their own facility rather than mixing them with vehicle traffic.



Alternatives 2 and 4 assume an 8-phase traffic signal which would protect the left turning movements on Las Gallinas Avenue. Protecting the left turning vehicles would reduce the number of potential conflicts with bicyclists.

Transit

The proposed treatments do not affect the physical transit environment; rather, it effects transit operations. Transit operations would parallel the vehicle operations as described in the section below.

Vehicles

To assess the effects of the treatments to vehicle operations, the alternatives were analyzed using Synchro and SimTraffic software. The level of service (LOS) and delay for each of the alternatives are described in **Table 6**. Detailed LOS calculations are included in **Attachment A**.

Queue lengths were also calculated for the existing plus alternative scenarios. The average, 95th percentile, and maximum queue for critical movements at the Project intersection (Las Gallinas Avenue / Manuel T Freitas Parkway) are described in **Table 7**. Detailed queue calculations are included in **Attachment A**.

Existing LOS/Delay Results

As shown in Table 3, for all alternatives, all intersections operate at an acceptable LOS, LOS D or better, during the AM and PM peak hour, with exception to Las Gallinas / Manuel T Freitas Parkway with Alternative 4 during the AM peak hour. Vehicle operations degrade from the existing LOS C to LOS E because the intersection provides protected left turn lanes along Las Gallinas Avenue, which limits the green time for the conflicting movements.

Alternatives 1 and 2 provide dual left turn lanes from the westbound approach which do not adversely impact the intersection, however, do not provide an added benefit and the cost to construct this alternative is high, therefore Alternatives 1 and 2 are *infeasible*.

Alternative 3 results in an increase in delay at the Las Gallinas / Manuel T Freitas Parkway intersection because green time for vehicles are taken away to accommodate a leading pedestrian interval for pedestrians crossing Manuel T Freitas Parkway. Although intersection delay increases, the project alternative does not result in a significant impact to existing operations.



Queue Results

As shown in Table 4, the project alternatives decrease the existing queue spillback from the westbound left turn on Manuel T Freitas Parkway, thereby reducing the westbound through queue because the left turn cars no longer block through vehicles from reaching the intersection. Generally, the storage length can accommodate the average and 95th percentile queue except for the southbound left turn which current and future queues are estimated to go beyond the provided storage length. The southbound left turn is constrained by closely spaced intersection just upstream at Hyacinth Way.

Similar to the delay and LOS calculations, Alternatives 3 and 4 result in slightly longer queue lengths due to the decrease in green time to accommodate the leading pedestrian interval or protected left turn phase, respectively.

Near Term (2020) LOS/Delay Results

The LOS and delay for each of the No Project and Alternative 3 and 4 scenarios are described in **Table 8** and queue lengths are described in **Table 9**. (Alternatives 1 and 2 were not assessed because they were deemed infeasible under existing conditions).

As shown in Table 8, the delay decreases with Alternative 3 and increases with Alternative 4. The addition of a leading pedestrian interval results in better operations than Alternative 4 because the green time taken away with Alternative 3 is less than the green time taken away for protected left turns on Las Gallinas Avenue. Alternatives 3 and 4 result in similar queue lengths and operate better than the no project condition.

TABLE 6: EXISTING + PROJECT LEVEL OF SERVICE										
Intersection	No Project		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
AM Peak Hour										
1. Las Gallinas Avenue / Manuel T Freitas Parkway	35	C	35	C	49	D	40	D	56	E
2. Las Gallinas Avenue / Nova Albion Way	22	C	28	C	26	C	23	C	23	C
3. Northgate Drive / Manuel T Freitas Parkway	13	B	14	B	15	B	13	B	16	B
PM Peak Hour										
1. Las Gallinas Avenue / Manuel T Freitas Parkway	24	C	22	C	28	C	27	C	32	C
2. Las Gallinas Avenue / Nova Albion Way	19	B	19	B	21	C	20	C	21	C
3. Northgate Drive / Manuel T Freitas Parkway	21	C	21	C	24	C	21	C	22	C
Fehr & Peers, 2015										

Fehr & Peers, 2015

TABLE 7: EXISTING + PROJECT QUEUE LENGTHS																	
Intersection	Movement	Storage Length	No Project			Alternative 1			Alternative 2			Alternative 3			Alternative 4		
			Avg	95 th	Max	Avg	95 th	Max	Avg	95 th	Max	Avg	95 th	Max	Avg	95 th	Max
AM Peak Hour																	
1. Las Gallinas Avenue / Manuel T Freitas Parkway	WBL	150 ¹	190²	250²	210²	140	220	240	150	230	270	250	420	490	290	460	490
	WBT	620	260	530	530	130	220	270	170	280	330	140	330	420	130	270	380
	SBL	120	160	220	180	150	220	180	170	210	180	150	210	180	170	210	180
	SBT	630	260	500	550	280	540	590	460	900	1,000	310	620	600	500	800	680
PM Peak Hour																	
1. Las Gallinas Avenue / Manuel T Freitas Parkway	WBL	150 ¹	150²	230²	210²	100	150	180	110	180	220	190	310	350	215	360	420
	WBT	620	130	260	290	90	150	170	80	160	200	80	150	170	80	160	210
	SBL	120	90	170	180	90	150	170	100	160	180	90	150	170	100	160	170
	SBT	630	90	170	230	90	160	190	100	190	230	80	170	240	100	180	210

Notes:

- Storage length increase with Project Alternatives
 - Alternative 1, 2, 5, 6: 450' pocket
 - Alternative 3, 4: 250' pocket (two lanes)
- Westbound left turn queue spills back to westbound through, such that left turn queue length should equate to the through queue length.

Fehr & Peers, 2015

1. Storage length increase with Project Alternatives
 - a. Alternative 1, 2, 5, 6: 450' pocket
 - b. Alternative 3, 4: 250' pocket (two lanes)

2. Westbound left turn queue spills back to westbound through, such that left turn queue length should equate to the through queue length.

Fehr & Peers, 2015

TABLE 8: CUMULATIVE + PROJECT LEVEL OF SERVICE						
Intersection	No Project		Alternative 3		Alternative 4	
	Delay	LOS	Delay	LOS	Delay	LOS
AM Peak Hour						
1. Las Gallinas Avenue / Manuel T Freitas Parkway	88	F	76	E	110	F
2. Las Gallinas Avenue / Nova Albion Way	29	C	28	C	29	C
3. Northgate Drive / Manuel T Freitas Parkway	23	C	23	C	25	C
PM Peak Hour						
1. Las Gallinas Avenue / Manuel T Freitas Parkway	30	C	46	D	37	D
2. Las Gallinas Avenue / Nova Albion Way	32	C	44	D	49	D
3. Northgate Drive / Manuel T Freitas Parkway	38	D	37	D	39	D
Fehr & Peers, 2015						

Fehr & Peers, 2015



TABLE 9: CUMULATIVE + PROJECT QUEUE LENGTHS

Intersection	Movement	Storage Length	No Project			Alternative 3			Alternative 4		
			Avg	95 th	Max	Avg	95 th	Max	Avg	95 th	Max
AM Peak Hour											
1. Las Gallinas Avenue / Manuel T Freitas Parkway	WBL	150 ¹	200 ²	230	210	340	560	510	340	540	510
	WBT	620	510	860	690	220	630	550	160	490	590
	SBL	120	180	190	180	180	190	180	180	200	180
	SBT	630	650	680	680	650	670	680	650	690	680
PM Peak Hour											
1. Las Gallinas Avenue / Manuel T Freitas Parkway	WBL	150 ¹	170	240	210	220	380	420	280	460	480
	WBT	620	200	400	440	130	280	310	130	300	350
	SBL	120	130	210	180	170	210	180	130	200	180
	SBT	630	210	500	540	480	840	660	160	360	390

Notes:

1. Storage length increase with Project Alternatives
 - a. Alternative 1, 2, 5, 6: 450' pocket
 - b. Alternative 3, 4: 250' pocket (two lanes)
2. Westbound left turn queue spills back to westbound through, such that left turn queue length should equate to the through queue length.

Fehr & Peers, 2015



RECOMMENDATION

Alternatives 1 through 4 all result in an added benefit to pedestrian and bicycle safety by removing pork chops and slowing vehicles down, providing exclusive left turns and separating the pedestrian and vehicle conflicts, or a leading pedestrian interval to give pedestrians the right-of-way before vehicles. While Alternatives 1 and 2 are possible, the benefits to the different modes do not out-weigh the costs associated with the project alternatives, therefore the alternatives are not considered feasible options.

Under existing conditions, year 2014, Alternatives 3 and 4 results in a nominal increase to intersection delay. In the near term, year 2020, the no project conditions degrade such that the Project intersection operates at an unacceptable level of service during the AM peak hour. Alternative 3 results in better intersection operations with a decrease to intersection delay while Alternative 4 worsens conditions and increases delay. In the PM peak hour, the intersection operates about the same between the three alternatives.

Despite the changes in vehicle operations, Alternatives 3 and 4 result in better multi-modal operations because they accommodate pedestrians, bicyclists and vehicles through the intersection and create a more multi-modal friendly environment. Alternative 3 provide the best combination of operations at the intersection.

This concludes our findings; please contact Sarah Nadiranto at (415)348-0300 for questions or comments.

Attachments

Figure 1 – Existing Conditions (Pedestrian, Bicycle, and Transit Network)

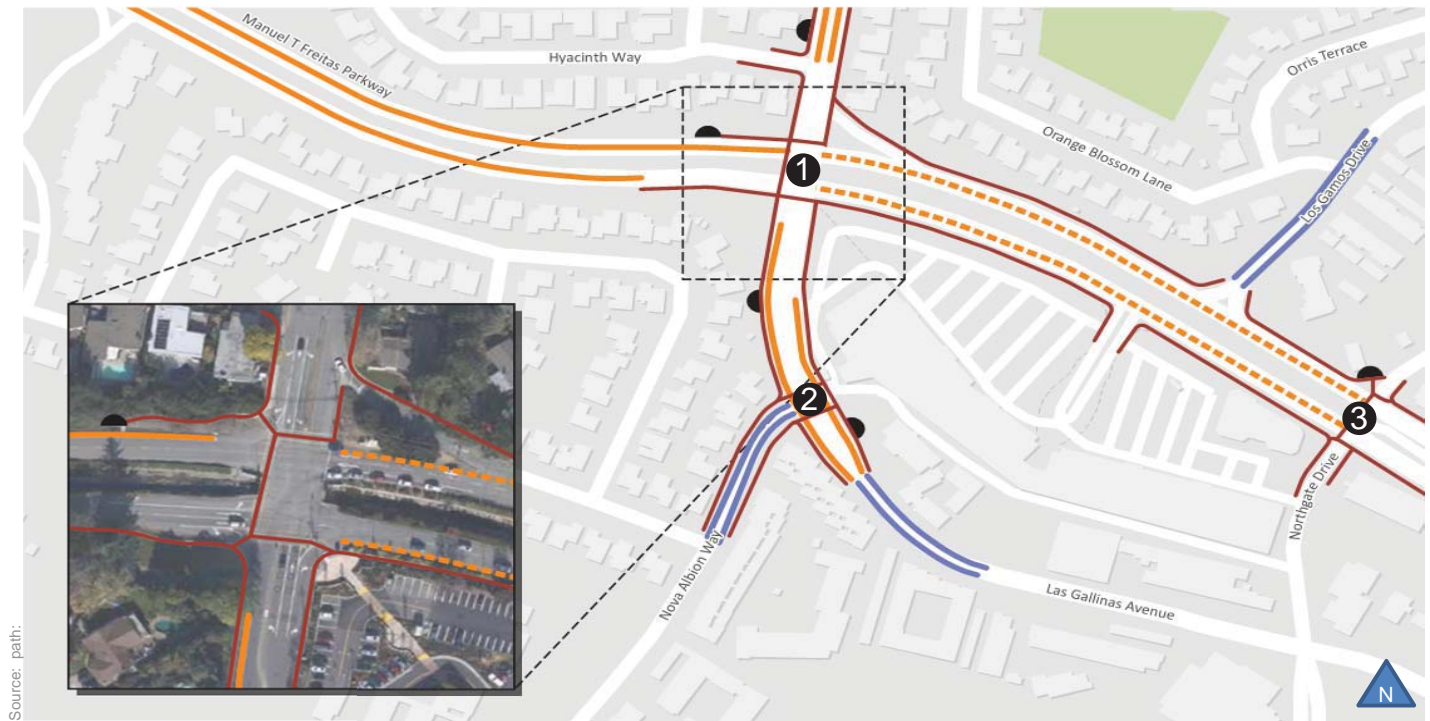
Figure 2 – Existing (2014) AM and PM Peak Hour Intersection Volumes

Figure 3 – 2020 AM and PM Peak Hour Intersection Volumes

Attachment A – LOS and Queue Calculations



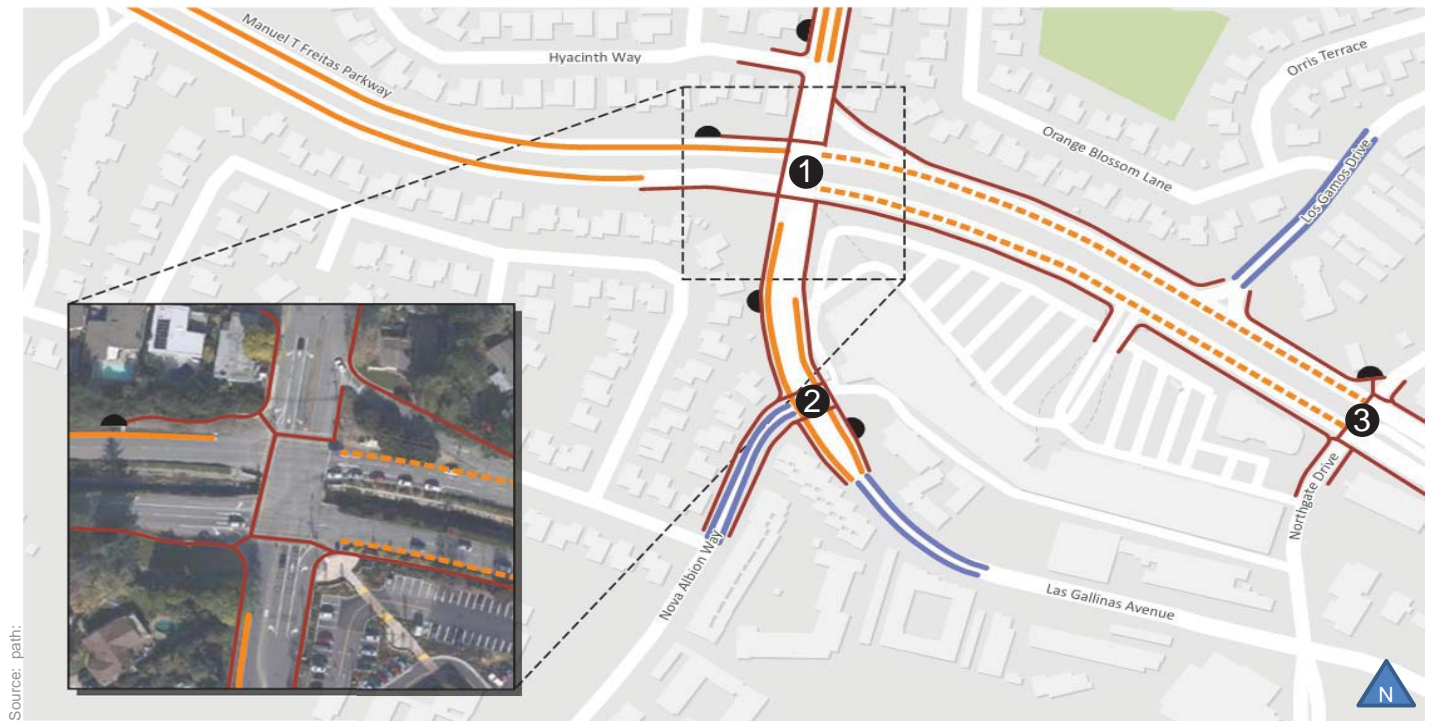
Figure 1
Existing Facilities



1. Las Gallinas Ave/M. T. Freitas Pkwy	2. Las Gallinas Ave/Nova Albion Way	3. Northgate Drive/M. T. Freitas Pkwy



Figure 2
Existing (2014)
Peak Hour Traffic Volumes and Lane Configurations



1. Las Gallinas Ave/M. T. Freitas Pkwy	2. Las Gallinas Ave/Nova Albion Way	3. Northgate Drive/M. T. Freitas Pkwy

Figure 3
Near Term (2020)
Peak Hour Traffic Volumes and Lane Configurations



Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	43	43	99.3%	6.2	36	56	0.0	56.1	20.0	42.7	98.8	E
	Through	120	112	93.4%	7.6	102	126	0.7	23.2	2.0	20.2	25.7	C
	Right Turn	213	202	94.8%	20.6	151	227	0.8	9.0	1.0	7.3	10.4	A
	Second Right												
	Subtotal	376	357	94.9%	19.3	317	386	1.0	19.0	3.0	15.1	25.0	B
SB	U Turn												
	Second Left												
	Left Turn	237	230	97.2%	9.2	214	244	0.4	51.8	5.6	44.0	60.1	D
	Through	327	321	98.2%	13.1	300	342	0.3	38.9	4.8	31.6	48.6	D
	Right Turn	34	30	89.2%	5.0	20	36	0.6	11.3	5.4	6.5	23.6	B
	Second Right												
	Subtotal	598	582	97.3%	11.6	564	603	0.7	42.6	4.9	34.9	50.7	D
EB	U Turn												
	Second Left												
	Left Turn	40	39	97.4%	5.0	34	48	0.2	58.6	9.0	45.8	70.9	E
	Through	654	634	97.0%	14.3	614	661	0.8	38.5	8.2	33.5	60.9	D
	Right Turn	71	67	94.1%	5.7	60	80	0.5	11.5	5.0	7.0	21.1	B
	Second Right												
	Subtotal	765	740	96.8%	13.9	725	767	0.9	37.2	7.6	32.5	57.9	D
WB	U Turn												
	Second Left												
	Left Turn	343	326	95.0%	18.0	296	354	0.9	66.3	20.4	47.9	109.8	E
	Through	571	549	96.2%	25.0	507	584	0.9	19.3	1.4	17.5	21.9	B
	Right Turn	93	92	98.6%	11.4	75	108	0.1	4.3	0.5	3.8	5.3	A
	Second Right												
	Subtotal	1,007	967	96.0%	38.7	907	1,022	1.3	33.7	7.2	27.2	48.8	C
Total		2,746	2,645	96.3%	40.6	2,587	2,711	1.9	34.7	3.1	30.6	40.2	C

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	119	111	93.3%	9.0	99	124	0.7	62.8	5.9	55.7	74.8	E
	Through	55	54	99.0%	7.1	38	64	0.1	32.8	2.6	28.9	36.0	C
	Right Turn	4	4	110.4%	1.4	2	7	0.2	15.5	11.1	1.4	33.9	B
	Second Right												
	Subtotal	178	170	95.5%	13.2	148	187	0.6	52.0	3.7	48.2	59.9	D
SB	U Turn												
	Second Left												
	Left Turn	2	2	96.0%	0.6	1	3	0.1	54.2	25.0	15.8	98.0	D
	Through	222	216	97.2%	15.6	190	239	0.4	51.9	3.4	47.8	59.9	D
	Right Turn	512	494	96.6%	19.6	463	521	0.8	5.0	0.5	4.3	6.0	A
	Second Right												
	Subtotal	736	712	96.8%	23.3	683	749	0.9	19.3	1.1	17.7	21.2	B
EB	U Turn												
	Second Left												
	Left Turn	316	297	93.9%	16.2	272	325	1.1	15.8	1.6	13.5	18.4	B
	Through	2	2	100.8%	1.6	0	5	0.0	15.5	15.7	0.0	48.2	B
	Right Turn	183	168	91.8%	10.0	149	183	1.1	6.3	0.9	4.7	7.4	A
	Second Right												
	Subtotal	501	467	93.2%	16.7	438	494	1.6	12.4	1.2	10.6	13.9	B
WB	U Turn												
	Second Left												
	Left Turn	7	7	107.0%	2.7	4	12	0.2	64.4	11.7	46.0	86.1	E
	Through	21	19	92.8%	2.8	13	24	0.3	60.9	7.0	47.4	71.0	E
	Right Turn	5	5	96.0%	1.6	3	9	0.1	18.1	12.6	4.3	46.1	B
	Second Right												
	Subtotal	33	32	96.3%	4.6	26	40	0.2	54.9	5.0	46.2	62.5	D
Total		1,448	1,381	95.3%	33.0	1,322	1,426	1.8	21.8	0.7	20.8	22.6	C

Intersection 3		Northgate Drive/Las Gallinas Ave							Signal					
Direction	Movement	Demand Volume (vph)			Served Volume (vph)				GEH	Total Delay (sec/veh)				LOS
			Average	Percent	Std. Dev.	Minimum	Maximum	Average		Std. Dev.	Minimum	Maximum		
NB	U Turn													
	Second Left													
	Left Turn	25	22	89.1%	4.9	14	29	0.6	44.5	5.1	34.6	49.8	D	
	Through	5	5	97.9%	1.9	4	10	0.0	45.0	12.6	29.4	65.7	D	
	Right Turn	25	25	98.7%	5.0	18	32	0.1	2.3	0.4	1.7	2.9	A	
	Second Right													
	Subtotal	55	52	94.3%	6.7	43	64	0.4	24.4	3.9	18.3	30.9	C	
SB	U Turn													
	Second Left													
	Left Turn	46	42	91.0%	7.9	28	53	0.6	42.8	5.0	34.6	50.9	D	
	Through	17	17	97.1%	5.0	7	26	0.1	40.2	4.8	34.8	47.0	D	
	Right Turn	11	10	88.1%	2.3	7	12	0.4	2.0	0.4	1.5	3.1	A	
	Second Right													
	Subtotal	74	68	92.0%	8.4	54	78	0.7	36.1	3.4	30.2	39.5	D	
EB	U Turn													
	Second Left													
	Left Turn	28	26	93.9%	5.7	17	35	0.3	47.3	4.2	41.8	57.5	D	
	Through	1,172	1,141	97.3%	30.7	1,084	1,205	0.9	7.3	0.5	6.6	8.1	A	
	Right Turn	31	30	95.4%	4.1	20	34	0.3	6.8	1.5	4.3	9.0	A	
	Second Right													
	Subtotal	1,231	1,196	97.2%	26.6	1,150	1,253	1.0	8.2	0.5	7.5	9.0	A	
WB	U Turn													
	Second Left													
	Left Turn	348	333	95.6%	17.5	295	349	0.8	47.5	2.5	43.9	53.2	D	
	Through	993	954	96.0%	38.2	889	1,011	1.3	6.0	0.4	5.4	6.7	A	
	Right Turn	83	84	101.2%	6.1	73	95	0.1	3.9	0.5	3.1	4.6	A	
	Second Right													
	Subtotal	1,424	1,370	96.2%	39.9	1,321	1,439	1.4	16.0	1.2	14.0	18.2	B	
Total		2,784	2,687	96.5%	46.4	2,628	2,790	1.9	13.2	0.6	12.5	14.5	B	

Queuing and Blocking Report
Existing AM

12/31/2014

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	190	432	423	130	210	523	479	158	126	198	168	180
Average Queue (ft)	52	216	194	40	188	256	201	10	45	66	72	152
95th Queue (ft)	142	363	348	135	242	526	441	80	99	145	139	213
Link Distance (ft)		1120	1120			623	623			212		
Upstream Blk Time (%)						1	0			0		
Queuing Penalty (veh)						5	0			1		
Storage Bay Dist (ft)	140			70	150			140	110		110	120
Storage Blk Time (%)	0	28	37	0	36	1	3	0	3	2	2	25
Queuing Penalty (veh)	1	11	26	1	105	3	3	0	10	6	3	91

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	549	147
Average Queue (ft)	258	17
95th Queue (ft)	492	99
Link Distance (ft)	631	
Upstream Blk Time (%)	1	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		120
Storage Blk Time (%)	25	0
Queuing Penalty (veh)	69	0

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	168	307	98	191	198	227	215
Average Queue (ft)	100	61	30	106	52	158	83
95th Queue (ft)	177	187	72	174	133	231	186
Link Distance (ft)		677	288		836	149	149
Upstream Blk Time (%)						18	2
Queuing Penalty (veh)						66	6
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	9	0		7	0		
Queuing Penalty (veh)	17	1		4	0		

Queuing and Blocking Report

Existing AM

12/31/2014

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	98	207	234	255	284	200	196	78	32	90	82
Average Queue (ft)	26	86	114	119	165	79	64	25	2	35	17
95th Queue (ft)	68	163	190	227	248	166	146	61	21	73	54
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		0			0			5	0	12	2
Queuing Penalty (veh)		0			0			1	0	3	1

Zone Summary

Zone wide Queuing Penalty: 437

Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	155	153	98.4%	16.3	125	172	0.2	33.7	2.7	28.4	37.1	C
	Through	258	255	98.9%	16.4	224	272	0.2	24.7	1.5	22.1	27.2	C
	Right Turn	324	309	95.4%	13.4	282	328	0.8	9.3	1.3	7.6	11.4	A
	Second Right												
	Subtotal	737	717	97.3%	25.0	669	755	0.7	20.0	1.1	17.9	21.1	B
SB	U Turn												
	Second Left												
	Left Turn	125	116	92.5%	10.6	103	138	0.9	45.8	6.6	37.6	59.5	D
	Through	158	153	96.9%	8.4	140	165	0.4	22.5	1.6	20.2	25.3	C
	Right Turn	24	23	97.6%	6.0	13	31	0.1	2.7	0.6	1.5	3.6	A
	Second Right												
	Subtotal	307	292	95.2%	12.4	268	306	0.9	30.2	3.6	24.9	38.1	C
EB	U Turn												
	Second Left												
	Left Turn	38	33	87.7%	5.3	27	44	0.8	48.4	3.9	41.3	53.6	D
	Through	413	400	96.8%	17.6	360	421	0.6	27.9	1.0	26.2	29.4	C
	Right Turn	56	56	99.6%	8.2	36	65	0.0	3.4	0.7	2.5	4.3	A
	Second Right												
	Subtotal	507	489	96.5%	18.0	457	520	0.8	26.5	1.1	24.7	28.2	C
WB	U Turn												
	Second Left												
	Left Turn	277	271	98.0%	20.5	239	295	0.3	40.3	4.5	34.9	50.3	D
	Through	413	405	98.2%	14.6	371	425	0.4	20.0	1.3	18.3	22.2	B
	Right Turn	177	168	95.2%	12.5	154	191	0.6	4.0	0.2	3.8	4.3	A
	Second Right												
	Subtotal	867	845	97.5%	22.1	821	885	0.7	23.4	2.1	20.6	28.0	C
Total		2,418	2,343	96.9%	40.2	2,248	2,390	1.5	23.8	1.1	22.5	26.5	C

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	143	142	99.2%	10.0	127	154	0.1	30.7	2.7	26.7	34.6	C
	Through	217	204	94.2%	18.5	180	247	0.9	16.2	1.1	14.7	18.3	B
	Right Turn	2	3	168.0%	1.4	1	5	0.8	7.0	5.9	2.3	22.3	A
	Second Right												
	Subtotal	362	350	96.6%	22.4	324	402	0.7	22.0	1.5	20.2	24.1	C
SB	U Turn												
	Second Left												
	Left Turn	113	110	97.5%	9.4	103	133	0.3	25.4	1.5	22.6	27.3	C
	Through	295	284	96.2%	19.0	252	312	0.7	5.3	0.7	4.3	6.5	A
	Right Turn												
	Second Right												
	Subtotal	408	394	96.5%	18.6	365	418	0.7	10.9	1.0	9.5	12.4	B
EB	U Turn												
	Second Left												
	Left Turn	400	396	99.0%	21.3	349	427	0.2	30.3	4.7	23.5	37.6	C
	Through	1	1	105.6%	1.1	0	3	0.1	9.0	14.4	0.0	44.3	A
	Right Turn	205	192	93.8%	18.9	172	231	0.9	10.6	2.4	8.1	14.9	B
	Second Right												
	Subtotal	606	589	97.2%	25.7	554	627	0.7	23.9	4.1	17.8	30.0	C
WB	U Turn												
	Second Left												
	Left Turn	7	7	94.6%	2.2	2	10	0.1	33.2	8.9	17.7	52.9	C
	Through	36	33	92.3%	7.5	23	46	0.5	33.1	3.5	28.0	39.0	C
	Right Turn	8	9	109.2%	3.9	3	16	0.3	13.4	5.8	4.5	24.2	B
	Second Right												
	Subtotal	51	49	95.2%	7.6	36	60	0.3	29.6	4.8	20.2	36.5	C
Total		1,427	1,381	96.8%	26.7	1,315	1,408	1.2	19.9	2.0	17.2	23.4	B

Intersection 3		Northgate Drive/Las Gallinas Ave							Signal					
Direction	Movement	Demand Volume (vph)			Served Volume (vph)				GEH	Total Delay (sec/veh)				LOS
			Average	Percent	Std. Dev.	Minimum	Maximum	Average		Std. Dev.	Minimum	Maximum		
NB	U Turn													
	Second Left													
	Left Turn	41	40	98.3%	5.0	33	50	0.1	33.9	3.0	29.4	38.7	C	
	Through	21	19	89.1%	4.0	14	25	0.5	34.3	4.4	27.3	42.8	C	
	Right Turn	136	138	101.3%	13.5	121	168	0.2	3.2	0.4	2.9	4.2	A	
	Second Right													
	Subtotal	198	197	99.4%	11.5	180	221	0.1	12.5	1.5	10.3	15.0	B	
SB	U Turn													
	Second Left													
	Left Turn	63	62	98.7%	8.6	50	75	0.1	34.1	3.1	28.3	38.7	C	
	Through	21	23	110.6%	2.3	19	26	0.5	31.2	3.5	25.9	36.8	C	
	Right Turn	40	41	103.0%	3.8	35	46	0.2	2.1	0.3	1.8	2.8	A	
	Second Right													
	Subtotal	124	127	102.1%	9.9	115	140	0.2	23.2	1.9	20.6	25.8	C	
EB	U Turn													
	Second Left													
	Left Turn	25	22	87.2%	4.5	15	32	0.7	50.4	5.6	43.8	61.5	D	
	Through	968	930	96.1%	20.3	900	965	1.2	20.4	2.1	17.5	24.3	C	
	Right Turn	39	36	93.3%	5.3	30	45	0.4	15.8	3.7	11.7	20.6	B	
	Second Right													
	Subtotal	1,032	989	95.8%	20.4	952	1,015	1.4	20.9	2.1	18.1	24.7	C	
WB	U Turn													
	Second Left													
	Left Turn	447	431	96.4%	19.8	403	467	0.8	44.6	2.7	40.6	49.3	D	
	Through	941	914	97.1%	22.6	870	960	0.9	12.3	1.2	10.6	15.0	B	
	Right Turn	71	72	101.8%	6.3	60	82	0.2	8.3	1.4	6.3	10.5	A	
	Second Right													
	Subtotal	1,459	1,417	97.1%	29.5	1,361	1,455	1.1	21.9	1.5	19.7	24.6	C	
Total		2,813	2,729	97.0%	47.2	2,636	2,786	1.6	21.0	1.2	18.8	23.2	C	

Queuing and Blocking Report

Existing PM

12/30/2014

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T	L	T	R	L	T	R
Maximum Queue (ft)	80	176	156	209	290	249	170	248	170	179	222	167
Average Queue (ft)	28	122	91	149	129	95	81	136	108	86	84	7
95th Queue (ft)	62	180	157	224	259	180	155	228	182	162	170	59
Link Distance (ft)		1120	1120		623	623		206			631	
Upstream Blk Time (%)								1				
Queuing Penalty (veh)								10				
Storage Bay Dist (ft)	140			150			110		110	120		120
Storage Blk Time (%)		5	16	10	0	1	4	11	6	5	3	
Queuing Penalty (veh)		2	9	20	0	1	22	51	23	10	4	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	170	360	112	168	151	158	209
Average Queue (ft)	138	119	39	80	82	65	71
95th Queue (ft)	197	301	85	138	135	129	153
Link Distance (ft)		677	288		836	155	155
Upstream Blk Time (%)						1	1
Queuing Penalty (veh)						1	2
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	18	0		1	0		
Queuing Penalty (veh)	36	0		2	1		

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	250	334	338	281	308	334	378	80	102	98	52
Average Queue (ft)	39	172	197	151	206	142	181	40	27	42	16
95th Queue (ft)	113	277	296	255	296	272	335	78	84	83	42
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		5				0		9	0	15	1
Queuing Penalty (veh)		1				1		13	0	9	1

Zone Summary

Zone wide Queuing Penalty: 220

Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	43	42	97.6%	5.0	36	50	0.2	52.3	16.7	37.5	94.0	D
	Through	120	113	94.4%	10.1	96	127	0.6	23.6	2.2	20.0	25.9	C
	Right Turn	213	198	92.9%	12.9	172	210	1.1	9.3	0.8	8.2	10.7	A
	Second Right												
	Subtotal	376	353	93.9%	19.1	320	379	1.2	19.0	2.2	16.0	23.5	B
SB	U Turn												
	Second Left												
	Left Turn	237	223	94.1%	12.2	199	240	0.9	56.3	12.9	40.1	82.5	E
	Through	327	313	95.7%	14.9	285	339	0.8	42.1	9.7	32.4	61.6	D
	Right Turn	34	32	94.0%	6.0	25	43	0.4	18.7	6.4	9.3	27.8	B
	Second Right												
	Subtotal	598	568	95.0%	20.2	540	603	1.2	46.4	10.8	34.0	68.2	D
EB	U Turn												
	Second Left												
	Left Turn	40	37	93.1%	6.5	30	49	0.4	64.1	18.6	43.0	102.4	E
	Through	654	629	96.1%	23.8	602	676	1.0	44.2	18.8	27.1	85.4	D
	Right Turn	71	66	92.8%	4.4	60	73	0.6	26.0	16.4	10.0	60.1	C
	Second Right												
	Subtotal	765	732	95.7%	25.7	694	777	1.2	43.6	18.4	26.2	83.8	D
WB	U Turn												
	Second Left												
	Left Turn	343	326	95.1%	17.6	287	344	0.9	46.8	8.5	37.5	64.3	D
	Through	571	540	94.6%	19.5	510	574	1.3	18.4	0.8	17.2	19.7	B
	Right Turn	93	91	98.0%	7.9	80	107	0.2	4.8	0.2	4.3	5.2	A
	Second Right												
	Subtotal	1,007	958	95.1%	19.4	929	984	1.6	26.8	3.3	22.8	33.2	C
Total		2,746	2,610	95.1%	38.0	2,545	2,672	2.6	34.7	6.9	26.5	46.6	C

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	119	118	99.4%	11.9	101	137	0.1	60.9	5.4	52.2	69.8	E
	Through	55	52	93.7%	6.4	39	63	0.5	28.1	5.2	17.5	34.9	C
	Right Turn	4	5	112.8%	1.1	3	7	0.2	7.7	3.8	3.0	14.1	A
	Second Right												
	Subtotal	178	174	97.9%	15.0	145	189	0.3	49.9	4.8	43.0	59.3	D
SB	U Turn												
	Second Left												
	Left Turn	2	1	67.2%	0.8	0	3	0.5	50.2	25.0	0.0	84.1	D
	Through	222	216	97.3%	15.3	196	239	0.4	60.4	3.0	56.0	65.2	E
	Right Turn	512	490	95.6%	25.7	447	534	1.0	15.5	4.0	9.9	22.6	B
	Second Right												
	Subtotal	736	707	96.0%	27.5	655	751	1.1	29.3	3.5	24.0	34.8	C
EB	U Turn												
	Second Left												
	Left Turn	316	296	93.6%	14.2	269	317	1.2	19.0	1.6	17.2	22.4	B
	Through	2	2	91.2%	1.3	0	5	0.1	11.1	8.5	0.0	23.7	B
	Right Turn	183	175	95.7%	8.4	161	190	0.6	6.6	1.0	5.6	8.4	A
	Second Right												
	Subtotal	501	473	94.4%	16.7	434	490	1.3	14.4	1.2	12.9	16.7	B
WB	U Turn												
	Second Left												
	Left Turn	7	6	86.4%	1.5	5	10	0.4	60.4	17.5	22.1	87.4	E
	Through	21	21	101.0%	4.5	15	30	0.0	64.8	10.0	49.9	85.0	E
	Right Turn	5	6	126.7%	3.4	3	14	0.6	32.9	18.9	12.9	75.5	C
	Second Right												
	Subtotal	33	34	101.8%	5.4	26	42	0.1	57.8	9.2	35.9	67.3	E
Total		1,448	1,387	95.8%	40.2	1,308	1,445	1.6	27.5	1.7	25.4	29.9	C

Intersection 3 Northgate Drive/Las Gallinas Ave

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	25	23	91.4%	4.5	14	27	0.4	42.6	7.2	28.1	56.4	D
	Through	5	6	117.1%	2.4	3	11	0.4	44.2	16.3	10.7	72.4	D
	Right Turn	25	26	102.5%	3.0	21	30	0.1	2.3	0.3	1.9	2.8	A
	Second Right												
	Subtotal	55	54	98.8%	7.1	41	63	0.1	23.8	5.7	13.3	33.4	C
SB	U Turn												
	Second Left												
	Left Turn	46	45	98.1%	7.6	32	54	0.1	42.6	3.9	37.0	48.8	D
	Through	17	18	106.2%	4.7	11	25	0.3	36.1	5.6	25.3	43.6	D
	Right Turn	11	10	90.8%	3.7	4	14	0.3	1.9	0.3	1.5	2.6	A
	Second Right												
	Subtotal	74	73	98.9%	8.7	62	84	0.1	35.5	4.2	28.6	40.5	D
EB	U Turn												
	Second Left												
	Left Turn	28	28	100.1%	5.3	17	36	0.0	46.1	5.5	39.2	55.2	D
	Through	1,172	1,110	94.7%	31.2	1,058	1,171	1.8	8.6	0.8	7.6	10.2	A
	Right Turn	31	32	102.8%	6.4	21	44	0.2	5.8	0.9	4.3	7.2	A
	Second Right												
	Subtotal	1,231	1,170	95.0%	33.9	1,115	1,236	1.8	9.5	0.8	8.4	10.8	A
WB	U Turn												
	Second Left												
	Left Turn	348	338	97.2%	15.7	313	364	0.5	46.3	2.7	43.2	50.5	D
	Through	993	944	95.1%	14.7	918	967	1.6	5.8	0.5	5.1	6.8	A
	Right Turn	83	79	94.8%	7.8	65	88	0.5	4.2	0.6	3.3	5.2	A
	Second Right												
	Subtotal	1,424	1,361	95.6%	20.1	1,333	1,402	1.7	15.8	1.0	14.0	16.8	B
Total		2,784	2,658	95.5%	42.2	2,611	2,763	2.4	13.7	0.6	12.6	14.5	B

Queuing and Blocking Report

Existing Alt 1 AM

12/31/2014

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	R
Maximum Queue (ft)	198	611	575	120	234	254	267	253	177	106	170	164
Average Queue (ft)	48	237	211	50	111	131	119	127	24	33	55	58
95th Queue (ft)	134	510	471	125	199	212	217	210	89	81	126	129
Link Distance (ft)		1104	1104				627	627			195	
Upstream Blk Time (%)		0									0	
Queuing Penalty (veh)		0									1	
Storage Bay Dist (ft)	150			60	250	250			150	110		110
Storage Blk Time (%)	0	24	40	2	0	0	1	3		1	2	2
Queuing Penalty (veh)	0	10	29	7	0	1	3	3		3	4	3

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB	SB
Directions Served	L	T	R
Maximum Queue (ft)	180	585	179
Average Queue (ft)	149	271	33
95th Queue (ft)	212	537	118
Link Distance (ft)		630	
Upstream Blk Time (%)		4	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)	120		120
Storage Blk Time (%)	28	25	0
Queuing Penalty (veh)	104	68	0

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	169	318	84	192	216	247	218
Average Queue (ft)	109	79	31	109	47	202	147
95th Queue (ft)	182	228	69	178	131	279	209
Link Distance (ft)		677	288		836	150	150
Upstream Blk Time (%)						30	12
Queuing Penalty (veh)						110	45
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	11	0		7	0		
Queuing Penalty (veh)	22	1		4	0		

Queuing and Blocking Report

Existing Alt 1 AM

12/31/2014

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	81	222	239	230	273	196	203	78	19	88	78
Average Queue (ft)	27	96	124	120	168	82	79	29	1	36	17
95th Queue (ft)	64	182	204	218	243	166	172	66	14	74	53
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		0			0			7		13	2
Queuing Penalty (veh)		0			0			2		4	1

Zone Summary

Zone wide Queuing Penalty: 424

Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	155	147	95.1%	12.3	126	162	0.6	36.0	3.3	29.4	40.5	D
	Through	258	258	100.1%	11.7	241	275	0.0	23.5	1.5	21.5	25.5	C
	Right Turn	324	297	91.8%	10.2	277	314	1.5	7.9	0.6	7.0	8.6	A
	Second Right												
	Subtotal	737	703	95.4%	20.3	680	738	1.3	19.5	1.3	17.4	21.7	B
SB	U Turn												
	Second Left												
	Left Turn	125	117	93.3%	9.2	98	131	0.8	48.7	6.7	32.9	58.7	D
	Through	158	156	98.7%	12.2	132	176	0.2	22.1	1.0	21.0	23.8	C
	Right Turn	24	24	101.2%	5.5	15	32	0.1	5.7	0.8	4.8	7.3	A
	Second Right												
	Subtotal	307	297	96.7%	14.6	273	323	0.6	31.2	3.1	23.7	34.4	C
EB	U Turn												
	Second Left												
	Left Turn	38	36	94.2%	3.9	31	43	0.4	45.7	4.9	39.7	54.3	D
	Through	413	377	91.3%	19.9	340	400	1.8	24.4	1.7	21.8	27.0	C
	Right Turn	56	56	100.1%	6.2	44	67	0.0	6.5	0.8	5.2	7.6	A
	Second Right												
	Subtotal	507	469	92.5%	22.1	436	498	1.7	23.9	1.5	21.4	25.8	C
WB	U Turn												
	Second Left												
	Left Turn	277	267	96.6%	19.3	239	291	0.6	30.1	1.2	28.6	32.6	C
	Through	413	392	94.9%	18.0	366	424	1.1	19.2	2.0	16.4	22.7	B
	Right Turn	177	170	96.3%	9.0	153	183	0.5	8.6	0.8	7.8	9.8	A
	Second Right												
	Subtotal	867	830	95.7%	33.1	778	892	1.3	20.5	1.1	19.1	22.1	C
Total		2,418	2,298	95.1%	51.1	2,199	2,368	2.5	22.3	0.8	21.0	23.3	C

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	143	135	94.2%	8.9	119	148	0.7	31.5	3.3	27.6	37.6	C
	Through	217	206	94.9%	17.6	176	226	0.8	16.7	1.5	14.1	18.7	B
	Right Turn	2	3	129.6%	1.4	1	5	0.4	6.0	5.1	1.3	17.4	A
	Second Right												
	Subtotal	362	343	94.8%	19.7	310	375	1.0	22.5	1.8	20.5	25.0	C
SB	U Turn												
	Second Left												
	Left Turn	113	110	97.6%	11.1	90	124	0.3	27.0	2.2	23.6	30.5	C
	Through	295	286	97.1%	19.7	258	324	0.5	6.3	0.9	5.0	7.3	A
	Right Turn												
	Second Right												
	Subtotal	408	397	97.2%	26.4	348	435	0.6	12.0	1.2	10.6	14.6	B
EB	U Turn												
	Second Left												
	Left Turn	400	380	94.9%	14.1	349	395	1.0	28.6	2.4	25.3	32.8	C
	Through	1	1	86.4%	0.7	0	2	0.1	23.5	37.0	0.0	102.2	C
	Right Turn	205	198	96.7%	15.1	175	214	0.5	9.6	1.2	8.0	11.9	A
	Second Right												
	Subtotal	606	579	95.5%	21.1	531	603	1.1	22.1	2.2	19.2	26.0	C
WB	U Turn												
	Second Left												
	Left Turn	7	6	83.7%	1.8	4	9	0.5	34.8	8.9	20.9	51.2	C
	Through	36	35	96.5%	5.9	26	42	0.2	30.8	4.5	24.5	39.2	C
	Right Turn	8	8	94.8%	3.5	2	12	0.1	10.9	5.6	3.6	24.6	B
	Second Right												
	Subtotal	51	48	94.5%	6.8	41	60	0.4	28.1	4.1	22.5	34.5	C
Total		1,427	1,367	95.8%	29.9	1,321	1,406	1.6	19.5	1.3	17.4	21.0	B

Intersection 3 Northgate Drive/Las Gallinas Ave

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	41	40	98.3%	5.1	32	47	0.1	34.6	6.0	23.0	43.0	C
	Through	21	21	100.1%	5.2	12	28	0.0	33.6	4.6	24.0	41.0	C
	Right Turn	136	132	96.8%	7.3	120	143	0.4	3.5	0.5	2.8	4.5	A
	Second Right												
	Subtotal	198	193	97.5%	7.3	182	204	0.4	13.3	1.5	11.0	15.3	B
SB	U Turn												
	Second Left												
	Left Turn	63	61	96.2%	8.4	49	71	0.3	34.3	4.1	28.5	42.8	C
	Through	21	18	84.1%	2.4	12	20	0.8	27.7	5.7	19.3	39.2	C
	Right Turn	40	42	104.6%	5.7	34	53	0.3	1.9	0.1	1.7	2.0	A
	Second Right												
	Subtotal	124	120	96.9%	9.4	108	135	0.4	22.0	2.8	18.6	27.0	C
EB	U Turn												
	Second Left												
	Left Turn	25	25	98.7%	5.0	18	32	0.1	52.1	5.5	45.4	61.8	D
	Through	968	895	92.5%	28.9	855	955	2.4	20.6	2.2	18.0	23.4	C
	Right Turn	39	39	99.2%	5.6	32	47	0.1	15.7	2.7	11.6	19.9	B
	Second Right												
	Subtotal	1,032	959	92.9%	28.9	922	1,018	2.3	21.2	2.2	18.5	24.2	C
WB	U Turn												
	Second Left												
	Left Turn	447	439	98.3%	19.4	407	465	0.4	45.9	2.1	42.1	49.2	D
	Through	941	899	95.6%	39.5	835	981	1.4	11.8	1.4	10.0	13.5	B
	Right Turn	71	67	94.9%	5.6	56	75	0.4	8.3	1.7	6.7	12.2	A
	Second Right												
	Subtotal	1,459	1,406	96.4%	43.7	1,357	1,516	1.4	22.3	1.5	19.4	24.1	C
Total		2,813	2,678	95.2%	57.1	2,620	2,781	2.6	21.2	1.4	19.1	23.2	C

Queuing and Blocking Report

Existing Alt 1 PM

12/30/2014

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	R
Maximum Queue (ft)	108	202	189	112	164	176	166	159	119	166	218	170
Average Queue (ft)	35	114	84	31	72	92	74	86	41	94	127	94
95th Queue (ft)	81	179	160	80	137	149	140	146	92	164	222	183
Link Distance (ft)		1107	1107				623	623			192	
Upstream Blk Time (%)												2
Queuing Penalty (veh)												17
Storage Bay Dist (ft)	150			60	250	250			150	110		110
Storage Blk Time (%)	0	2	14	0				1	0	8	11	1
Queuing Penalty (veh)	0	1	8	1				1	0	44	55	5

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB	SB
Directions Served	L	T	R
Maximum Queue (ft)	162	181	95
Average Queue (ft)	86	84	15
95th Queue (ft)	149	158	55
Link Distance (ft)		627	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	120		120
Storage Blk Time (%)	7	2	
Queuing Penalty (veh)	13	4	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	169	472	81	176	202	188	171
Average Queue (ft)	141	146	30	86	88	74	83
95th Queue (ft)	196	377	66	148	161	148	154
Link Distance (ft)		677	288		836	156	156
Upstream Blk Time (%)						0	0
Queuing Penalty (veh)						1	1
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	24	0		2	1		
Queuing Penalty (veh)	50	1		4	1		

Queuing and Blocking Report

Existing Alt 1 PM

12/30/2014

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	175	347	365	281	321	270	326	157	109	82	66
Average Queue (ft)	30	173	200	165	204	124	145	49	25	41	13
95th Queue (ft)	95	299	325	256	288	235	269	109	90	74	44
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		0	0								
Queuing Penalty (veh)		0	0								
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		6		0	0			14	0	15	1
Queuing Penalty (veh)		2		0	1			19	0	9	1

Zone Summary

Zone wide Queuing Penalty: 238

Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy									Signal				
Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	43	37	86.6%	7.8	30	55	0.9	67.8	2.9	63.0	72.6	E
	Through	120	116	97.0%	14.4	101	145	0.3	31.9	4.5	25.8	39.3	C
	Right Turn	213	206	96.5%	15.1	185	230	0.5	8.8	1.8	6.5	11.4	A
	Second Right												
	Subtotal	376	359	95.6%	22.0	319	385	0.9	22.4	1.8	19.6	25.4	C
SB	U Turn												
	Second Left												
	Left Turn	237	225	94.8%	14.8	202	241	0.8	95.9	19.1	63.7	127.7	F
	Through	327	313	95.7%	19.7	285	341	0.8	64.8	17.5	39.1	95.6	E
	Right Turn	34	30	87.8%	4.4	22	38	0.7	42.8	17.2	17.5	80.2	D
	Second Right												
	Subtotal	598	567	94.9%	21.5	540	601	1.3	76.0	18.4	47.8	107.7	E
EB	U Turn												
	Second Left												
	Left Turn	40	39	98.6%	6.5	29	52	0.1	82.8	22.8	59.3	118.6	F
	Through	654	627	95.8%	28.1	586	684	1.1	62.8	27.3	35.4	106.5	E
	Right Turn	71	67	93.8%	7.3	58	78	0.5	35.5	28.1	10.0	95.8	D
	Second Right												
	Subtotal	765	733	95.8%	31.0	679	790	1.2	61.4	27.0	34.6	106.2	E
WB	U Turn												
	Second Left												
	Left Turn	343	324	94.5%	18.5	297	356	1.0	51.0	4.2	46.1	60.8	D
	Through	571	552	96.6%	13.9	522	576	0.8	29.0	0.9	27.5	30.1	C
	Right Turn	93	86	93.0%	9.1	72	102	0.7	7.3	0.9	5.5	9.1	A
	Second Right												
	Subtotal	1,007	962	95.6%	15.3	936	984	1.4	34.4	1.7	32.4	37.9	C
Total		2,746	2,622	95.5%	33.7	2,576	2,676	2.4	49.3	6.0	42.0	57.9	D

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp									Signal				
Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	119	110	92.2%	9.9	93	120	0.9	92.0	25.9	67.1	157.2	F
	Through	55	51	93.6%	6.9	39	61	0.5	31.4	8.7	24.4	54.7	C
	Right Turn	4	5	120.0%	2.7	1	10	0.4	19.2	16.2	2.8	47.9	B
	Second Right												
	Subtotal	178	166	93.2%	13.8	144	187	0.9	71.6	22.6	52.3	130.9	E
SB	U Turn												
	Second Left												
	Left Turn	2	1	57.6%	1.0	0	3	0.7	32.5	28.1	0.0	70.5	C
	Through	222	213	95.7%	17.2	184	239	0.6	51.6	4.8	45.1	58.3	D
	Right Turn	512	487	95.0%	22.6	460	521	1.1	11.9	2.0	9.7	15.3	B
	Second Right												
	Subtotal	736	700	95.1%	30.8	663	751	1.3	24.0	2.9	20.1	28.4	C
EB	U Turn												
	Second Left												
	Left Turn	316	302	95.7%	17.7	271	323	0.8	15.9	1.3	13.8	18.1	B
	Through	2	3	129.6%	1.4	0	5	0.4	15.5	10.8	4.9	39.0	B
	Right Turn	183	176	96.1%	13.3	150	198	0.5	6.2	0.6	4.7	7.2	A
	Second Right												
	Subtotal	501	481	96.0%	20.7	448	522	0.9	12.3	0.8	10.7	13.3	B
WB	U Turn												
	Second Left												
	Left Turn	7	7	107.0%	4.1	3	13	0.2	49.4	11.4	36.9	70.9	D
	Through	21	19	92.3%	4.3	13	26	0.4	57.6	8.0	42.9	68.3	E
	Right Turn	5	5	96.0%	2.7	0	9	0.1	10.1	6.5	0.0	20.5	B
	Second Right												
	Subtotal	33	32	96.0%	6.7	21	43	0.2	49.2	7.1	37.8	58.4	D
Total		1,448	1,379	95.2%	37.0	1,332	1,437	1.8	26.2	3.2	21.5	32.3	C

Intersection 3		Northgate Drive/Las Gallinas Ave							Signal				
Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				LOS
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	
NB	U Turn												
	Second Left												
	Left Turn	25	23	92.2%	4.7	14	30	0.4	55.7	8.6	45.4	68.3	E
	Through	5	5	105.6%	2.6	2	10	0.1	53.2	22.1	11.2	80.9	D
	Right Turn	25	28	111.4%	5.2	18	36	0.6	2.6	0.4	2.2	3.7	A
	Second Right												
	Subtotal	55	56	102.1%	6.6	42	64	0.2	29.4	6.4	19.9	43.8	C
SB	U Turn												
	Second Left												
	Left Turn	46	45	97.7%	6.4	37	60	0.2	51.6	5.3	43.0	59.4	D
	Through	17	16	94.9%	4.7	10	26	0.2	53.4	11.5	38.8	68.6	D
	Right Turn	11	13	115.2%	4.1	6	18	0.5	1.9	0.2	1.7	2.4	A
	Second Right												
	Subtotal	74	74	99.6%	9.8	62	87	0.0	43.7	4.0	38.7	49.2	D
EB	U Turn												
	Second Left												
	Left Turn	28	25	90.9%	5.8	18	36	0.5	63.2	5.6	52.3	71.9	E
	Through	1,172	1,133	96.7%	40.9	1,079	1,212	1.1	7.4	1.0	6.4	9.1	A
	Right Turn	31	29	93.8%	5.1	21	38	0.3	5.9	1.8	3.8	9.3	A
	Second Right												
	Subtotal	1,231	1,188	96.5%	42.5	1,121	1,266	1.2	8.6	0.9	7.4	10.2	A
WB	U Turn												
	Second Left												
	Left Turn	348	342	98.4%	19.2	314	372	0.3	55.4	3.5	50.0	60.6	E
	Through	993	954	96.1%	14.3	930	975	1.2	5.5	0.6	4.6	6.6	A
	Right Turn	83	82	98.4%	5.9	71	87	0.1	4.3	0.8	3.0	5.7	A
	Second Right												
	Subtotal	1,424	1,378	96.8%	24.3	1,352	1,420	1.2	17.8	1.6	15.1	20.0	B
Total		2,784	2,696	96.8%	37.8	2,632	2,752	1.7	14.7	1.0	13.0	16.7	B

Queuing and Blocking Report
Existing AM - Alt 2 (8 Phase)

12/31/2014

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	R
Maximum Queue (ft)	209	696	682	120	218	265	311	329	210	118	190	152
Average Queue (ft)	58	307	283	49	123	144	161	167	49	32	64	55
95th Queue (ft)	163	630	608	123	203	230	271	277	166	83	144	121
Link Distance (ft)		1104	1104				627	627			195	
Upstream Blk Time (%)		1	0								1	
Queuing Penalty (veh)		0	0								3	
Storage Bay Dist (ft)	150			60	250	250			150	110		110
Storage Blk Time (%)		38	51	1	0	0	1	11		0	3	1
Queuing Penalty (veh)		15	36	3	0	1	4	10		1	9	1

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB	SB
Directions Served	L	T	R
Maximum Queue (ft)	180	994	166
Average Queue (ft)	167	453	25
95th Queue (ft)	208	893	105
Link Distance (ft)		1629	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	120		120
Storage Blk Time (%)	43	24	
Queuing Penalty (veh)	158	65	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	169	341	87	194	255	235	208
Average Queue (ft)	108	70	27	119	72	198	145
95th Queue (ft)	186	219	67	195	216	280	207
Link Distance (ft)		677	288		836	150	150
Upstream Blk Time (%)						22	7
Queuing Penalty (veh)						83	27
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	9	0		17	0		
Queuing Penalty (veh)	17	1		10	0		

Queuing and Blocking Report
Existing AM - Alt 2 (8 Phase)

12/31/2014

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	112	282	304	264	307	248	250	89	56	93	66
Average Queue (ft)	30	88	122	151	190	79	76	32	3	42	18
95th Queue (ft)	82	217	244	248	276	178	179	73	29	82	51
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		0	0								
Queuing Penalty (veh)		0	0								
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		1		0	0			9	0	17	3
Queuing Penalty (veh)		0		0	2			2	0	5	2

Zone Summary

Zone wide Queuing Penalty: 456

Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	155	148	95.3%	12.1	128	160	0.6	48.7	3.5	39.8	51.5	D
	Through	258	240	93.1%	21.6	205	272	1.1	28.4	2.3	24.5	32.4	C
	Right Turn	324	305	94.0%	17.9	282	327	1.1	10.4	0.9	8.4	11.8	B
	Second Right												
	Subtotal	737	692	94.0%	19.8	658	723	1.7	24.8	1.2	22.3	26.5	C
SB	U Turn												
	Second Left												
	Left Turn	125	118	94.4%	8.9	103	131	0.6	50.3	2.3	46.7	53.4	D
	Through	158	148	93.9%	9.6	135	160	0.8	27.7	2.5	24.4	31.8	C
	Right Turn	24	21	86.4%	2.4	18	25	0.7	5.9	1.6	4.4	9.1	A
	Second Right												
	Subtotal	307	287	93.5%	13.9	271	311	1.2	35.4	1.8	32.8	38.7	D
EB	U Turn												
	Second Left												
	Left Turn	38	34	89.9%	6.2	25	43	0.6	54.1	5.5	41.3	60.8	D
	Through	413	397	96.0%	20.4	369	435	0.8	32.3	1.3	30.2	34.2	C
	Right Turn	56	55	98.6%	5.1	48	63	0.1	8.5	1.6	6.3	11.8	A
	Second Right												
	Subtotal	507	486	95.8%	20.9	461	530	0.9	31.2	1.0	29.9	32.9	C
WB	U Turn												
	Second Left												
	Left Turn	277	275	99.2%	16.1	248	302	0.1	51.8	3.8	46.7	58.3	D
	Through	413	408	98.9%	14.8	391	439	0.2	19.1	1.8	16.1	21.2	B
	Right Turn	177	175	98.8%	15.5	153	197	0.2	5.7	0.9	4.2	6.8	A
	Second Right												
	Subtotal	867	858	99.0%	20.2	832	899	0.3	26.9	1.7	25.1	30.7	C
Total		2,418	2,324	96.1%	27.9	2,285	2,361	1.9	28.2	0.7	27.0	29.0	C

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	143	142	99.4%	9.6	127	158	0.1	35.4	3.9	28.3	40.6	D
	Through	217	201	92.4%	11.6	183	218	1.1	16.8	1.3	14.8	19.1	B
	Right Turn	2	2	96.0%	1.8	0	6	0.1	4.7	5.1	0.0	16.3	A
	Second Right												
	Subtotal	362	345	95.2%	7.9	332	353	0.9	24.4	2.0	20.4	27.7	C
SB	U Turn												
	Second Left												
	Left Turn	113	111	98.4%	6.3	104	120	0.2	27.8	2.1	24.3	31.7	C
	Through	295	283	95.9%	13.3	252	300	0.7	7.2	1.0	5.8	8.7	A
	Right Turn												
	Second Right												
	Subtotal	408	394	96.6%	10.4	372	412	0.7	13.0	1.0	11.7	14.2	B
EB	U Turn												
	Second Left												
	Left Turn	400	378	94.4%	21.3	338	420	1.1	31.3	5.7	24.3	42.0	C
	Through	1	1	67.2%	0.8	0	2	0.4	8.6	15.2	0.0	42.0	A
	Right Turn	205	203	99.0%	16.5	177	228	0.1	11.4	3.5	8.1	18.5	B
	Second Right												
	Subtotal	606	581	95.9%	28.3	534	637	1.0	24.3	5.0	18.1	34.0	C
WB	U Turn												
	Second Left												
	Left Turn	7	6	89.1%	2.9	3	11	0.3	35.3	7.9	25.7	47.0	D
	Through	36	35	96.5%	5.0	28	42	0.2	31.9	3.2	24.9	35.3	C
	Right Turn	8	8	98.4%	2.1	5	12	0.0	14.9	5.5	7.5	23.6	B
	Second Right												
	Subtotal	51	49	95.8%	6.4	37	58	0.3	29.5	3.2	24.1	34.7	C
Total		1,427	1,369	95.9%	24.6	1,321	1,403	1.6	21.3	2.7	18.2	26.9	C

Intersection 3		Northgate Drive/Las Gallinas Ave							Signal				
Direction	Movement	Demand Volume (vph)			Served Volume (vph)				Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	41	37	89.2%	6.6	25	45	0.7	36.1	4.3	28.9	43.7	D
	Through	21	22	103.8%	4.3	14	28	0.2	39.0	6.4	30.4	52.7	D
	Right Turn	136	135	99.5%	6.2	125	142	0.1	3.3	0.2	3.0	3.6	A
	Second Right												
	Subtotal	198	194	97.8%	5.6	186	204	0.3	13.6	1.6	10.6	15.7	B
SB	U Turn												
	Second Left												
	Left Turn	63	62	98.9%	6.9	51	71	0.1	39.2	2.8	33.7	41.8	D
	Through	21	21	101.5%	3.6	16	26	0.1	37.8	6.0	26.3	47.8	D
	Right Turn	40	40	100.3%	5.0	33	48	0.0	2.2	0.3	1.8	3.0	A
	Second Right												
	Subtotal	124	124	99.8%	9.4	111	139	0.0	26.8	1.8	24.3	28.7	C
EB	U Turn												
	Second Left												
	Left Turn	25	23	93.7%	3.9	16	28	0.3	59.6	7.4	51.6	72.2	E
	Through	968	927	95.7%	17.8	897	954	1.3	26.3	2.4	21.9	29.4	C
	Right Turn	39	38	97.2%	7.0	25	45	0.2	22.2	4.4	16.2	30.8	C
	Second Right												
	Subtotal	1,032	988	95.7%	18.5	954	1,012	1.4	27.0	2.3	22.8	29.8	C
WB	U Turn												
	Second Left												
	Left Turn	447	420	94.0%	22.2	383	444	1.3	51.9	3.8	46.1	58.8	D
	Through	941	914	97.2%	22.4	872	939	0.9	11.8	1.2	9.4	13.5	B
	Right Turn	71	67	94.6%	7.2	60	80	0.5	8.9	2.3	6.3	13.8	A
	Second Right												
	Subtotal	1,459	1,402	96.1%	36.3	1,353	1,454	1.5	23.7	1.9	20.3	25.3	C
Total		2,813	2,707	96.2%	43.5	2,656	2,786	2.0	24.3	1.6	21.0	26.1	C

Queuing and Blocking Report
Existing PM - Alt 2 (8 Phase)

12/30/2014

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	R
Maximum Queue (ft)	130	236	219	120	204	212	199	182	133	170	231	170
Average Queue (ft)	37	141	111	36	92	108	69	74	28	112	144	112
95th Queue (ft)	93	213	199	92	168	175	151	146	77	183	241	195
Link Distance (ft)		1107	1107				623	623			192	
Upstream Blk Time (%)												5
Queuing Penalty (veh)												40
Storage Bay Dist (ft)	150			60	250	250			150	110		110
Storage Blk Time (%)	0	8	23	1		0	0	1	0	14	15	4
Queuing Penalty (veh)	0	3	13	1		0	0	1	0	81	71	15

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB	SB
Directions Served	L	T	R
Maximum Queue (ft)	176	229	72
Average Queue (ft)	93	94	13
95th Queue (ft)	154	182	50
Link Distance (ft)		627	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	120		120
Storage Blk Time (%)	7	5	
Queuing Penalty (veh)	13	7	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	169	466	95	181	214	186	178
Average Queue (ft)	142	170	31	91	89	75	82
95th Queue (ft)	196	412	69	156	170	150	155
Link Distance (ft)		677	288		836	156	156
Upstream Blk Time (%)		0				0	1
Queuing Penalty (veh)		0				1	1
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	27	0		3	2		
Queuing Penalty (veh)	55	1		8	2		

Queuing and Blocking Report
Existing PM - Alt 2 (8 Phase)

12/30/2014

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	230	389	414	291	318	270	315	137	107	101	119
Average Queue (ft)	31	240	260	170	209	122	146	47	31	44	23
95th Queue (ft)	109	359	380	264	289	236	272	96	98	86	72
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		0	0								
Queuing Penalty (veh)		0	1								
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		16		0	0	0		15	0	17	3
Queuing Penalty (veh)		4		0	2	0		21	0	11	2

Zone Summary

Zone wide Queuing Penalty: 353

Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	43	44	101.6%	4.0	36	49	0.1	60.2	19.0	45.8	108.4	E
	Through	120	113	94.3%	9.1	102	129	0.6	26.0	2.6	21.0	29.3	C
	Right Turn	213	205	96.2%	13.6	181	222	0.6	9.7	1.1	8.4	11.8	A
	Second Right												
	Subtotal	376	362	96.2%	13.7	348	394	0.7	21.0	3.1	17.8	29.0	C
SB	U Turn												
	Second Left												
	Left Turn	237	221	93.2%	13.5	200	245	1.1	68.9	16.0	49.4	97.2	E
	Through	327	310	94.8%	18.9	268	336	1.0	52.7	14.7	31.1	75.9	D
	Right Turn	34	34	98.5%	7.3	20	48	0.1	25.2	13.3	8.6	52.4	C
	Second Right												
	Subtotal	598	564	94.4%	23.8	523	593	1.4	57.4	15.0	36.5	83.3	E
EB	U Turn												
	Second Left												
	Left Turn	40	38	95.3%	6.1	30	50	0.3	63.3	11.6	46.2	84.2	E
	Through	654	655	100.2%	24.8	601	684	0.0	46.9	8.8	35.2	63.8	D
	Right Turn	71	68	96.4%	6.5	58	81	0.3	21.4	6.7	13.6	36.2	C
	Second Right												
	Subtotal	765	762	99.6%	23.9	711	795	0.1	45.4	8.5	34.0	61.8	D
WB	U Turn												
	Second Left												
	Left Turn	343	334	97.3%	14.3	322	356	0.5	56.2	9.6	46.1	74.2	E
	Through	571	552	96.8%	19.9	527	585	0.8	20.4	0.8	19.3	21.4	C
	Right Turn	93	89	95.9%	10.2	70	105	0.4	3.9	0.3	3.6	4.5	A
	Second Right												
	Subtotal	1,007	975	96.9%	23.3	934	1,012	1.0	31.2	3.6	27.7	38.1	C
Total		2,746	2,663	97.0%	23.9	2,628	2,700	1.6	39.5	5.5	32.1	48.2	D

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	119	114	96.1%	16.1	92	141	0.4	66.6	10.4	55.5	85.7	E
	Through	55	54	99.0%	6.7	45	64	0.1	35.1	4.3	28.2	40.4	D
	Right Turn	4	5	120.0%	1.9	3	8	0.4	9.5	6.2	2.1	18.3	A
	Second Right												
	Subtotal	178	174	97.5%	14.5	149	195	0.3	55.2	8.4	44.5	72.2	E
SB	U Turn												
	Second Left												
	Left Turn	2	2	86.4%	1.0	0	3	0.2	50.9	38.5	0.0	99.9	D
	Through	222	222	100.0%	9.6	202	233	0.0	51.9	2.1	48.6	54.3	D
	Right Turn	512	488	95.2%	22.9	431	510	1.1	5.0	0.4	4.5	5.7	A
	Second Right												
	Subtotal	736	711	96.6%	22.9	655	735	0.9	19.7	0.5	18.8	20.5	B
EB	U Turn												
	Second Left												
	Left Turn	316	304	96.1%	18.4	281	340	0.7	16.5	1.2	14.9	18.0	B
	Through	2	2	100.8%	1.3	0	4	0.0	11.2	12.3	0.0	39.8	B
	Right Turn	183	178	97.5%	12.5	159	195	0.3	6.4	0.7	5.8	7.5	A
	Second Right												
	Subtotal	501	484	96.6%	25.8	454	537	0.8	12.8	0.9	11.6	13.9	B
WB	U Turn												
	Second Left												
	Left Turn	7	7	105.6%	2.6	3	12	0.1	64.3	12.7	44.5	81.9	E
	Through	21	20	96.0%	4.2	13	26	0.2	61.5	12.4	47.5	84.9	E
	Right Turn	5	5	101.8%	2.5	2	11	0.0	21.4	11.0	7.6	39.9	C
	Second Right												
	Subtotal	33	33	98.9%	4.2	23	37	0.1	56.2	8.0	42.0	66.2	E
Total		1,448	1,402	96.8%	37.4	1,342	1,460	1.2	22.6	1.5	20.9	25.9	C

Intersection 3		Northgate Drive/Las Gallinas Ave							Signal				
Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	25	25	98.7%	3.9	16	32	0.1	46.2	7.3	29.4	54.0	D
	Through	5	5	99.8%	2.0	1	9	0.0	42.0	14.1	19.4	70.0	D
	Right Turn	25	21	85.2%	4.3	16	30	0.8	2.2	0.4	1.7	2.9	A
	Second Right												
	Subtotal	55	51	92.7%	5.7	40	60	0.6	27.1	4.4	17.6	34.0	C
SB	U Turn												
	Second Left												
	Left Turn	46	45	97.3%	7.9	34	59	0.2	42.4	3.0	37.4	46.5	D
	Through	17	17	98.8%	4.6	9	26	0.0	40.0	10.3	24.1	55.0	D
	Right Turn	11	12	105.6%	4.7	8	22	0.2	1.9	0.3	1.5	2.3	A
	Second Right												
	Subtotal	74	73	98.9%	10.6	59	91	0.1	35.7	3.4	31.0	40.3	D
EB	U Turn												
	Second Left												
	Left Turn	28	29	103.2%	5.1	21	36	0.2	45.4	4.3	39.7	52.9	D
	Through	1,172	1,141	97.3%	18.1	1,113	1,167	0.9	8.0	0.5	7.1	8.9	A
	Right Turn	31	33	105.3%	8.1	18	43	0.3	5.7	2.0	3.3	10.5	A
	Second Right												
	Subtotal	1,231	1,202	97.7%	22.4	1,172	1,247	0.8	8.8	0.5	7.9	9.7	A
WB	U Turn												
	Second Left												
	Left Turn	348	326	93.7%	9.9	312	345	1.2	45.7	2.1	42.1	49.3	D
	Through	993	959	96.6%	21.7	923	997	1.1	6.6	0.6	5.4	7.5	A
	Right Turn	83	81	97.0%	7.4	70	91	0.3	3.9	0.6	3.2	5.0	A
	Second Right												
	Subtotal	1,424	1,366	95.9%	20.0	1,339	1,392	1.6	15.7	0.5	15.2	17.0	B
Total		2,784	2,692	96.7%	32.9	2,642	2,745	1.8	13.4	0.4	13.0	14.4	B

Queuing and Blocking Report

Existing Alt 3 AM

2/23/2015

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	210	480	445	210	486	426	414	179	131	197	165	180
Average Queue (ft)	43	236	207	50	251	137	141	13	42	62	66	154
95th Queue (ft)	134	403	377	159	425	343	317	92	98	145	135	215
Link Distance (ft)		1106	1106			623	623			199		
Upstream Blk Time (%)						1	0			1		
Queuing Penalty (veh)						3	0			3		
Storage Bay Dist (ft)	150			150	450			140	110		110	120
Storage Blk Time (%)	0	29	20	0	4	0	4	0	2	3	2	32
Queuing Penalty (veh)	1	12	14	0	11	0	4	0	7	8	3	117

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	597	170
Average Queue (ft)	312	34
95th Queue (ft)	621	123
Link Distance (ft)	630	
Upstream Blk Time (%)	7	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		120
Storage Blk Time (%)	29	0
Queuing Penalty (veh)	79	0

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	169	287	95	192	229	225	226
Average Queue (ft)	103	68	29	106	61	159	78
95th Queue (ft)	181	199	71	182	172	238	180
Link Distance (ft)		677	288		836	149	149
Upstream Blk Time (%)						19	2
Queuing Penalty (veh)						71	6
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	10	0		9	0		
Queuing Penalty (veh)	19	1		6	0		

Queuing and Blocking Report

Existing Alt 3 AM

2/23/2015

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	78	211	236	219	253	236	200	78	33	95	77
Average Queue (ft)	27	88	117	111	161	94	69	28	2	37	16
95th Queue (ft)	63	163	191	208	233	194	157	67	20	77	54
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		0						7	0	12	2
Queuing Penalty (veh)		0						2	0	3	1

Intersection: 12: Manuel T Freitas Pkwy

Movement	WB	NB	SB
Directions Served	T	R	R
Maximum Queue (ft)	3	152	28
Average Queue (ft)	0	66	8
95th Queue (ft)	5	122	25
Link Distance (ft)	411	236	232
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Las Gallinas Ave

Movement	NB	SB	SB
Directions Served	T	L	T
Maximum Queue (ft)	52	45	315
Average Queue (ft)	3	2	57
95th Queue (ft)	34	23	214
Link Distance (ft)	149		199
Upstream Blk Time (%)	0		3
Queuing Penalty (veh)	1		20
Storage Bay Dist (ft)		70	
Storage Blk Time (%)			6
Queuing Penalty (veh)			0

Network Summary

Network wide Queuing Penalty: 392

Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	155	148	95.3%	17.1	111	175	0.6	44.0	5.7	36.8	51.7	D
	Through	258	249	96.4%	11.0	236	270	0.6	28.5	2.5	25.5	33.0	C
	Right Turn	324	308	95.1%	17.5	277	331	0.9	9.4	0.7	7.8	10.4	A
	Second Right												
	Subtotal	737	705	95.6%	17.6	684	727	1.2	23.5	2.1	20.5	25.8	C
SB	U Turn												
	Second Left												
	Left Turn	125	117	93.6%	8.2	99	128	0.7	56.5	10.2	44.4	77.2	E
	Through	158	149	94.6%	10.6	133	167	0.7	26.3	2.8	22.0	30.9	C
	Right Turn	24	26	106.8%	6.2	15	35	0.3	6.1	1.8	4.1	9.2	A
	Second Right												
	Subtotal	307	292	95.2%	16.4	263	322	0.9	36.7	5.5	29.5	47.2	D
EB	U Turn												
	Second Left												
	Left Turn	38	32	83.9%	4.7	25	41	1.0	50.8	3.9	44.5	57.8	D
	Through	413	396	95.8%	19.0	368	420	0.9	29.0	1.3	27.1	31.3	C
	Right Turn	56	50	89.5%	9.1	38	69	0.8	8.6	1.1	6.8	10.8	A
	Second Right												
	Subtotal	507	478	94.2%	18.0	459	504	1.3	28.3	1.1	27.1	30.5	C
WB	U Turn												
	Second Left												
	Left Turn	277	269	97.3%	16.5	245	293	0.5	45.0	5.8	38.3	54.4	D
	Through	413	393	95.1%	14.3	374	415	1.0	20.5	1.4	18.4	22.8	C
	Right Turn	177	168	95.2%	8.9	156	182	0.6	3.7	0.1	3.6	4.0	A
	Second Right												
	Subtotal	867	831	95.8%	24.9	797	885	1.2	25.1	1.8	21.7	28.2	C
Total		2,418	2,305	95.3%	23.5	2,262	2,341	2.3	26.7	1.1	24.0	28.0	C

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	143	140	98.1%	15.4	121	167	0.2	34.7	8.0	29.3	54.7	C
	Through	217	208	96.0%	10.3	187	220	0.6	16.4	2.0	13.9	20.5	B
	Right Turn	2	4	182.4%	2.1	1	8	1.0	8.5	6.7	0.4	19.6	A
	Second Right												
	Subtotal	362	352	97.3%	22.4	323	393	0.5	23.7	4.5	20.0	34.9	C
SB	U Turn												
	Second Left												
	Left Turn	113	108	95.2%	10.4	93	124	0.5	26.2	3.1	21.9	30.9	C
	Through	295	278	94.2%	15.9	251	303	1.0	5.3	0.6	4.4	6.6	A
	Right Turn												
	Second Right												
	Subtotal	408	386	94.5%	16.5	360	408	1.1	11.1	1.0	9.3	12.5	B
EB	U Turn												
	Second Left												
	Left Turn	400	375	93.7%	22.0	345	404	1.3	29.9	4.8	20.7	36.1	C
	Through	1	1	96.0%	0.8	0	2	0.0	14.9	13.6	0.0	34.2	B
	Right Turn	205	197	95.9%	15.5	170	221	0.6	11.8	3.1	7.7	16.1	B
	Second Right												
	Subtotal	606	572	94.4%	26.7	535	614	1.4	23.7	4.1	16.5	28.8	C
WB	U Turn												
	Second Left												
	Left Turn	7	6	83.7%	2.1	2	9	0.5	29.0	11.5	10.8	55.7	C
	Through	36	35	96.0%	5.3	28	45	0.2	30.5	4.0	25.5	36.6	C
	Right Turn	8	7	92.4%	2.6	3	12	0.2	11.4	4.6	5.9	20.7	B
	Second Right												
	Subtotal	51	48	93.7%	6.3	42	61	0.5	27.2	4.2	21.2	34.7	C
Total		1,427	1,358	95.2%	45.8	1,294	1,441	1.9	20.2	2.5	16.5	25.8	C

Intersection 3		Northgate Drive/Las Gallinas Ave							Signal				
Direction	Movement	Demand Volume (vph)			Served Volume (vph)				Total Delay (sec/veh)				
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	LOS
NB	U Turn												
	Second Left												
	Left Turn	41	40	97.2%	6.7	25	50	0.2	34.5	5.0	24.9	43.1	C
	Through	21	20	95.5%	4.5	12	26	0.2	34.0	5.1	25.9	44.5	C
	Right Turn	136	134	98.5%	9.1	123	147	0.2	3.4	0.5	2.8	4.6	A
	Second Right												
	Subtotal	198	194	97.9%	14.0	177	216	0.3	12.9	1.6	10.2	15.7	B
SB	U Turn												
	Second Left												
	Left Turn	63	64	100.9%	7.8	49	72	0.1	34.7	2.0	31.5	38.3	C
	Through	21	20	96.9%	3.2	15	25	0.1	31.9	5.4	21.1	37.5	C
	Right Turn	40	42	105.4%	6.7	31	51	0.3	2.0	0.2	1.7	2.3	A
	Second Right												
	Subtotal	124	126	101.7%	11.4	108	140	0.2	23.4	1.8	20.7	27.3	C
EB	U Turn												
	Second Left												
	Left Turn	25	23	91.8%	6.4	12	33	0.4	51.0	4.3	42.6	56.1	D
	Through	968	933	96.4%	35.0	888	991	1.1	21.1	3.0	17.3	28.5	C
	Right Turn	39	35	90.3%	9.8	19	50	0.6	14.9	1.7	11.5	17.0	B
	Second Right												
	Subtotal	1,032	991	96.1%	36.5	945	1,046	1.3	21.6	2.9	17.7	28.8	C
WB	U Turn												
	Second Left												
	Left Turn	447	434	97.1%	11.1	411	444	0.6	45.2	1.4	43.1	47.4	D
	Through	941	901	95.7%	27.8	865	958	1.3	12.0	1.8	9.1	14.7	B
	Right Turn	71	64	89.9%	7.2	57	79	0.9	8.7	1.8	6.0	11.2	A
	Second Right												
	Subtotal	1,459	1,399	95.9%	28.3	1,367	1,455	1.6	22.1	1.3	20.1	24.8	C
Total		2,813	2,710	96.3%	51.5	2,629	2,793	2.0	21.4	1.4	19.6	24.5	C

Queuing and Blocking Report

Existing Alt 3 PM

2/23/2015

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	90	215	194	108	345	168	178	38	170	232	170	170
Average Queue (ft)	27	120	88	19	186	78	88	1	101	141	104	87
95th Queue (ft)	65	189	163	61	313	142	151	20	176	235	195	151
Link Distance (ft)		1106	1106			623	623			193		
Upstream Blk Time (%)										4		
Queuing Penalty (veh)										30		
Storage Bay Dist (ft)	150			150	450			140	110		110	120
Storage Blk Time (%)	0	3	1		0		1		12	15	3	9
Queuing Penalty (veh)	0	1	0		0		2		72	73	12	17

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	241	75
Average Queue (ft)	83	15
95th Queue (ft)	166	51
Link Distance (ft)	630	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		120
Storage Blk Time (%)	2	
Queuing Penalty (veh)	4	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	169	535	89	174	197	128	181
Average Queue (ft)	139	167	30	89	88	55	68
95th Queue (ft)	198	432	67	157	167	106	136
Link Distance (ft)		677	288		836	155	155
Upstream Blk Time (%)		0				0	0
Queuing Penalty (veh)		0				0	1
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	24	0		4	2		
Queuing Penalty (veh)	49	1		9	2		

Queuing and Blocking Report

Existing Alt 3 PM

2/23/2015

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	153	376	411	284	313	269	318	140	106	102	75
Average Queue (ft)	27	175	205	156	199	121	144	49	28	43	16
95th Queue (ft)	87	320	348	254	284	240	280	109	93	86	52
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		0	1								
Queuing Penalty (veh)		1	3								
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		7			0	0		13	0	15	2
Queuing Penalty (veh)		2			0	0		18	0	9	1

Intersection: 12: Manuel T Freitas Pkwy

Movement	EB	EB	NB	SB
Directions Served	T	T	R	R
Maximum Queue (ft)	4	9	187	32
Average Queue (ft)	0	0	82	10
95th Queue (ft)	6	7	156	29
Link Distance (ft)	623	623	236	232
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 15: Las Gallinas Ave

Movement	WB	NB	SB	SB
Directions Served	R	T	L	T
Maximum Queue (ft)	138	168	83	12
Average Queue (ft)	56	30	35	0
95th Queue (ft)	112	117	72	10
Link Distance (ft)	171	155		193
Upstream Blk Time (%)	1	1		
Queuing Penalty (veh)	0	5		
Storage Bay Dist (ft)			70	
Storage Blk Time (%)			1	
Queuing Penalty (veh)			3	

Network Summary

Network wide Queuing Penalty: 318

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Las Gallinas / Freitas Parkway
Existing Alt 4
AM Peak Hour

Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	43	41	95.6%	66.8	10.6	E
	Through	120	117	97.5%	51.4	5.6	D
	Right Turn	213	202	95.0%	12.6	2.0	B
	Subtotal	376	360	95.9%	31.3	2.1	C
SB	Left Turn	237	226	95.4%	121.4	27.7	F
	Through	327	299	91.5%	86.7	23.1	F
	Right Turn	34	30	87.0%	57.9	18.5	E
	Subtotal	598	555	92.8%	99.3	24.9	F
EB	Left Turn	40	39	98.6%	79.9	17.5	E
	Through	654	628	96.0%	64.6	19.6	E
	Right Turn	71	63	89.2%	31.9	14.6	C
	Subtotal	765	731	95.5%	62.7	18.9	E
WB	Left Turn	343	329	95.8%	68.4	6.5	E
	Through	571	550	96.3%	22.3	1.8	C
	Right Turn	93	92	98.9%	4.0	0.6	A
	Subtotal	1,007	970	96.3%	36.3	3.1	D
Total		2,746	2,616	95.3%	56.3	8.4	E

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	119	119	99.8%	58.6	4.1	E
	Through	55	56	101.6%	32.2	5.3	C
	Right Turn	4	4	88.8%	10.5	9.8	B
	Subtotal	178	178	100.1%	49.4	3.8	D
SB	Left Turn	2	1	62.4%	36.2	34.1	D
	Through	222	215	97.0%	60.1	2.3	E
	Right Turn	512	474	92.5%	4.6	0.4	A
	Subtotal	736	690	93.8%	22.0	1.0	C
EB	Left Turn	316	300	95.1%	15.8	1.3	B
	Through	2	2	91.2%	17.1	13.3	B
	Right Turn	183	171	93.4%	6.0	0.9	A
	Subtotal	501	473	94.4%	12.3	1.0	B
WB	Left Turn	7	6	86.4%	56.1	19.1	E
	Through	21	22	107.0%	64.4	5.1	E
	Right Turn	5	4	86.4%	18.5	15.3	B
	Subtotal	33	33	99.5%	57.3	4.6	E
Total		1,448	1,374	94.9%	23.0	0.8	C

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Las Gallinas / Freitas Parkway
Existing Alt 4
AM Peak Hour

Intersection 3

Northgate Drive/Manuel T Freitas Pkwy

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	25	25	101.0%	40.7	4.4	D
	Through	5	5	97.9%	36.4	13.8	D
	Right Turn	25	24	96.8%	2.1	0.2	A
	Subtotal	55	54	98.8%	23.2	3.2	C
SB	Left Turn	46	45	97.9%	42.8	6.8	D
	Through	17	15	90.4%	39.3	7.0	D
	Right Turn	11	12	104.7%	2.0	0.5	A
	Subtotal	74	72	97.2%	35.3	4.1	D
EB	Left Turn	28	27	98.1%	51.3	7.6	D
	Through	1,172	1,131	96.5%	12.6	1.5	B
	Right Turn	31	30	97.5%	10.0	2.2	A
	Subtotal	1,231	1,189	96.6%	13.4	1.5	B
WB	Left Turn	348	334	95.9%	46.7	1.3	D
	Through	993	954	96.1%	6.6	0.6	A
	Right Turn	83	82	99.4%	3.9	0.6	A
	Subtotal	1,424	1,371	96.3%	16.2	1.1	B
Total		2,784	2,686	96.5%	15.6	1.1	B

Queuing and Blocking Report

Existing Alt 4 AM

5/5/2015

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	209	731	702	210	491	393	361	160	133	213	169	180
Average Queue (ft)	54	303	275	59	291	128	129	14	40	85	70	169
95th Queue (ft)	152	609	584	183	464	291	260	98	94	172	144	212
Link Distance (ft)		1106	1106			623	623			199		
Upstream Blk Time (%)		1	0			0	0			2		
Queuing Penalty (veh)		0	0			0	0			6		
Storage Bay Dist (ft)	150			150	450			140	110		110	120
Storage Blk Time (%)	0	37	28		2		6		1	10	3	55
Queuing Penalty (veh)	0	15	20		7		6		3	26	4	199

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	676	180
Average Queue (ft)	505	28
95th Queue (ft)	798	110
Link Distance (ft)	630	
Upstream Blk Time (%)	30	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		120
Storage Blk Time (%)	31	0
Queuing Penalty (veh)	84	0

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	168	303	88	194	202	234	217
Average Queue (ft)	102	60	30	108	56	169	58
95th Queue (ft)	177	186	70	178	143	245	162
Link Distance (ft)		677	288		836	149	149
Upstream Blk Time (%)						27	1
Queuing Penalty (veh)						100	4
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	9	0		6	0		
Queuing Penalty (veh)	16	1		4	0		

Queuing and Blocking Report

Existing Alt 4 AM

5/5/2015

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	177	397	422	226	268	236	221	76	30	88	86
Average Queue (ft)	32	162	190	120	168	89	74	27	2	36	15
95th Queue (ft)	102	338	359	219	242	187	169	65	23	74	51
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		0	0								
Queuing Penalty (veh)		1	2								
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		5			0			6	0	14	2
Queuing Penalty (veh)		1			0			2	0	4	1

Zone Summary

Zone wide Queuing Penalty: 509

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Las Gallinas / Freitas Parkway
Existing Alt 4
PM Peak Hour

Intersection 1 Las Gallinas Ave/Manuel T Freitas Pkwy Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	155	146	94.1%	62.0	4.5	E
	Through	258	241	93.5%	29.7	1.8	C
	Right Turn	324	308	95.0%	10.2	1.0	B
	Subtotal	737	695	94.3%	27.9	1.1	C
SB	Left Turn	125	117	93.8%	55.9	4.5	E
	Through	158	150	94.7%	29.3	2.7	C
	Right Turn	24	23	96.4%	6.6	0.9	A
	Subtotal	307	290	94.5%	38.2	2.6	D
EB	Left Turn	38	33	87.7%	51.3	5.5	D
	Through	413	391	94.7%	35.5	1.5	D
	Right Turn	56	55	98.7%	9.3	1.5	A
	Subtotal	507	480	94.6%	33.6	1.6	C
WB	Left Turn	277	266	95.9%	64.3	6.5	E
	Through	413	401	97.0%	24.2	1.6	C
	Right Turn	177	166	93.8%	3.8	0.2	A
	Subtotal	867	832	96.0%	32.9	2.2	C
Total		2,418	2,297	95.0%	32.2	0.9	C

Intersection 2 Las Gallinas Ave/Nova Albion Way-I-80 EB On-ramp Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	143	137	95.6%	34.5	2.9	C
	Through	217	208	96.0%	17.9	1.6	B
	Right Turn	2	2	91.2%	7.2	5.4	A
	Subtotal	362	347	95.8%	24.4	1.4	C
SB	Left Turn						
	Through	113	108	95.5%	25.5	1.7	C
	Right Turn	295	288	97.5%	5.5	0.5	A
	Subtotal	408	395	96.9%	10.9	1.0	B
EB	Left Turn	400	382	95.5%	33.0	5.1	C
	Through	1	1	96.0%	18.0	30.4	B
	Right Turn	205	194	94.8%	12.9	3.7	B
	Subtotal	606	577	95.2%	26.2	4.5	C
WB	Left Turn	7	6	79.5%	29.0	4.4	C
	Through	36	34	94.4%	30.3	3.7	C
	Right Turn	8	8	102.0%	11.7	6.0	B
	Subtotal	51	48	93.6%	27.0	3.3	C
Total		1,427	1,367	95.8%	21.4	2.1	C

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Las Gallinas / Freitas Parkway
Existing Alt 4
PM Peak Hour

Intersection 3

Northgate Drive/Manuel T Freitas Pkwy

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	41	40	97.2%	37.2	5.4	D
	Through	21	19	91.0%	39.4	8.8	D
	Right Turn	136	131	96.5%	3.4	0.9	A
	Subtotal	198	190	96.0%	14.0	2.5	B
SB	Left Turn	63	64	101.8%	34.4	3.6	C
	Through	21	20	95.1%	29.4	5.9	C
	Right Turn	40	39	97.7%	2.2	0.3	A
	Subtotal	124	123	99.3%	23.4	2.6	C
EB	Left Turn	25	22	87.9%	50.0	4.2	D
	Through	968	923	95.4%	23.9	3.9	C
	Right Turn	39	40	101.4%	17.3	5.0	B
	Subtotal	1,032	985	95.4%	24.2	3.8	C
WB	Left Turn	447	441	98.6%	46.3	2.3	D
	Through	941	901	95.7%	11.5	1.3	B
	Right Turn	71	66	92.8%	7.5	1.5	A
	Subtotal	1,459	1,408	96.5%	22.2	1.4	C
Total		2,813	2,705	96.2%	22.4	1.7	C

Queuing and Blocking Report

Existing Alt 4 PM

5/5/2015

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	144	230	199	77	416	202	210	137	170	246	170	173
Average Queue (ft)	30	133	104	20	215	79	87	7	125	159	120	95
95th Queue (ft)	83	198	179	53	360	156	162	66	187	256	204	158
Link Distance (ft)		1106	1106			623	623			193		
Upstream Blk Time (%)										8		
Queuing Penalty (veh)										60		
Storage Bay Dist (ft)	150			150	450			140	110		110	120
Storage Blk Time (%)		5	2		0		2		23	17	3	8
Queuing Penalty (veh)		2	1		0		4		132	81	12	15

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	211	99
Average Queue (ft)	95	16
95th Queue (ft)	178	63
Link Distance (ft)	630	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		120
Storage Blk Time (%)	5	
Queuing Penalty (veh)	8	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	170	517	89	191	224	143	183
Average Queue (ft)	144	178	29	89	88	58	74
95th Queue (ft)	196	444	67	156	168	119	148
Link Distance (ft)		677	288		836	155	155
Upstream Blk Time (%)						0	1
Queuing Penalty (veh)						1	1
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	28	0		3	2		
Queuing Penalty (veh)	58	2		6	3		

Queuing and Blocking Report

Existing Alt 4 PM

5/5/2015

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	167	380	400	304	325	238	314	144	108	95	112
Average Queue (ft)	28	199	224	161	203	111	142	47	25	46	21
95th Queue (ft)	103	343	365	262	288	219	267	107	91	87	75
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		0	0								
Queuing Penalty (veh)		0	2								
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)	0	11		0	0			14	0	15	2
Queuing Penalty (veh)	0	3		0	1			19	0	9	1

Zone Summary

Zone wide Queuing Penalty: 421

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Freitas Parkway Las Gallinas Intersection Improvements
2020 No Project
AM Peak Hour

Intersection 1 Las Gallinas Avenue/Manuel T Freitas Parkway Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	52	45	87.3%	51.2	10.7	D
	Through	152	150	98.4%	24.5	2.5	C
	Right Turn	184	178	96.9%	10.8	0.7	B
	Subtotal	388	373	96.2%	21.2	2.2	C
SB	Left Turn	400	286	71.4%	139.3	9.1	F
	Through	434	312	71.9%	118.0	4.8	F
	Right Turn	35	21	59.2%	85.0	8.2	F
	Subtotal	869	619	71.2%	126.8	6.8	F
EB	Left Turn	36	32	88.0%	133.0	38.2	F
	Through	755	691	91.5%	123.4	39.2	F
	Right Turn	81	80	98.3%	86.0	39.8	F
	Subtotal	872	802	91.9%	120.0	39.1	F
WB	Left Turn	355	331	93.4%	161.7	53.5	F
	Through	487	482	99.0%	18.5	1.4	B
	Right Turn	178	173	97.3%	4.9	0.4	A
	Subtotal	1,020	987	96.8%	64.2	18.1	E
Total		3,149	2,780	88.3%	88.4	7.2	F

Intersection 2 Las Gallinas Parkway/Nova Albion Way-I-80 EB On-ramp Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	160	153	95.8%	76.9	17.5	E
	Through	105	102	97.6%	28.8	5.9	C
	Right Turn	3	3	108.8%	18.7	12.6	B
	Subtotal	268	259	96.6%	57.4	13.6	E
SB	Left Turn	6	5	88.0%	50.0	12.7	D
	Through	387	320	82.8%	49.1	1.4	D
	Right Turn	472	400	84.7%	5.1	0.4	A
	Subtotal	865	726	83.9%	24.9	0.7	C
EB	Left Turn	279	268	96.1%	23.0	2.1	C
	Through	3	3	105.6%	16.0	12.6	B
	Right Turn	254	244	95.9%	9.7	1.0	A
	Subtotal	536	515	96.1%	16.7	1.4	B
WB	Left Turn	14	13	94.6%	55.6	15.6	E
	Through	38	36	95.5%	63.1	4.9	E
	Right Turn	4	4	91.2%	18.9	17.5	B
	Subtotal	56	53	95.0%	58.4	4.7	E
Total		1,725	1,553	90.0%	28.7	2.5	C

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Freitas Parkway Las Gallinas Intersection Improvements
2020 No Project
AM Peak Hour

Intersection 3

Northgate Drive/Manuel T Freitas Parkway

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	48	48	99.0%	41.2	4.4	D
	Through	27	26	96.0%	40.3	5.5	D
	Right Turn	73	75	102.3%	3.7	0.9	A
	Subtotal	148	148	100.1%	22.0	2.3	C
SB	Left Turn	76	74	97.8%	38.3	3.0	D
	Through	29	27	92.4%	37.4	4.1	D
	Right Turn	22	21	95.1%	2.7	1.3	A
	Subtotal	127	122	96.1%	32.0	2.8	C
EB	Left Turn	63	52	82.6%	49.3	5.0	D
	Through	1,285	1,127	87.7%	13.6	1.1	B
	Right Turn	118	106	90.1%	10.7	1.2	B
	Subtotal	1,466	1,286	87.7%	14.8	1.2	B
WB	Left Turn	475	453	95.4%	68.8	14.1	E
	Through	972	953	98.0%	13.9	2.7	B
	Right Turn	175	171	97.6%	9.1	2.0	A
	Subtotal	1,622	1,577	97.2%	29.3	5.2	C
Total		3,363	3,133	93.1%	23.1	2.8	C

Queuing and Blocking Report

2020 No Project AM

2/3/2015

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	200	916	892	130	210	694	610	117	160	205	166	180
Average Queue (ft)	60	510	488	62	205	511	287	6	48	87	72	177
95th Queue (ft)	175	960	928	163	234	856	653	63	112	174	140	194
Link Distance (ft)		1120	1120			623	623			212		
Upstream Blk Time (%)		1	1			34	0			1		
Queuing Penalty (veh)		0	0			171	2			3		
Storage Bay Dist (ft)	140			70	150			140	110		110	120
Storage Blk Time (%)		61	66	1	69	0	2		2	5	2	62
Queuing Penalty (veh)		22	54	2	168	1	4		6	13	4	293

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	682	148
Average Queue (ft)	652	15
95th Queue (ft)	682	94
Link Distance (ft)	631	
Upstream Blk Time (%)	73	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		120
Storage Blk Time (%)	44	
Queuing Penalty (veh)	193	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	169	344	124	199	361	228	215
Average Queue (ft)	114	109	50	140	112	199	58
95th Queue (ft)	188	263	102	213	296	252	154
Link Distance (ft)		677	288		836	149	149
Upstream Blk Time (%)						38	1
Queuing Penalty (veh)						167	4
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	13	1		23	1		
Queuing Penalty (veh)	33	4		25	1		

Queuing and Blocking Report

2020 No Project AM

2/3/2015

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	153	326	338	311	367	450	355	166	106	103	136
Average Queue (ft)	47	132	163	204	241	166	151	63	19	51	30
95th Queue (ft)	106	245	271	325	354	353	291	127	81	93	93
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		0	0								0
Queuing Penalty (veh)		0	1								0
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)	0	2		1	3	0		22	0	21	5
Queuing Penalty (veh)	0	1		3	16	2		16	0	11	4

Zone Summary

Zone wide Queuing Penalty: 1223

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Freitas Parkway Las Gallinas Intersection Improvements
2020 No Project
PM Peak Hour

Intersection 1 Las Gallinas Avenue/Manuel T Freitas Parkway Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	173	163	94.2%	38.4	3.4	D
	Through	327	308	94.2%	25.7	1.4	C
	Right Turn	353	335	94.9%	10.6	1.2	B
	Subtotal	853	806	94.5%	22.0	1.8	C
SB	Left Turn	167	153	91.5%	97.8	29.3	F
	Through	181	176	97.0%	43.9	19.4	D
	Right Turn	26	29	112.2%	22.9	19.5	C
	Subtotal	374	358	95.6%	65.4	24.2	E
EB	Left Turn	62	56	90.6%	47.8	3.9	D
	Through	467	445	95.3%	30.0	1.4	C
	Right Turn	92	90	97.7%	4.6	1.2	A
	Subtotal	621	591	95.1%	27.8	1.2	C
WB	Left Turn	302	288	95.2%	51.1	10.1	D
	Through	571	549	96.1%	21.3	0.9	C
	Right Turn	300	286	95.3%	5.8	0.7	A
	Subtotal	1,173	1,122	95.7%	25.1	3.2	C
Total		3,021	2,877	95.2%	29.7	3.6	C

Intersection 2 Las Gallinas Parkway/Nova Albion Way-I-80 EB On-ramp Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	167	156	93.2%	45.5	6.0	D
	Through	304	290	95.3%	20.0	2.4	B
	Right Turn	6	5	89.6%	12.7	7.4	B
	Subtotal	477	451	94.5%	28.7	3.7	C
SB	Left Turn	6	6	104.0%	32.2	9.9	C
	Through	223	217	97.3%	28.3	2.6	C
	Right Turn	263	244	92.9%	5.2	0.7	A
	Subtotal	492	467	95.0%	16.2	1.3	B
EB	Left Turn	422	395	93.7%	54.0	20.1	D
	Through	6	6	97.6%	49.7	27.2	D
	Right Turn	171	161	94.2%	27.6	17.6	C
	Subtotal	599	562	93.9%	46.4	19.4	D
WB	Left Turn	16	17	108.0%	33.1	6.2	C
	Through	56	55	98.4%	34.5	3.2	C
	Right Turn	15	15	99.8%	17.6	3.8	B
	Subtotal	87	87	100.4%	31.3	2.7	C
Total		1,655	1,568	94.7%	31.5	8.1	C

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Freitas Parkway Las Gallinas Intersection Improvements
2020 No Project
PM Peak Hour

Intersection 3 Northgate Drive/Manuel T Freitas Parkway Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	173	167	96.5%	34.7	2.6	C
	Through	66	64	96.6%	36.0	2.3	D
	Right Turn	208	200	96.3%	11.2	1.6	B
	Subtotal	447	431	96.4%	23.9	1.8	C
SB	Left Turn	114	110	96.6%	29.1	2.5	C
	Through	40	38	95.0%	25.9	3.5	C
	Right Turn	52	54	103.6%	2.7	0.6	A
	Subtotal	206	202	98.1%	21.4	2.6	C
EB	Left Turn	43	38	87.7%	58.5	5.7	E
	Through	1,023	972	95.1%	53.2	8.1	D
	Right Turn	91	85	93.6%	46.6	9.2	D
	Subtotal	1,157	1,095	94.7%	52.9	7.8	D
WB	Left Turn	500	456	91.2%	46.9	2.8	D
	Through	1,103	1,048	95.0%	27.8	2.9	C
	Right Turn	141	134	95.3%	27.0	5.0	C
	Subtotal	1,744	1,639	94.0%	33.1	2.3	C
Total		3,554	3,367	94.7%	37.7	3.3	D

Queuing and Blocking Report

2020 No Project PM

2/3/2015

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	145	236	220	130	210	437	390	198	169	240	170	179
Average Queue (ft)	54	139	117	36	174	198	167	34	114	171	129	134
95th Queue (ft)	111	208	200	127	244	397	328	155	188	260	204	209
Link Distance (ft)		1120	1120			623	623			206		
Upstream Blk Time (%)										6		
Queuing Penalty (veh)										55		
Storage Bay Dist (ft)	140			70	150			140	110		110	120
Storage Blk Time (%)	0	9	22	0	24	2	4	1	13	20	4	40
Queuing Penalty (veh)	0	6	21	0	68	5	13	3	86	106	21	82

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	543	144
Average Queue (ft)	206	9
95th Queue (ft)	495	69
Link Distance (ft)	631	
Upstream Blk Time (%)	5	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		120
Storage Blk Time (%)	7	
Queuing Penalty (veh)	14	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	170	636	125	198	335	217	149
Average Queue (ft)	158	302	52	113	137	116	60
95th Queue (ft)	197	641	103	189	263	196	119
Link Distance (ft)		677	288		836	155	155
Upstream Blk Time (%)		6				4	0
Queuing Penalty (veh)		0				11	0
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	44	1		7	6		
Queuing Penalty (veh)	78	3		22	10		

Queuing and Blocking Report

2020 No Project PM

2/3/2015

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	250	501	505	310	375	596	554	404	110	108	186
Average Queue (ft)	80	355	382	163	214	241	314	183	87	63	44
95th Queue (ft)	232	534	551	262	318	446	498	336	150	107	130
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		8	14			0		0			0
Queuing Penalty (veh)		47	80			0		0			0
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		43		0	0	1		46	0	23	4
Queuing Penalty (veh)		18		0	1	6		96	1	21	5

Zone Summary

Zone wide Queuing Penalty: 881

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Freitas Parkway Las Gallinas Intersection Improvements
2020 Plus Alt 3 w LPI
AM Peak Hour

Intersection 1 Las Gallinas Avenue/Manuel T Freitas Parkway Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	52	46	89.0%	57.9	17.5	E
	Through	152	157	103.3%	25.8	2.2	C
	Right Turn	184	173	93.9%	10.7	1.1	B
	Subtotal	388	376	96.9%	23.1	3.2	C
SB	Left Turn	400	239	59.8%	178.6	8.2	F
	Through	434	261	60.1%	142.8	7.0	F
	Right Turn	35	21	59.0%	107.7	14.0	F
	Subtotal	869	521	59.9%	157.9	7.9	F
EB	Left Turn	36	34	94.7%	100.3	24.7	F
	Through	755	727	96.3%	88.4	20.1	F
	Right Turn	81	82	101.1%	52.3	16.4	D
	Subtotal	872	843	96.7%	85.3	19.5	F
WB	Left Turn	355	335	94.3%	102.3	39.9	F
	Through	487	465	95.5%	17.7	1.1	B
	Right Turn	178	170	95.3%	5.2	0.4	A
	Subtotal	1,020	969	95.0%	44.6	13.6	D
Total		3,149	2,709	86.0%	76.1	3.9	E

Intersection 2 Las Gallinas Parkway/Nova Albion Way-I-80 EB On-ramp Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	160	148	92.8%	71.7	12.1	E
	Through	105	104	99.2%	29.2	4.1	C
	Right Turn	3	3	115.2%	12.7	9.5	B
	Subtotal	268	256	95.5%	53.7	8.6	D
SB	Left Turn	6	6	94.4%	43.5	14.3	D
	Through	387	306	79.0%	48.4	2.4	D
	Right Turn	472	370	78.3%	4.9	0.7	A
	Subtotal	865	681	78.7%	24.7	1.0	C
EB	Left Turn	279	269	96.5%	22.0	1.3	C
	Through	3	3	105.6%	18.5	14.4	B
	Right Turn	254	246	96.8%	9.1	0.6	A
	Subtotal	536	518	96.7%	15.9	0.8	B
WB	Left Turn	14	15	107.0%	64.1	9.1	E
	Through	38	33	87.2%	65.1	7.4	E
	Right Turn	4	4	100.8%	20.8	19.5	C
	Subtotal	56	52	93.1%	61.1	6.2	E
Total		1,725	1,507	87.4%	27.8	1.3	C

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Freitas Parkway Las Gallinas Intersection Improvements
2020 Plus Alt 3 w LPI
AM Peak Hour

Intersection 3

Northgate Drive/Manuel T Freitas Parkway

Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	48	46	96.8%	39.8	3.7	D
	Through	27	30	111.3%	42.1	6.2	D
	Right Turn	73	72	98.6%	4.0	1.0	A
	Subtotal	148	149	100.3%	23.0	2.5	C
SB	Left Turn	76	73	95.6%	40.2	4.6	D
	Through	29	28	95.3%	33.9	4.8	C
	Right Turn	22	23	103.0%	2.3	0.5	A
	Subtotal	127	123	96.8%	31.7	2.6	C
EB	Left Turn	63	55	86.7%	50.7	4.1	D
	Through	1,285	1,115	86.8%	13.5	1.1	B
	Right Turn	118	103	87.0%	10.2	1.5	B
	Subtotal	1,466	1,272	86.8%	14.8	1.1	B
WB	Left Turn	475	451	95.1%	68.4	12.2	E
	Through	972	931	95.8%	13.0	2.0	B
	Right Turn	175	171	97.9%	8.8	0.9	A
	Subtotal	1,622	1,554	95.8%	28.8	3.9	C
Total		3,363	3,098	92.1%	22.9	2.0	C

Queuing and Blocking Report

2020 Alt 3 AM

2/3/2015

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	210	718	693	210	509	554	478	132	130	204	162	180
Average Queue (ft)	71	396	373	102	336	220	156	32	44	83	61	179
95th Queue (ft)	205	701	684	249	564	634	425	88	104	166	130	188
Link Distance (ft)		1106	1106			623	623			199		
Upstream Blk Time (%)						11	0			0		
Queuing Penalty (veh)						57	1			2		
Storage Bay Dist (ft)	150			150	450			150	110		110	120
Storage Blk Time (%)	0	54	48	0	20	0	1	0	2	5	2	75
Queuing Penalty (veh)	0	20	39	1	47	0	2	0	8	12	4	354

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	678	167
Average Queue (ft)	649	30
95th Queue (ft)	667	122
Link Distance (ft)	627	
Upstream Blk Time (%)	80	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		120
Storage Blk Time (%)	40	
Queuing Penalty (veh)	172	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	169	310	141	196	332	232	202
Average Queue (ft)	110	99	47	133	100	196	55
95th Queue (ft)	181	235	101	205	260	249	145
Link Distance (ft)		677	288		836	149	149
Upstream Blk Time (%)						36	1
Queuing Penalty (veh)						154	2
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	12	2		18	1		
Queuing Penalty (veh)	31	4		20	1		

Queuing and Blocking Report

2020 Alt 3 AM

2/3/2015

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	161	314	336	331	366	488	510	169	108	105	140
Average Queue (ft)	49	131	161	198	238	155	148	64	21	52	31
95th Queue (ft)	111	239	264	314	350	350	333	128	87	96	94
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		0	0				0				0
Queuing Penalty (veh)		0	1				0				0
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		1		0	3	0		23	0	22	5
Queuing Penalty (veh)		1		2	15	1		17	0	11	4

Zone Summary

Zone wide Queuing Penalty: 983

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Freitas Parkway Las Gallinas Intersection Improvements
2020 Plus Alt 3 w LPI
PM Peak Hour

Intersection 1 Las Gallinas Avenue/Manuel T Freitas Parkway Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	173	169	97.6%	53.6	10.8	D
	Through	327	303	92.5%	32.9	2.8	C
	Right Turn	353	331	93.9%	13.1	0.5	B
	Subtotal	853	803	94.1%	29.1	3.6	C
SB	Left Turn	167	137	82.2%	265.9	91.5	F
	Through	181	151	83.4%	156.6	69.7	F
	Right Turn	26	22	84.6%	115.5	73.7	F
	Subtotal	374	310	83.0%	203.2	82.9	F
EB	Left Turn	62	59	95.7%	47.5	4.2	D
	Through	467	440	94.2%	29.8	1.7	C
	Right Turn	92	90	97.8%	10.4	1.4	B
	Subtotal	621	589	94.9%	28.6	1.5	C
WB	Left Turn	302	287	95.0%	55.7	14.7	E
	Through	571	561	98.3%	21.5	1.1	C
	Right Turn	300	297	99.1%	11.3	1.3	B
	Subtotal	1,173	1,146	97.7%	27.4	4.0	C
Total		3,021	2,848	94.3%	46.3	6.7	D

Intersection 2 Las Gallinas Parkway/Nova Albion Way-I-80 EB On-ramp Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	167	158	94.9%	46.0	5.0	D
	Through	304	284	93.4%	23.7	2.7	C
	Right Turn	6	6	97.6%	15.6	8.8	B
	Subtotal	477	448	94.0%	31.5	3.6	C
SB	Left Turn	6	5	84.8%	23.8	9.0	C
	Through	223	205	92.1%	27.6	2.2	C
	Right Turn	263	237	90.0%	5.6	0.6	A
	Subtotal	492	447	90.9%	15.9	1.1	B
EB	Left Turn	422	401	95.1%	89.1	34.1	F
	Through	6	6	97.6%	78.9	39.6	E
	Right Turn	171	155	90.9%	53.0	24.8	D
	Subtotal	599	563	93.9%	79.0	31.3	E
WB	Left Turn	16	16	100.2%	32.2	4.2	C
	Through	56	54	96.0%	34.3	3.2	C
	Right Turn	15	15	103.0%	17.1	4.0	B
	Subtotal	87	85	98.0%	30.9	2.6	C
Total		1,655	1,543	93.3%	44.0	11.0	D

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Freitas Parkway Las Gallinas Intersection Improvements
2020 Plus Alt 3 w LPI
PM Peak Hour

Intersection 3 Northgate Drive/Manuel T Freitas Parkway Signal

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	173	169	97.4%	34.1	3.3	C
	Through	66	62	94.1%	35.5	2.9	D
	Right Turn	208	205	98.4%	10.9	3.3	B
	Subtotal	447	435	97.4%	23.4	3.0	C
SB	Left Turn	114	103	90.4%	29.1	3.3	C
	Through	40	37	93.1%	23.8	3.0	C
	Right Turn	52	54	103.0%	2.5	0.4	A
	Subtotal	206	194	94.1%	20.7	2.5	C
EB	Left Turn	43	40	92.2%	54.2	5.5	D
	Through	1,023	948	92.6%	48.9	8.7	D
	Right Turn	91	86	94.6%	42.0	9.7	D
	Subtotal	1,157	1,073	92.8%	48.5	8.6	D
WB	Left Turn	500	468	93.5%	48.7	2.9	D
	Through	1,103	1,076	97.5%	30.3	3.3	C
	Right Turn	141	142	100.4%	29.8	3.9	C
	Subtotal	1,744	1,685	96.6%	35.4	2.9	D
Total		3,554	3,387	95.3%	37.2	3.4	D

Queuing and Blocking Report

2020 Alt 3 PM

2/3/2015

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	141	236	211	121	420	307	303	209	170	257	170	180
Average Queue (ft)	49	126	102	31	218	132	141	86	127	184	137	168
95th Queue (ft)	104	199	180	78	381	275	265	187	201	260	212	215
Link Distance (ft)		1106	1106			623	623			193		
Upstream Blk Time (%)						0	0			15		
Queuing Penalty (veh)						1	0			125		
Storage Bay Dist (ft)	150			150	450			150	110		110	120
Storage Blk Time (%)	0	4	1	0	2		3	1	23	27	6	82
Queuing Penalty (veh)	0	2	1	0	5		10	3	155	140	32	170

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	658	173
Average Queue (ft)	482	25
95th Queue (ft)	844	95
Link Distance (ft)	627	
Upstream Blk Time (%)	51	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		120
Storage Blk Time (%)	16	0
Queuing Penalty (veh)	30	0

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	170	713	124	199	399	206	174
Average Queue (ft)	163	448	50	116	149	109	65
95th Queue (ft)	190	840	96	195	299	186	133
Link Distance (ft)		677	288		836	155	155
Upstream Blk Time (%)		24				3	0
Queuing Penalty (veh)		0				8	1
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	58	1		8	8		
Queuing Penalty (veh)	103	3		25	14		

Queuing and Blocking Report

2020 Alt 3 PM

2/3/2015

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	249	485	490	293	378	614	649	367	110	108	178
Average Queue (ft)	61	322	350	169	220	264	343	178	85	58	40
95th Queue (ft)	184	518	536	263	327	495	575	331	151	105	118
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		7	12					0			0
Queuing Penalty (veh)		43	70					0			0
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		35		0	0	2		45	0	22	4
Queuing Penalty (veh)		15		0	2	12		94	1	20	4

Zone Summary

Zone wide Queuing Penalty: 1090

Intersection 1										Las Gallinas Avenue/Manuel T Freitas Parkway					Signal
Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				LOS		
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum			
NB	U Turn														
	Second Left														
	Left Turn	52	50	96.9%	7.3	39	60	0.2	76.1	18.2	50.6	101.2	E		
	Through	152	151	99.6%	10.9	132	171	0.0	54.5	4.3	48.2	59.5	D		
	Right Turn	184	181	98.2%	12.8	154	192	0.2	15.9	1.4	13.9	18.7	B		
	Second Right														
	Subtotal	388	383	98.6%	10.1	363	396	0.3	39.2	3.9	33.2	43.9	D		
SB	U Turn														
	Second Left														
	Left Turn	400	230	57.6%	13.8	206	250	9.6	190.8	12.9	169.0	210.3	F		
	Through	434	236	54.3%	18.4	208	263	10.8	145.0	12.5	127.6	164.9	F		
	Right Turn	35	18	51.8%	4.8	10	26	3.3	108.2	8.0	96.7	125.5	F		
	Second Right														
	Subtotal	869	484	55.7%	31.6	434	535	14.8	165.4	11.6	146.0	183.3	F		
EB	U Turn														
	Second Left														
	Left Turn	36	30	83.7%	6.7	18	38	1.0	205.6	32.8	152.7	247.5	F		
	Through	755	725	96.1%	44.9	636	774	1.1	192.7	29.9	124.1	228.0	F		
	Right Turn	81	78	96.0%	9.4	59	92	0.4	160.5	35.8	87.9	213.8	F		
	Second Right														
	Subtotal	872	833	95.5%	56.8	712	900	1.3	190.1	30.1	121.6	227.2	F		
WB	U Turn														
	Second Left														
	Left Turn	355	344	96.9%	11.7	332	367	0.6	87.6	17.3	68.9	129.1	F		
	Through	487	465	95.5%	21.2	429	489	1.0	21.0	1.9	18.8	25.4	C		
	Right Turn	178	169	94.9%	13.9	150	191	0.7	3.9	0.2	3.7	4.2	A		
	Second Right														
	Subtotal	1,020	978	95.9%	17.3	953	999	1.3	41.4	5.8	34.8	55.1	D		
	Total	3,149	2,678	85.0%	56.7	2,604	2,782	8.7	109.5	10.0	87.8	119.8	F		

Intersection 2									Las Gallinas Parkway/Nova Albion Way-I-80 EB On-ramp					Signal
Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				LOS	
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum		
NB	U Turn													
	Second Left													
	Left Turn	160	154	96.1%	10.4	135	164	0.5	71.1	7.1	63.1	83.3	E	
	Through	105	108	102.8%	11.2	89	131	0.3	29.2	3.0	24.3	34.8	C	
	Right Turn	3	3	102.4%	1.7	1	6	0.0	15.1	10.0	1.2	37.8	B	
	Second Right													
	Subtotal	268	265	98.8%	16.8	237	296	0.2	53.4	5.2	46.9	63.0	D	
SB	U Turn													
	Second Left													
	Left Turn	6	5	81.6%	1.3	3	7	0.5	54.0	13.7	35.1	79.6	D	
	Through	387	291	75.3%	12.8	272	314	5.2	55.6	2.7	52.4	61.2	E	
	Right Turn	472	360	76.3%	22.3	330	389	5.5	4.4	0.5	3.8	5.4	A	
	Second Right													
	Subtotal	865	657	75.9%	23.3	620	691	7.6	27.5	1.2	26.1	30.0	C	
EB	U Turn													
	Second Left													
	Left Turn	279	268	96.1%	17.5	245	306	0.7	22.0	2.1	19.1	25.2	C	
	Through	3	3	86.4%	1.9	0	6	0.2	26.8	19.3	0.0	51.0	C	
	Right Turn	254	245	96.3%	17.1	212	264	0.6	9.3	1.4	7.6	12.4	A	
	Second Right													
	Subtotal	536	515	96.2%	25.7	483	561	0.9	16.0	1.6	13.9	19.2	B	
WB	U Turn													
	Second Left													
	Left Turn	14	15	107.0%	4.3	9	21	0.3	64.1	6.1	56.0	75.9	E	
	Through	38	32	83.4%	5.5	22	39	1.1	61.5	4.5	56.0	69.8	E	
	Right Turn	4	4	110.4%	1.8	2	8	0.2	25.7	12.3	8.4	44.9	C	
	Second Right													
	Subtotal	56	51	91.2%	7.7	35	63	0.7	59.0	4.2	54.3	66.6	E	
	Total	1,725	1,488	86.2%	46.9	1,410	1,560	5.9	29.2	1.3	27.2	32.0	C	

Intersection 3									Northgate Drive/Manuel T Freitas Parkway					Signal
Direction	Movement	Demand Volume (vph)	Average	Percent	Served Volume (vph)				Total Delay (sec/veh)				LOS	
					Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum		
NB	U Turn													
	Second Left													
	Left Turn	48	44	92.2%	7.8	30	57	0.6	40.1	5.6	30.8	48.4	D	
	Through	27	26	97.1%	5.0	21	36	0.2	41.2	6.3	33.2	53.4	D	
	Right Turn	73	71	96.8%	7.7	60	88	0.3	3.8	0.8	2.7	5.5	A	
	Second Right													
	Subtotal	148	141	95.4%	9.6	127	154	0.6	22.1	2.6	17.7	25.3	C	
SB	U Turn													
	Second Left													
	Left Turn	76	67	88.5%	7.4	53	79	1.0	38.2	2.5	33.0	41.7	D	
	Through	29	31	106.3%	3.7	24	36	0.3	36.9	5.2	27.2	42.4	D	
	Right Turn	22	22	99.9%	3.7	15	28	0.0	2.3	0.3	2.0	2.8	A	
	Second Right													
	Subtotal	127	120	94.6%	8.1	107	130	0.6	31.3	2.2	28.2	35.1	C	
EB	U Turn													
	Second Left													
	Left Turn	63	53	84.0%	7.5	36	60	1.3	47.6	2.7	42.5	52.5	D	
	Through	1,285	1,118	87.0%	42.4	1,062	1,184	4.8	20.8	1.9	18.1	24.0	C	
	Right Turn	118	98	83.5%	10.0	84	113	1.9	16.9	1.5	15.3	19.6	B	
	Second Right													
	Subtotal	1,466	1,270	86.6%	47.6	1,210	1,336	5.3	21.6	1.6	19.4	24.6	C	
WB	U Turn													
	Second Left													
	Left Turn	475	452	95.2%	22.0	424	494	1.1	65.8	9.6	54.4	84.7	E	
	Through	972	941	96.8%	21.5	915	971	1.0	11.9	0.9	10.4	13.4	B	
	Right Turn	175	172	98.0%	13.5	155	198	0.3	8.5	1.1	7.0	10.7	A	
	Second Right													
	Subtotal	1,622	1,564	96.4%	42.6	1,508	1,620	1.4	27.1	3.4	22.9	33.2	C	
Total		3,363	3,095	92.0%	60.4	3,010	3,214	4.7	24.8	1.9	22.8	28.5	C	

Queuing and Blocking Report
2020 AM - Alternative 4 (8 Phase)

2/20/2015

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	210	1137	1139	210	506	594	501	138	149	216	170	180
Average Queue (ft)	54	792	769	105	344	164	138	7	55	118	83	177
95th Queue (ft)	170	1309	1301	258	540	493	382	66	125	210	171	195
Link Distance (ft)		1106	1106			623	623			199		
Upstream Blk Time (%)		19	19			3	0			4		
Queuing Penalty (veh)		0	0			15	1			18		
Storage Bay Dist (ft)	150			150	450			140	110		110	120
Storage Blk Time (%)	0	68	67	0	10	0	3		5	20	2	70
Queuing Penalty (veh)	0	24	54	1	25	0	6		17	47	5	329

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	676	138
Average Queue (ft)	648	13
95th Queue (ft)	693	68
Link Distance (ft)	630	
Upstream Blk Time (%)	78	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		120
Storage Blk Time (%)	28	
Queuing Penalty (veh)	123	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	169	339	122	199	332	235	180
Average Queue (ft)	112	100	46	138	112	199	37
95th Queue (ft)	186	255	97	210	260	250	114
Link Distance (ft)		677	288		836	149	149
Upstream Blk Time (%)						42	0
Queuing Penalty (veh)						181	0
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	12	1		19	1		
Queuing Penalty (veh)	32	4		22	2		

Queuing and Blocking Report
2020 AM - Alternative 4 (8 Phase)

2/20/2015

Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	234	476	494	320	352	435	336	159	108	102	135
Average Queue (ft)	62	240	270	193	230	151	146	61	23	48	31
95th Queue (ft)	163	461	488	306	337	356	288	120	89	90	84
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		2	2			0					0
Queuing Penalty (veh)		11	18			0					0
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		12		0	2	0		20	0	19	7
Queuing Penalty (veh)		8		2	12	0		15	0	10	5

Intersection: 12: Manuel T Freitas Pkwy

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	T	T	T	R	R
Maximum Queue (ft)	44	64	36	17	236	30
Average Queue (ft)	2	3	5	2	102	7
95th Queue (ft)	21	35	46	25	196	25
Link Distance (ft)	623	623	411	411	236	232
Upstream Blk Time (%)					1	
Queuing Penalty (veh)					0	
Storage Bay Dist (ft)						
Storage Blk Time (%)		0		0		
Queuing Penalty (veh)		0		0		

Intersection: 15: Las Gallinas Ave

Movement	NB	SB	SB
Directions Served	T	L	T
Maximum Queue (ft)	135	68	328
Average Queue (ft)	13	4	136
95th Queue (ft)	74	31	321
Link Distance (ft)	149		199
Upstream Blk Time (%)	0		14
Queuing Penalty (veh)	2		126
Storage Bay Dist (ft)		70	
Storage Blk Time (%)			25
Queuing Penalty (veh)			1

Network Summary

Network wide Queuing Penalty: 1114

Intersection 1 Las Gallinas Avenue/Manuel T Freitas Parkway													Signal
Direction	Movement	Demand Volume (vph)	Served Volume (vph)						Total Delay (sec/veh)				LOS
			Average	Percent	Std. Dev.	Minimum	Maximum	GEH	Average	Std. Dev.	Minimum	Maximum	
NB	U Turn												
	Second Left												
	Left Turn	173	156	89.9%	13.5	139	175	1.4	62.4	8.0	48.7	72.9	E
	Through	327	304	92.9%	13.8	278	323	1.3	33.1	2.3	29.1	37.6	C
	Right Turn	353	335	94.8%	17.3	306	360	1.0	14.1	1.5	12.2	17.2	B
	Second Right												
	Subtotal	853	794	93.1%	29.7	750	853	2.1	30.9	2.4	27.5	34.1	C
SB	U Turn												
	Second Left												
	Left Turn	167	153	91.8%	7.9	140	168	1.1	80.1	16.8	56.8	114.9	F
	Through	181	166	92.0%	14.8	143	183	1.1	36.2	11.2	28.7	66.1	D
	Right Turn	26	26	99.7%	5.8	19	36	0.0	13.1	11.0	7.1	42.3	B
	Second Right												
	Subtotal	374	346	92.4%	18.9	317	378	1.5	53.9	12.6	40.1	84.9	D
EB	U Turn												
	Second Left												
	Left Turn	62	60	96.2%	6.6	51	69	0.3	53.5	4.7	43.9	59.6	D
	Through	467	469	100.4%	27.5	437	530	0.1	39.4	2.5	35.1	44.9	D
	Right Turn	92	88	95.6%	8.2	78	103	0.4	11.6	1.6	8.0	13.0	B
	Second Right												
	Subtotal	621	616	99.2%	23.8	588	661	0.2	36.8	2.2	33.4	41.6	D
WB	U Turn												
	Second Left												
	Left Turn	302	291	96.4%	13.0	275	311	0.6	84.0	19.7	56.2	119.2	F
	Through	571	547	95.8%	29.2	502	585	1.0	27.4	1.5	25.1	29.3	C
	Right Turn	300	294	98.1%	12.8	279	319	0.3	7.0	1.2	5.3	9.0	A
	Second Right												
	Subtotal	1,173	1,132	96.5%	20.2	1,102	1,165	1.2	36.8	5.8	28.5	46.6	D
	Total	3,021	2,888	95.6%	45.7	2,824	2,976	2.4	37.3	2.8	33.0	42.5	D

Intersection 2 Las Gallinas Parkway/Nova Albion Way+I-80 EB On-ramp										Signal				
Direction	Movement	Demand Volume (vph)	Average	Percent	Served Volume (vph)				GEH	Total Delay (sec/veh)				LOS
					Std. Dev.	Minimum	Maximum	Average		Std. Dev.	Minimum	Maximum		
NB	U Turn													
	Second Left													
	Left Turn	167	159	95.0%	11.9	144	176	0.7	47.3	5.2	38.4	54.4	D	
	Through	304	291	95.9%	12.8	278	324	0.7	28.0	5.4	21.9	40.5	C	
	Right Turn	6	7	115.2%	3.2	2	12	0.4	17.5	8.2	5.4	31.6	B	
	Second Right													
	Subtotal	477	457	95.8%	17.5	429	476	0.9	34.6	4.6	30.5	44.1	C	
SB	U Turn													
	Second Left													
	Left Turn	6	5	84.8%	2.5	2	10	0.4	30.9	14.1	12.6	64.3	C	
	Through	223	217	97.5%	9.5	202	231	0.4	28.4	1.8	25.8	31.8	C	
	Right Turn	263	245	93.0%	8.3	229	256	1.2	5.6	0.6	4.7	6.6	A	
	Second Right													
	Subtotal	492	467	94.9%	12.9	449	486	1.1	16.5	1.1	14.9	18.9	B	
EB	U Turn													
	Second Left													
	Left Turn	422	392	92.9%	18.0	360	414	1.5	102.9	21.7	63.7	143.5	F	
	Through	6	4	68.8%	1.7	2	7	0.8	97.1	27.5	63.8	148.5	F	
	Right Turn	171	156	91.5%	12.8	133	176	1.1	65.7	20.2	29.2	102.8	E	
	Second Right													
	Subtotal	599	553	92.2%	26.2	516	584	1.9	92.4	21.3	53.7	132.2	F	
WB	U Turn													
	Second Left													
	Left Turn	16	17	104.4%	4.0	12	23	0.2	33.2	5.6	24.4	44.5	C	
	Through	56	57	101.1%	7.7	44	67	0.1	35.6	3.4	29.0	41.1	D	
	Right Turn	15	15	99.2%	2.8	12	20	0.0	22.9	6.5	13.5	31.9	C	
	Second Right													
	Subtotal	87	88	101.4%	10.2	73	107	0.1	32.9	3.0	27.1	37.8	C	
	Total	1,655	1,565	94.6%	31.4	1,516	1,605	2.2	49.5	8.1	34.9	66.8	D	

Intersection 3 Northgate Drive/Manuel T Freitas Parkway										Signal				
Direction	Movement	Demand Volume (vph)	Average	Percent	Served Volume (vph)				GEH	Total Delay (sec/veh)				LOS
					Std. Dev.	Minimum	Maximum	Average		Std. Dev.	Minimum	Maximum		
NB	U Turn													
	Second Left													
	Left Turn	173	166	96.1%	12.3	148	182	0.5	34.2	4.4	28.4	39.8	C	
	Through	66	61	92.9%	6.0	53	69	0.6	36.2	5.2	26.6	46.2	D	
	Right Turn	208	204	98.1%	11.0	189	223	0.3	11.2	3.1	6.5	17.1	B	
	Second Right													
	Subtotal	447	432	96.6%	20.0	409	470	0.7	23.6	3.9	18.2	29.7	C	
SB	U Turn													
	Second Left													
	Left Turn	114	108	94.7%	10.0	87	125	0.6	28.1	2.5	25.1	32.4	C	
	Through	40	37	92.4%	4.2	31	45	0.5	24.3	4.2	15.7	31.6	C	
	Right Turn	52	52	100.2%	7.2	38	63	0.0	2.8	0.4	2.1	3.3	A	
	Second Right													
	Subtotal	206	197	95.6%	11.9	181	220	0.6	20.7	2.1	18.4	26.0	C	
EB	U Turn													
	Second Left													
	Left Turn	43	36	83.9%	5.0	30	44	1.1	55.3	6.6	46.0	66.3	E	
	Through	1,023	986	96.4%	19.9	964	1,031	1.2	56.3	8.0	46.1	66.0	E	
	Right Turn	91	87	96.0%	9.9	69	107	0.4	50.8	9.0	40.1	62.6	D	
	Second Right													
	Subtotal	1,157	1,109	95.9%	19.1	1,082	1,148	1.4	55.8	7.8	45.8	65.3	E	
WB	U Turn													
	Second Left													
	Left Turn	500	486	97.2%	27.6	437	526	0.6	50.9	3.7	47.1	57.7	D	
	Through	1,103	1,059	96.0%	21.3	1,024	1,099	1.3	28.1	2.3	24.5	31.6	C	
	Right Turn	141	131	92.7%	7.0	118	138	0.9	27.1	3.1	22.7	32.2	C	
	Second Right													
	Subtotal	1,744	1,675	96.1%	32.2	1,629	1,713	1.7	34.7	2.0	32.0	38.3	C	
	Total	3,554	3,413	96.0%	41.1	3,365	3,490	2.4	39.3	3.1	34.3	43.4	D	

Queuing and Blocking Report

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Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	164	265	246	170	479	353	338	199	170	250	170	179
Average Queue (ft)	51	160	137	35	276	134	136	42	134	195	143	133
95th Queue (ft)	116	235	220	99	458	296	268	173	195	260	215	198
Link Distance (ft)		1106	1106			623	623			193		
Upstream Blk Time (%)						0	0			18		
Queuing Penalty (veh)						1	0			150		
Storage Bay Dist (ft)	150			150	450			140	110		110	120
Storage Blk Time (%)	0	11	6		3		7	3	26	28	7	30
Queuing Penalty (veh)	0	7	6		9		22	9	176	150	35	63

Intersection: 1: Las Gallinas Ave & Manuel T Freitas Pkwy

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	392	141
Average Queue (ft)	158	21
95th Queue (ft)	361	80
Link Distance (ft)	630	
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		120
Storage Blk Time (%)	8	
Queuing Penalty (veh)	15	

Intersection: 2: Las Gallinas Ave & Nova Albion Way

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	LT	R
Maximum Queue (ft)	170	722	144	199	425	218	170
Average Queue (ft)	165	505	54	120	163	115	64
95th Queue (ft)	187	882	110	202	343	195	128
Link Distance (ft)		677	288		836	155	155
Upstream Blk Time (%)		34			0	4	0
Queuing Penalty (veh)		0			0	9	1
Storage Bay Dist (ft)	110			140			
Storage Blk Time (%)	61	1		8	12		
Queuing Penalty (veh)	108	3		24	20		

Queuing and Blocking Report

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Intersection: 3: Northgate Drive & Manuel T Freitas Pkwy

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	L	T	TR	LT	R	L	TR
Maximum Queue (ft)	250	496	497	320	371	608	557	379	110	109	176
Average Queue (ft)	77	374	398	185	224	242	319	181	80	60	35
95th Queue (ft)	229	520	538	286	325	456	517	333	150	104	109
Link Distance (ft)		411	411			1064	1064	450			229
Upstream Blk Time (%)		10	16			0		0			0
Queuing Penalty (veh)		56	95			0		0			0
Storage Bay Dist (ft)	190			330	330				50	50	
Storage Blk Time (%)		47		0	0	1		45	1	23	4
Queuing Penalty (veh)		20		0	3	5		93	1	21	4

Intersection: 12: Manuel T Freitas Pkwy

Movement	EB	EB	EB	NB	SB
Directions Served	T	T	R	R	R
Maximum Queue (ft)	88	99	16	274	34
Average Queue (ft)	9	13	1	177	10
95th Queue (ft)	57	65	16	312	30
Link Distance (ft)	623	623		236	232
Upstream Blk Time (%)				36	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)			100		
Storage Blk Time (%)		1			
Queuing Penalty (veh)		1			

Intersection: 15: Las Gallinas Ave

Movement	WB	NB	SB	SB
Directions Served	R	T	L	T
Maximum Queue (ft)	187	193	101	117
Average Queue (ft)	95	110	41	6
95th Queue (ft)	193	227	77	45
Link Distance (ft)	171	155		193
Upstream Blk Time (%)	16	10		0
Queuing Penalty (veh)	0	77		0
Storage Bay Dist (ft)			70	
Storage Blk Time (%)			2	0
Queuing Penalty (veh)			10	0

Network Summary

Network wide Queuing Penalty: 1196