Tracy Costco Depot Annex Project
EIR Errata
(SCH #2020080531)

I. Introduction

In November 2024, the City of Tracy ("City") published an Environmental Impact Report ("EIR") for the Tracy Costco Depot Annex Project. The EIR consisted of a Draft EIR ("DEIR") published on September 16, 2022, a Recirculated Draft EIR ("RDEIR") published on December 22, 2023, and a Response to Comments document ("RTC Document") published on November 4, 2024.

On December 4, 2024, after the close of the public comment period on the EIR, the City conducted a Planning Commission meeting on the Project at which additional late comments were submitted on the EIR, including an extensive late comment letter from the San Joaquin Residents for Responsible Development ("San Joaquin Residents" or "Residents"). Although not required by the California Environmental Quality Act ("CEQA"), the City elected to prepare a complete written response to Residents' comment letter and to address other comments made at the December 4, 2024 meeting.

This Errata includes minor edits and changes to the EIR, additions to several mitigation measures, and City staff-initiated edits to clarify the analyses or correct typographical errors within the EIR. In addition, this Errata contains Residents' late comment letter and the City's written responses thereto, in the same manner as if the comments were timely submitted during the multiple public comment periods on the EIR.

The revisions herein do not result in new significant environmental impacts, do not constitute significant new information, nor do they alter the conclusions of any of the environmental analyses in the EIR. Therefore, this Errata does not trigger recirculation of the EIR pursuant to State CEQA Guidelines Section 15088.5.

II. Revisions to EIR and MMRP

The changes and additions to the EIR are provided below in revisions marked with underline for new text and strike out for deleted text.

Three mitigation measures within the EIR, as well as the Mitigation Monitoring and Reporting Program (MMRP) for the Project, are revised as follows:

> **Mitigation Measure 3.3-1**: During Project operation, operators of heavy-duty trucks that travel to and from the Project site are required to use trucks that have 2010 model year or newer engines that meet the CARB's 2010 engine emission standards of 0.01 g/bhp-hr for particulate matter (PM) and 0.20 g/bhp-hr of NOx emissions, or newer, cleaner trucks and equipment. <u>Heavy-duty trucks that travel to and from the Project site and are owned by Costco are required to be model year 2018 or later</u>.

Mitigation Measure 3.3-26: The Project applicant shall install conduit as infrastructure for electric vehicle charging stations onsite to allow for truck docks to serve electric trucks in the future. Such conduit shall be provided on the site to serve 50% of the number of truck docking stations, with the location of conduit at the discretion of the developer (e.g., truck trailer parking spaces or other locations). The Project Applicant shall ensure that sufficient electric vehicle charging stations are installed when necessary to serve the charging demands of electric trucks and vehicles domiciled at the project site.

Mitigation Measure 3.3-34: The Project applicant shall, during construction, install signage on any unpaved primary construction accessways onsite on the project site to limit vehicle speeds to no more than 15 mph. The Project Applicant shall comply with SJVAPCD Regulation VIII (fugitive dust rule) and shall comply with SJVAPCD Rule 9510 (indirect source review) to reduce growth in both NOx and PM10 emissions.

The changes indicated below are made to page 3.3-39 through 3.3-40 of Section 3.3 of the RDEIR:

TABLE 3.3-11: OPERATIONAL PROJECT GENERATED EMISSIONS (TONS PER YEAR) – WITHOUT PROJECT SUSTAINABILITY FEATURES

POLLUTANT	*CO*	*NOX*	*ROG*	*SOX*	*PM_{10}*	*$PM_{2.5}$*
THRESHOLD	100	10	10	27	15	15
EMISSIONS – BUILDING 1 ONLY	12.4	7.30	2.45	0.07	3.67	1.04
EMISSIONS – BUILDING 2 ONLY	27.5	16.1	5.32	0.2	8.13	2.30
EMISSIONS – TOTAL PROJECT[1]	~~39.9~~40.0	23.4~~5~~	7.~~69~~72	0.23	11.8	3.~~33~~34
EXCEEDS THRESHOLD?	**N**	**Y**	**N**	**N**	**N**	**N**

SOURCE~~S~~: CALEEMOD (V.2022.1)

NOTE: [1]THE SUM OF INDIVIDUAL BUILDINGS' EMISSIONS MAY NOT EXACTLY EQUAL THE TOTAL PROJECT EMISSIONS DUE TO ROUNDING, AS WELL AS DUE TO A CONSERVATIVE OVERCOUNTING OF THE TOTAL PROJECT ASPHALT AREAS FOR EACH INDIVIDUAL PROJECT BUILDING WITHIN THE 'INDIVIDUAL BUILDING' SCENARIOS.

The SJVAPCD has developed daily mass emissions screening criteria for ROG, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$ to determine whether project emissions would result in a violation of an AAQS. Because the NAAQS and CAAQS are concentration-based standards, Project emissions were evaluated using the SJVAPCD mass emissions screening approach, which provides a preliminary assessment to determine whether a project would contribute to a violation of an AAQS. The screening is conducted by evaluating daily Project emissions against a 100 pound per day threshold for each criteria air pollutant. The following table (Table 3.3-12) provides the proposed Project's 'without Project sustainability features' operational emissions in pounds per day in comparison to these screening thresholds. As shown in Table 3.3-12, under the 'without Project sustainability features' scenario, the proposed Project's operational emissions would not exceed any of the daily mass screening criteria thresholds.

TABLE 3.3-12: OPERATIONAL PROJECT GENERATED EMISSIONS (POUNDS PER DAY) - WITHOUT PROJECT SUSTAINABILITY FEATURES

POLLUTANT	*CO*	*NOX*	*ROG*	*SOX*	*PM_{10}*	*$PM_{2.5}$*
THRESHOLD (POUNDS/DAY)	100	100	100	100	100	100
EMISSIONS – TOTAL PROJECT	88.9	10.2	34.7	0.1	3.8	1.2
EXCEEDS THRESHOLD?	**N**	**N**	**N**	**N**	**N**	**N**

SOURCE~~S~~: CALEEMOD (V.2022.1)

NOTE: THE SUM OF INDIVIDUAL BUILDINGS' EMISSIONS MAY NOT EXACTLY EQUAL THE TOTAL PROJECT EMISSIONS DUE TO ROUNDING, AS WELL AS DUE TO A CONSERVATIVE OVERCOUNTING OF THE TOTAL PROJECT ASPHALT AREAS FOR EACH INDIVIDUAL PROJECT BUILDING WITHIN THE 'INDIVIDUAL BUILDING' SCENARIOS.

NOTE: EMISSIONS ONLY INCLUDE THOSE EMISSIONS THAT ARE CONSIDERED "ON-SITE", PER SJVAPCD GUIDANCE. THIS EXCLUDES "MOBILE" EMISSIONS, EXCEPT FOR APPROXIMATELY 5.2% OF MOBILE EMISSIONS THAT ARE ESTIMATED TO BE ON-SITE, USING A CONSERVATIVE ESTIMATE OF THE ON-SITE MOBILE TRAVEL (1.110701 MILES) DIVIDED BY THE AVERAGE VEHICLE TRIP LENGTH MODELED FOR THE PROJECT OF 21.37224776 MILES.

Proposed Project operational emissions 'inclusive of quantified Project Sustainability features' are shown in Table 3.3-13 and Table 3.3-14, based on implementation of SJVAPCD Rule 9510. While compliance with SJVAPCD Rule 9510 is regulatorily required, the rule itself is an indirect source rule designed to achieve emission reductions from development projects. Thus, it is included here to represent the SJVAPCD regulatory requirement to mitigate the operational emissions.[1] The proposed Project would also be required to implement Mitigation Measure 3.3-1 through Mitigation Measure 3.3-36, as provided under Impact 3.3-1. However, due to the difficulty in modeling the emissions (i.e., NOx emissions) reductions that would occur due to implementation of Mitigation Measure 3.3-1 through Mitigation Measure 3.3-36, the emissions reductions associated with Mitigation Measure 3.3-1 through Mitigation Measure 3.3-36 were not modeled. Thus, Table 3.3-13 and Table 3.3-14 provide a conservative estimate of the operational emissions results for the proposed Project, with the quantified Project sustainability features accounted for.

TABLE 3.3-13: OPERATIONAL PROJECT GENERATED EMISSIONS (TONS PER YEAR) – INCLUSIVE OF QUANTIFIED PROJECT SUSTAINABILITY FEATURES

POLLUTANT	*CO*	*NOX*	*ROG*	*SOX*	*PM_{10}*	*$PM_{2.5}$*
THRESHOLD	100	10	10	27	15	15
EMISSIONS	~~39.9~~40.0	15.6	~~7.69~~7.72	0.23	11.8	3.~~33~~34
EXCEEDS THRESHOLD?	**N**	**Y**	**N**	**N**	**N**	**N**

SOURCE~~S~~: CALEEMOD (V.2022.1)

The changes indicated below are made to pages 3.13-13 through 3.13-15 of the DEIR:

[1] The NOx emissions were adjusted to reflect the 33.3% reduction required, per compliance with Air District Rule 9510.

3.13-2: TDM MEASURES

TDM MEASURE	*DESCRIPTION*	*MAX. VMT REDUCTION*	*MEASURES DETERMINED TO BE FEASIBLE BY THE APPLICANT*	*VMT REDUCTION APPLIED*
PARKING STRATEGIES				
Reduce Parking Supply	Reduce the number of available parking spots provided to employees.	1%	X	1%
Unbundle Parking	Remove free parking at the site, and charge employees for parking. The higher the cost of parking, the higher the reduction.	1%		0%
Parking Cash-out	Provide employees a choice of forgoing current parking for a cash payment to be determined by the employer. The higher the cash payment and eligible employees, the higher the reduction.	2%		0%
PARKING STRATEGIES				
Transit Stops	Coordinate with local transit agency to provide bus stop near the site. Real time transportation information displays support on-the-go decision making to support sustainable trip making.	1%		0%
Implement Neighbor-hood Shuttle	Implement project-operated or project-sponsored neighborhood shuttle serving residents, employees, and visitors of the project site.	2%		0%
Transit Subsidies	Involves the subsidization of transit fare for residents and employees of the project site. This strategy assumes transit service is already present in the project area. Pays for employees to use local transit. This could either be a discounted ticket or a full-reimbursed transit ticket.	2%		0%
COMMUNICATION & INFORMATION STRATEGIES				
Travel Behavior Change Program	Involves the development of a travel behavior change program that targets individuals' attitudes, goals, and travel behaviors, educating participants on the impacts of their travel choices and the opportunities to alter their habits. Provide a website that allows employees to research other modes of transportation for commuting. Employee-focused travel behavior change programs target individuals' attitudes, goals, and travel behaviors, educating participants on the impacts of their travel choices and the opportunities to alter their habits.	1%	X	1%
Promotions & Marketing	Involves the use of marketing and promotional tools to educate and inform travelers about site-specific transportation options and the effects of their travel choices with passive educational and promotional materials. Marketing and public information campaign to promote awareness of TDM program with an on-site coordinator to monitor program.	1%	X	1%
COMMUTING STRATEGIES				
Employer Sponsored Vanpool or Shuttle	Implementation of employer-sponsored employee vanpool or shuttle providing new opportunities for access to connect employees to the project site.	2%		0%
Emergency Ride Home	Provides an occasional subsidized ride to commuters who use alternative modes. Guaranteed ride home for people if they need to go home in the middle of the	1%	X	1%

TDM Measure	*Description*	*Max. VMT Reduction*	*Measures Determined to be Feasible by the Applicant*	*VMT Reduction Applied*
(ERH) Program	day due to an emergency or stay late and need a ride at a time when transit service is not available.			
Tele-commuting Alternative work schedule	Four-Ten work schedule results in 20% weekly VMT reduction, 10% trip reduction equals 15% VMT reduction.	7%		0%
On-site Childcare	Provides on-site childcare to remove the need to drive a child to daycare at a separate location.	1%		0%
Shared Mobility Strategies				
Ride Share Program	Increases vehicle occupancy by providing ride-share matching services, designating preferred parking for ride-share participants, designing adequate passenger loading/unloading and waiting areas for ride-share vehicles, and providing a website or message board to connect riders and coordinate rides. Need a point person from the business on-site.	2%	X	2%
Employee/ Employer Car Share	Implement car sharing to allow people to have on-demand access to a vehicle, as-needed. This may include providing membership to an existing program located within 1/4 mile, contracting with a third-party vendor to extend membership-based service to an area, or implementing a project-specific fleet that supports the residents and employees on -site.	1%		0%
Designated Parking Spaces for Car Share Vehicles	Implement car sharing to allow people to have on-demand access to a vehicle, as-needed. This may include providing membership to an existing program located within 1/4 mile, contracting with a third-party vendor to extend membership-based service to an area, or implementing a project-specific fleet that supports the residents and employees on -site.	1%	X	1%
Bicycle Infrastructure Strategies				
Bike Share Program	Participate in a bike share program/On site bike share program.	1%		0%
Implement/ Improve On-street Bicycle Facility	Implements or provides funding for improvements to corridors and crossings for bike networks identified within a one-half mile buffer area of the project boundary, to support safe and comfortable bicycle travel.	1%		0%
Include Bike Parking Per City Code	Implements short and long-term bicycle parking to support safe and comfortable bicycle travel by providing parking facilities at destinations.	1%	X	1%
Include Secure Bike Parking and Showers	Implements additional end-of-trip bicycle facilities to support safe and comfortable bicycle travel.	1%	X	1%
Bicycle Repair Station/ Services	On-site bicycle repair tools and space to use them supports on-going use of bicycles for transportation.	1%	X	1%
Neighborhood Enhancement Strategies				
Traffic Calming	Implement traffic calming improvements on streets and	1%		0%

TDM Measure	*Description*	*Max. VMT Reduction*	*Measures Determined to be Feasible by the Applicant*	*VMT Reduction Applied*
Improve-ments	intersections throughout and around the project site.			
Pedestrian Network Improve-ments	Implement pedestrian network improvements throughout and around the project site that encourages people to walk.	2%	X	2%
Miscellaneous Strategies				
Virtual Care Strategies for Hospitals	Implement options for virtual care for health services for hospitals.	2%		0%
On-Site Affordable Housing	Provide a percentage of on-site affordable housing for employees that is less than 100%.	1%		0%
Job Creation Land Use (e.g. Office)	Provide offices or other job creation land use. Applies to housing projects.	3%		0%
Provide On-Site Meals	Provide on-site meal options for employees (e.g., micro market vending machines or food trucks)	*	X	0%
			TOTAL VMT REDUCTION APPLIED	**12%**

Source: Kimley Horn, 2022.

Appendix A of the RDEIR is updated to include revised CalEEMod modeling results, as provided in Appendix A to Attachment 1 to this Errata.

Appendix B of the RTC is updated to include inadvertently missing appendices, which are provided in Appendix B to Attachment 1 to this Errata.

III. Responses to Letter Submitted Following EIR Publication

The EIR is revised to add the Residents letter and responses to such letter. The letter and responses, as well as exhibits to the responses, are set forth in Attachment 1 to this Errata.

ADAMS BROADWELL JOSEPH & CARDOZO
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
520 CAPITOL MALL, SUITE 350
SACRAMENTO, CA 95814-4721

TEL (916) 444-6201
FAX (916) 444-6209
kcarmichael@adamsbroadwell.com

SO. SAN FRANCISCO OFFICE
601 GATEWAY BLVD., SUITE 1000
SO. SAN FRANCISCO, CA 94080
TEL (650) 589-1660
FAX (650) 589-5062

KEVIN T. CARMICHAEL
CHRISTINA M. CARO
THOMAS A. ENSLOW
KELILAH D. FEDERMAN
RICHARD M. FRANCO
ANDREW J. GRAF
TANYA A. GULESSERIAN
DARION N. JOHNSON
RACHAEL E. KOSS
AIDAN F. MARSHALL
ALAURA R. McGUIRE
TARA C. RENGIFO

Of Counsel
MARC D. JOSEPH
DANIEL L. CARDOZO

December 4, 2024

Via Email and Hand Delivery
Planning Commission
c/o: Forest Ebbs, Director of Community and Economic Development
City of Tracy
333 Civic Center Plaza,
Tracy, CA 95376
Email: forrest.ebbs@cityoftracy.org

Via Email
Genevieve Federighi, Associate Planner
Email: Genevieve.Federighi@cityoftracy.org

Re: Comments on Agenda Item 1.D. - Tracy Costco Depot Annex Project (SCH # 2020080531)

Dear Planning Commissioners and Ms. Federighi:

We write on behalf of San Joaquin Residents for Responsible Development ("San Joaquin Residents" or "Residents") to provide comments on the Tracy Costco Depot Annex Project (SCH # 2020080531) ("Project"). The Project appears as Item 1.D. on the agenda for the December 4, 2024 City of Tracy ("City") Planning Commission ("Commission") hearing.[1] The Staff Report recommends the Planning Commission adopt a resolution to certify the Final Environmental Impact Report ("FEIR") for the Project and adopt the mitigation monitoring and reporting program ("MMRP"), findings of fact and a statement of overriding considerations for the annexation and development of the Project, and to introduce and adopt an ordinance that approves the prezoning of the Property to Light Industrial (M1).[2] N-1

[1] City of Tracy, Planning Commission, Agenda and Staff Report ("Staff Report") (December 4, 2024) available at https://www.cityoftracy.org/home/showpublisheddocument/19312/638681525612600000
[2] Staff Report, PDF p. 554.
7539-005j

The Project proposes the construction and subsequent operation of two warehouse buildings that would serve as an annex to the existing Costco Depot located approximately 1.5-miles to the west of the Project and as a Direct Delivery Center (DDC).[3] The two buildings (approximately 543,526 sf for Building 1 and 1,193,198 sf for Building 2) total approximately 1,736,724 sf on the Project site.[4]

The Project's Draft EIR ("DEIR") was available for public review and comment from September 16, 2022, through October 31, 2022. Based on comments received on the Draft EIR, on December 22, 2023, the City modified certain sections of the Draft EIR and published a Recirculated Draft EIR ("RDEIR") for the Project, inviting comments on the modified sections of the Draft EIR that comprised the RDEIR.[5] The City received 13 comment letters on the DEIR and RDEIR and includes responses to the comments in the FEIR.[6]

N-1 cont'd

On December 3, 2024, the City issued a memorandum to the Planning Commission providing notice that the Applicant had entered into a settlement agreement with the Sierra Club ("Settlement Agreement").[7] Pursuant to the terms of the Settlement Agreement, the Applicant is required to implement "Enhanced Measures" to reduce the Project's significant environmental impacts.[8] The Enhanced Measures include the requirement that 72 percent of heavy-duty trucks transporting goods from the facility to market delivery operations in other cities be zero-emission by the end of 2027; Costco's on-site cargo handling equipment must be fully electric at the start of operations; trucks at the project site will have to adhere to strict idling limits; and requires Costco to power the Project entirely with 100% renewable electricity and on-site solar generation.[9] Residents supports the inclusion of the Enhanced Measures in the MMRP for the Project. However, the additional mitigation provided by the Settlement Agreement does not resolve all of the Project's significant unmitigated impacts. Additional revisions to the FEIR, and additional mitigation, are still required.

N-2

[3] City of Tracy, Recirculated Draft Environmental Impact Report – Tracy Costco Annex Depot ("RDEIR") p. 2.0-3, available at https://www.cityoftracy.org/our-city/departments/planning/specific-plans-environmental-impact-reports-and-initial-studies/-folder-77
[4] *Ibid.*
[5] FEIR, PDF p. 9.
[6] FEIR, PDF pp. 17-585.
[7] City of Tracy, Additional documents received for the December 4, 2024 Planning Commission Item 1.D (Tracy Costco Depot Annex Project) ("Commission Memo") (December 3, 2024) available at https://www.cityoftracy.org/home/showpublisheddocument/19332/638688443958409720
[8] Commission Memo, PDF p. 2.
[9] Commission Memo, PDF pp. 10-12.

Residents reviewed the FEIR and Staff Report with the assistance of health risk, air quality, GHG emissions and hazardous materials expert James Clark Ph.D. and traffic and transportation expert Norman Marshall.[10] Based on Residents' review, Residents find that the FEIR fails as an informational document under the California Environmental Quality Act ("CEQA")[11] because it fails to disclose and analyze the environmental impacts of the Project's proposed battery backup system. Furthermore, the FEIR fails to analyze the Project's potentially significant health risk and air quality impacts from exposure to Valley Fever, and from toxic emissions from the operation of fire pumps and backup generators on site. Additionally, the FEIR lacks substantial evidence that the Project's significant transportation impacts would be mitigated to the greatest extent feasible, as required by CEQA. N-2 cont'd

The Planning Commission cannot recommend approval at this time because the City has not complied with CEQA. The Commission should instead direct staff to revise and recirculate the FEIR to address the outstanding deficiencies described herein and in comments submitted by various public interest groups and agencies.[12]

I. STATEMENT OF INTEREST

San Joaquin Residents is an unincorporated association of individuals and labor organizations with members who may be adversely affected by the potential public and worker health and safety hazards and environmental and public service impacts of the Project. The association includes the International Brotherhood of Electrical Workers Local 595, Plumbers & Steamfitters Local 442, Sheet Metal Workers Local 104, Sprinkler Fitters Local 669, District Council of Ironworkers and their members and their families, and other individuals that live, recreate and/or work in and around the City. N-3

San Joaquin Residents supports the development of sustainable commercial and industrial centers where properly analyzed and carefully planned to minimize impacts on public health and the environment. Logistics centers like the Project should avoid adverse impacts to air quality, noise levels, transportation, and public

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[10] Mr. Marshall's technical comments (hereinafter "Marshall Comments") and curricula vitae are attached hereto as **Exhibit A**; Dr. Clark's technical comments (hereinafter "Clark Comments") and curricula vitae are attached hereto as **Exhibit B**.
[11] Pub. Resources Code §§ 21000 et seq.; 14 Cal. Code Regs ("CEQA Guidelines") §§ 15000 et seq. ("CEQA Guidelines").
[12] FEIR, PDF pp. 17-585.

health, and should take all feasible steps to ensure unavoidable impacts are mitigated to the maximum extent feasible. Only by maintaining the highest standards can commercial and industrial development truly be sustainable.

The individual members of San Joaquin Residents and the members of the affiliated labor organizations live, work, recreate and raise their families in and around the City. They would be directly affected by the Project's environmental and health and safety impacts. Individual members may also work constructing the Project itself. They would be the first in line to be exposed to any health and safety hazards which may be present on the Project site. They each have a personal interest in protecting the Project area from unnecessary, adverse environmental and public health impacts. N-3 cont'd

San Joaquin Residents and its members also have an interest in enforcing environmental laws that encourage sustainable development and ensure a safe working environment for the members they represent. Environmentally detrimental projects can jeopardize future jobs by making it more difficult and more expensive for industry to expand in the City, and by making it less desirable for businesses to locate and people to live and recreate in the City, including the Project vicinity. Continued environmental degradation can, and has, caused construction moratoriums and other restrictions on growth that, in turn, reduces future employment opportunities.

Finally, San Joaquin Residents is concerned with projects that can result in serious environmental harm without providing countervailing economic benefits. CEQA provides a balancing process whereby economic benefits are weighed against significant impacts to the environment.[13] It is in this spirit we offer these comments.

II. LEGAL DISCUSSION

CEQA requires that an agency analyze the potential environmental impacts of its proposed actions in an EIR, except in limited circumstances.[14] The EIR is the very heart of CEQA.[15] "The foremost principle in interpreting CEQA is that the Legislature intended the act to be read so as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language."[16] N-4

[13] Pub. Resources Code § 21081(a)(3); *Citizens for Sensible Development of Bishop Area v. County of Inyo* (1985) 172 Cal.App.3d 151, 171.
[14] *See, e.g.,* PRC§ 21100.
[15] *Dunn-Edwards v. BAAQMD* (1992) 9 Cal.App.4th 644, 652.
[16] *Communities for a Better Env't v. Cal. Res. Agency* (2002) 103 Cal. App.4th 98, 109.

CEQA has two primary purposes. First, CEQA is designed to inform decisionmakers and the public about the potential, significant environmental effects of a project.[17, 18] CEQA's purpose is to inform the public and its responsible officials of the environmental consequences of their decisions before they are made. In this respect, an EIR "protects not only the environment but also informed self-government."[19] The EIR has been described as "an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return."

To fulfill this function, the discussion of impacts in an EIR must be detailed, complete, and "reflect a good faith effort at full disclosure."[20] CEQA requires an EIR to disclose all potential direct and indirect, significant environmental impacts of a project.[21] In addition, an adequate EIR must contain the facts and analysis necessary to support its conclusions.[22]

N-4 cont'd

The second purpose of CEQA is to require public agencies to avoid or reduce environmental damage when possible by requiring appropriate mitigation measures and through the consideration of environmentally superior alternatives.[23] The EIR serves to provide agencies and the public with information about the environmental impacts of a proposed project and to "identify ways that environmental damage can be avoided or significantly reduced." To that end, if an EIR identifies significant impacts, it must then propose and evaluate mitigation measures to minimize these impacts.[24] CEQA imposes an affirmative obligation on agencies to avoid or reduce environmental harm by adopting feasible project alternatives or mitigation measures.[25] Without an adequate analysis and description of feasible mitigation measures, it would be impossible for agencies relying upon the EIR to meet this obligation.

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[17] 14 Cal. Code Regs. ("CEQA Guidelines"), § 15002, subd. (a)(1).
[18] See, e.g., PRC § 21100.
[19] *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 564.
[20] CEQA Guidelines § 15151; *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 721-722.
[21] PRC § 21100, subd. (b)(1); CEQA Guidelines § 15126.2, subd. (a).
[22] See *Citizens of Goleta Valley* 52 Cal.3d at 568.
[23] CEQA Guidelines § 15002, subds. (a)(2)-(3); see also, *Berkeley Keep Jets Over the Bay Committee v. Board of Port Commissioners* (2001) 91 Cal.App.4th 1344, 1354; *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 564; *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 391, 400.
[24] PRC §§ 21002.1, subd. (a), 21100, subd. (b)(3).
[25] *Id.* §§ 21002-21002.1.

While the courts review an EIR using an "abuse of discretion" standard, "the reviewing court is not to 'uncritically rely on every study or analysis presented by a project proponent in support of its position. A clearly inadequate or unsupported study is entitled to no judicial deference."[26] As the courts have explained, "a prejudicial abuse of discretion" occurs "if the failure to include relevant information precludes informed decision-making and informed public participation, thereby thwarting the statutory goals of the EIR process."[27]

A lead agency is required to recirculate an EIR when significant new information is added to the EIR after public notice is given of the availability of the draft EIR for public review under Section 15087 but before certification.[28] The term "information" can include changes in the project or environmental setting as well as additional data or other information.[29] New information added to an EIR is not "significant" unless the EIR is changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect (including a feasible project alternative) that the project's proponents have declined to implement.[30]

N-4
cont'd

"Significant new information" requiring recirculation include, for example, a disclosure showing that:

(1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.
(2) A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.
(3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project's proponents decline to adopt it.
(4) The draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.[31]

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[26] *Berkeley Jets*, 91 Cal. App. 4th 1344, 1355 (emphasis added), *quoting, Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 391 409, fn. 12.
[27] *Berkeley Jets*, 91 Cal.App.4th at 1355; *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, 722; *Galante Vineyards v. Monterey Peninsula Water Management Dist.* (1997) 60 Cal.App.4th 1109, 1117; *County of Amador v. El Dorado County Water Agency* (1999) 76 Cal.App.4th 931, 946.
[28] 14 CCR §15088.5(a).
[29] *Id.*
[30] *Id.*
[31] *Id.; Mountain Lion Coalition v. Fish and Game Com.* (1989) 214 Cal.App.3d 1043.

The lead agency is required only to recirculate the chapters or portions that have been modified if the revisions are limited to a few chapters or portions of the EIR.[32] Here, substantial evidence presented by Residents' experts shows that feasible mitigation measures distinct from those proposed in the FEIR would clearly lessen the environmental impact of the Project, but the City failed to adopt, or even analyze the feasibility of mitigation measures and alternatives. Further, substantial evidence presented in Residents' comments show that new significant environmental impacts will occur as a result of Project construction and operation due to fugitive dust emissions, and truck traffic. Pursuant to CEQA, the City must revise and recirculate the EIR before the Project can legally be approved. N-4 cont'd

III. THE FEIR FAILS TO DESCRIBE THE PROJECT

A. The FEIR Fails to Include Necessary Information Regarding the Use of Fire Pumps and Backup Generators

The air quality analysis included in the FEIR fails to include analysis of the Project's emissions from operation of fire pumps and backup generators (see Figure 1).[33]

Figure 1: Excerpt from CalEEMod Analysis of Project Emissions N-5

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

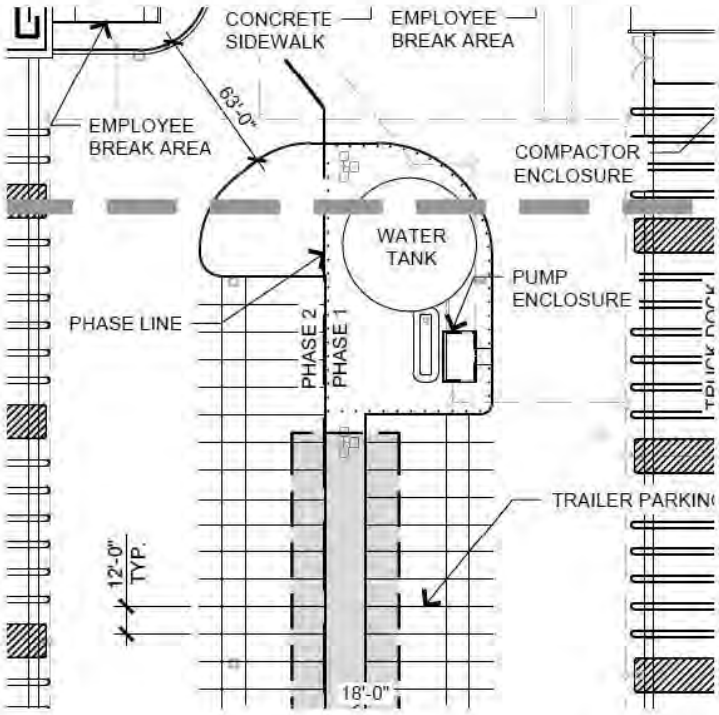
Boilers

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

The FEIR's air quality analysis is inconsistent with the Project site plans, which clearly show that the Project will include a "Fire Pump House" between the two proposed buildings (see Figure 2).[34] As Dr. Clark explains, a fire pump house typically contains several key components, including pumps, pipes, valves, meters and controllers, which require an energy source to operate (often generators) and can result in direct and indirect air emissions. The FEIR's Project description therefore shows that the Project will include an emissions source which the FEIR's air quality analysis fails to quantify.

[32] 14 CCR §15088.5(b).
[33] FEIR, PDF p. 124.
[34] Staff Report, PDF p. 565.

Figure 2: Excerpt from Project Site Plan



N-5 cont'd

The Project will also use backup generators. According to the FEIR, the use of diesel-powered backup generators is not prohibited. Pursuant to Mitigation Measure 3.3-6: The Project applicant shall ensure that diesel generators shall not be used on site during project operations, ***except in emergency situations***, in which case such generators shall have Best Available Control Technology ("BACT") that meets CARB's final Tier IV emission standards.[35] This measure explicitly permits the use of diesel backup generators in emergency situations, and does not further define what constitutes an emergency situation. As a result, it is reasonably foreseeable that diesel backup generators – which emit GHGs and toxic air contaminants ("TAC"s) could be used at the Project site.

[35] FEIR, PDF p. 285 (emphasis provided)

Dr. Clark explains that the operation of the fire pump during routine maintenance and testing will generate diesel particulate matter ("DPM") and operation of backup generators in emergency situations will increase the Project's air quality impacts.[36] Additionally, Operation of the Project's fire pump(s) and backup generators would necessarily increase the Project's air quality impacts, which are already determined to be significant and unavoidable.[37] The City has a duty to mitigate these impacts to the greatest extent feasible. N-5 cont'd

The FEIR's failure to include relevant information regarding operation of fire pumps and backup generators at the Project site results in a corresponding failure to accurately disclose the extent of the Project's air quality and GHG emissions. The City must prepare a revised EIR for the Project which includes analysis of the Project's fire pumps and BUGs.

B. The FEIR Fails to Include Fundamental Information Regarding the Installation of Backup Battery Systems

In response to comments on the RDEIR, Mitigation Measure 3.3-4 was added to the FEIR which requires the installation of a battery energy storage system ("BESS") on-site to provide electricity in the event of a 48-hour blackout.[38] However, the FEIR fails to include information regarding the type of batteries to be used in the Project, and lacks information regarding the size of the batteries, the chemical components of each individual battery, or the proposed layout of battery units. This information is critically important for worker safety and on-site and off-site impacts in the event of an accident. Absent this information, the opportunity for meaningful public review is drastically limited. N-6

According to the National Fire Protection Association, battery storage systems can create hazardous conditions from thermal runaway resulting in the release of toxic or flammable gasses and other environmental impacts.[39] The conditions leading to thermal runaway can be mitigated using explosion prevention systems or deflagration venting, fire suppression systems, battery management

[36] Clark Comments, p. 7.
[37] FEIR, PDF p. 590.
[38] FEIR, PDF p. 576.
[39] National Fire Protection Association, Energy Storage Systems Safety Fact Sheet (hereinafter "ESS Fact Sheet") (June 2020) pp. 1-2. available at https://www.nfpa.org/~/media/Files/Code%20or%20topic%20fact%20sheets/-ESSFactSheet.ashx

systems, and adequate spacing between battery arrays based on the number and type of batteries used.[40] Recent battery system failures have resulted in injuries to first responders[41], the release of hazardous gasses[42] and fires that are difficult to extinguish.[43]

N-6 cont'd

The FEIR fails to provide any information regarding the design of the backup battery systems, including battery types, layout, type of cooling system they will use, and the type of fire detection and fire suppression systems that will be installed. This information is critical to determine the hazards and the potential environmental impacts posed by the batteries on site. A Revised DEIR must be prepared which fully discloses all components of the Project and analyzes the potential hazards of the battery system that will be installed at the Project site.

IV. THE FEIR FAILS TO ADEQUATELY DISCLOSE, ANALYZE OR MITIGATE THE PROJECT'S SIGNIFICANT TRANSPORTATION IMPACTS

The FEIR fails to adequately respond to comments provided by the California Department of Transportation explaining that the RDEIR's analysis with respect to the Project's vehicle miles traveled ("VMT") was unsupported by substantial evidence, and, as discussed below, the VMT analysis is so unclear as to be indecipherable. The City must revise and recirculate the RDEIR to address these issues.

N-7

The FEIR states that trip generation rates for the Project were calculated using the e-commerce trip generation rates provided by "Kittleson's *Tracy Costco Depot Transportation Impact Analysis Report* (August 28, 2017)".[44] However, the referenced report was not included in the RDEIR, an error which was identified by commenters on the RDEIR. In the FEIR's response to comments, the FEIR states that:

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[40] ESS Fact Sheet, p. 2.
[41] AZ Central, 'Reasons that are still unknown': 30 experts investigate Surprise battery explosion that injured 9 (April 23, 2019) available at https://www.azcentral.com/story/money/business/energy/2019/04/23/arizona-public-service-provides-update-investigation-battery-fire-aps-surprise/3540437002/
[42] KSBW Action News, Highway 1 reopened near Moss Landing, shelter-in-place lifted (September 21, 2022) available at https://www.ksbw.com/article/highway-1-reopened-near-moss-landing-shelter-in-place-lifted/41302918#
[43] AZ Central, Fire crews tend to massive, smoldering battery in Chandler facility (April 21, 2022) available at https://www.azcentral.com/story/money/business/energy/2022/04/21/fire-crews-tend-massive-smoldering-battery-chandler-facility/7405430001/
[44] RDEIR, PDF p. 663.

> The 2017 Kittleson Tracy Costco Depot Transportation Impact Analysis Report (2017 Report) is included as Appendix B of this Response to Comments document. The 2017 Report was prepared to assess the potential effects of changes to the then existing Costco Depot campus located at 25501 Gateway Blvd, Tracy, CA 95377. In 2017, Costco was considering expanding the then existing depot building and constructing a new ecommerce building on the campus. The e-commerce building would replace an existing Costco e-commerce facility located at that time at 25149 S Schulte Road. The report does not pertain to the Depot Annex but rather provided Costco-specific trip information that was used for the Traffic Study. Since the 2017 Report does not evaluate any component of the Project, revision and recirculation of the Transportation Section of the EIR is not required.[45]

While the Kittleson Tracy Costco Depot Transportation Impact Analysis is included in the FEIR, no trip generation rates are provided in the document, and there is no information provided about the underlying data, stating that the underlying data is provided in Appendix F which is not included in the RDEIR nor the FEIR.[46] The overall lack of verifiable data regarding the Project's transportation impacts renders the FEIR's conclusions on the Project's transportation impacts wholly unsupported. N-7 cont'd

Despite the lack of supporting data in the FEIR, the FEIR continues to states that trip generation for the Project was assumed to be 2.17 trips per 1,000 square feet. However, this daily trip rate does not appear in the transportation studies prepared for the Project.

To further complicate the matter, the FEIR states that the Project will likely only generate 0.38 trips per 1,000 square-feet[47], a figure so low that it cannot be taken seriously by qualified transportation consultants, as explained by Mr. Marshall. To illustrate the FEIR's unsupported trip generation numbers, Mr. Marshall graphed the FEIR's assumed trip rates of 2.17 and 0.38 compared to the reasonably foreseeable trip rates for warehouse uses detailed in the Institute of Transportation Engineers *Trip Generation Manual*, highly qualified transportation impact guidance.[48]

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[45] FEIR, PDF p. 32.
[46] FEIR, PDF p. 679
[47] FEIR, PDF p. 40.
[48] Marshall Comments, p. 3.

N-7 cont'd

The FEIR contains no credible evidence to support its assumptions that the Project's trip generation rates would be lower than industry averages. Mr. Marshall therefore concludes that the FEIR's transportation analysis remains unsupported.

It is therefore reasonably foreseeable that the Project could generate far more trips than assumed in the FEIR, resulting in even greater GHG emissions impacts from truck trips than disclosed in the FEIR. As noted above, the Enhanced Measures provided through the Sierra Club Settlement Agreement will result in GHG emissions reductions for outbound heavy duty truck trips. But those measures do not apply to inbound trips, which remain unmitigated. The FEIR therefore lacks substantial evidence to conclude that the Project's truck trips will not result in significant and unmitigated air quality and GHG impacts.

The City must revise the transportation study to include an accurate trip generation rate, to analyze the reasonably foreseeable use of the Project for higher intensity uses such as Fulfillment Center Warehouse – Sort, present its findings in a revised and recirculated DEIR for the Project, and include additional mitigation to further reduce truck emissions.

A. The FEIR Fails to Adequately Mitigate the Project's Transportation Impacts

The FEIR concludes that the Project will result in a significant and unavoidable VMT impact, stating that the City's VMT Calculator estimates that the Project would generate 24.8 VMT per employee, and the Project exceeds the threshold by 164 percent.[49] The FEIR goes on to state:

> The California Air Pollution Control Officers Association (CAPCOA) indicates that up to 15% of VMT reduction can reasonably be achieved. The Project has the option to "purchase" additional VMT from the VMT banking fee above 15%. For the purpose of this report, a maximum of 15% is assumed. [50]

This conclusion is misleading and false. As Mr. Marshall points out, the CAPCOA *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity* establishes 45% Commute Trip reduction as the maximum possible.[51] Therefore, the FEIR's assertion that a maximum of 15% is the limit is false. This error was highlighted by the Department of Transportation, and the Sierra Club, Delta Sierra Group of the Motherlode Chapter in comments on the DEIR and RDEIR.[52] However, the FEIR fails to correct this mistake, and instead provides the following response: N-7 cont'd

> Since the release of the 2022 Draft EIR, the applicant has agreed to several additional TDM measures. See Chapter 3.0 of this Response to Comments document for the revisions to Table 3.13-2 and Mitigation Measure 3.13-1. The TDM strategies aim to achieve a feasible maximum of 12 percent VMT reduction, with the opportunity for 3 percent VMT reduction coming from the VMT Banking Fee Program. If the VMT banking fee has not been adopted by the time the Project is built, the applicant would not have to pay into the VMT banking fee program because there would be no such fee program to implement. In this case, the applicant would be required to take all actions needed to reduce VMT by 15% with TDM measures.

The FEIR's response to comments incorrectly doubles down on the assumption that 15% is the maximum achievable commute trip reduction for the Project. Mr. Marshall explains that the measures deemed to be feasible by the

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[49] FEIR, PDF p. 154.
[50] RDEIR, PDF p. 654.
[51] Marshall Comments, p. 4.
[52] FEIR, PDF pp. 37, 78, and 410.

Applicant are not sufficient to reduce the Project's significant VMT impacts.[53] Furthermore, the allowance for the Project to meet the arbitrarily chosen 15% threshold through the payment of impact fees will not result in real world reductions in VMT.[54] The Settlement Agreement adopts the 15% reduction from the FEIR, so this impact remains significant and unmitigated. N-7 cont'd

The City must revise the Project's transportation impact study, and incorporate additional feasible mitigation measures to reduce the Project's transportation impacts using the strategies available in the CAPCOA Handbook to achieve a reduction in Project VMT close to the maximum 45% reduction. Absent the analysis and inclusion of additional feasible mitigation measures, the City lacks substantial evidence to conclude that the Project's transportation impacts are mitigated to the greatest extent feasible.

V. THE FEIR FAILS TO ADEQUATELY DISCLOSE, ANALYZE OR MITIGATE THE PROJECT'S POTENTIALLY SIGNIFICANT AIR QUALITY IMPACTS

A. The FEIR Fails to Mitigate the Project's Significant and Unavoidable Air Quality Impacts to the Greatest Extent Feasible

CEQA requires agencies to commit to all feasible mitigation measures to reduce significant environmental impacts.[55] In particular, the lead agency may not make required CEQA findings, including finding that a project impact is significant and unavoidable, unless the administrative record demonstrates that it has adopted all feasible mitigation to reduce significant environmental impacts to the greatest extent feasible.[56] Yet, as explained below, the FEIR falls far short of this mandate by adopting mitigation measures that are vague, ineffective, and unenforceable and by failing to commit to other feasible and effective mitigation strategies to address the significant air quality impacts of the Project. As a result, the City lacks substantial evidence to support a statement of overriding considerations because existing mitigation measures do not demonstrate that significant impacts will be mitigated to the greatest extent feasible. N-8

[53] Marshall Comments, p. 5
[54] Marshal Comments, p. 5.
[55] 14 C.C.R. § 15002(a)(2).
[56] Pub. Res. Code § 21081(a)(3), (b); 14 C.C.R. §§ 15090, 15091; *Covington v. Great Basin Unified Air Pollution Control Dist.* (2019) 43 Cal.App.5th 867, 883.

According to the FEIR, the Project is anticipated to generate approximately 2,576 passenger vehicle trips and 1,224 heavy-duty truck trips per day, based on this estimate the FEIR states that the Project would generate 15.6 tons (31,200 lbs) of NOx per year.[57] Based on this finding, the FEIR concludes that the Project's operational emissions will exceed SJVAPCD's significance thresholds for NOx, even with implementation of Project sustainability features and mitigation measures, and the Project's air quality impacts would remain ***significant and unavoidable***.[58]

The Enhanced Measures provided through the Sierra Club Settlement Agreement include measure EM-2 which requires that 72 percent of heavy-duty trucks transporting goods from the Project Site be model year 2014 or newer and ensure that all outbound heavy duty trucks are zero emission vehicles by December 31, 2027.[59] However, this measure only reduces emissions from trucks leaving the Project and will not reduce emissions from inbound heavy duty trucks.

N-8 cont'd

Dr. Clark found that additional feasible mitigation measures beyond those presented in the FEIR and Settlement Agreement are available to reduce the Project's NOx emissions. In addition to the Enhanced Measures, Mitigation Measure 3.3-1 requires that:

> During Project operation, operators of heavy-duty trucks that travel to and from the Project site are required to use trucks that have 2010 model year or newer engines that meet the CARB's 2010 engine emission standards of 0.01 g/bhp-hr for particulate matter (PM) and 0.20 g/bhp-hr of NOx emissions, or newer, cleaner trucks and equipment.[60]

Dr. Clark found that by updating the Mitigation Measure to require the use of only heavy-duty vehicles produced in the year 2018 or later (for trucks not included in the 72% inbound category), NOx and DPM emissions from the Project would significantly decrease. Dr. Clark explains that, based on an analysis of emissions from the EMFAC model produced by the California Air Resources Board ("CARB"), vehicles model year 2018 and newer produce 37 percent to 45 percent less emission of NOx, DPM, and reactive organic gases (ROGs) that contribute to GHG formation than those produced from 2010 through 2017.[61]

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[57] FEIR, PDF p. 593.
[58] FEIR, PDF pp. 593-594.
[59] Commission Memo, PDF p. 10.
[60] FEIR, PDF p. 285.
[61] Clark Comments, p. 6.

Additional feasible mitigation beyond the measures included in the FEIR and Sierra Club Settlement Agreement are available to reduce the Project's significant and unavoidable air quality impacts. As a result, the City lacks substantial evidence to conclude that it has eliminated or substantially lessened all significant effects on the environment to the greatest extent feasible. The City must evaluate the feasibility and effectiveness of the proposed revision to MM 3.3-1 in a revised and recirculated EIR for the Project. N-8 cont'd

B. The FEIR Fails to Address Impacts from Valley Fever

The FEIR fails to address the potential health risk to construction workers and nearby sensitive receptors from exposure to *Coccidioides immitis* ("*Cocci*") fungus spores which can spread a disease known as Valley Fever. The populations most at-risk of contracting Valley Fever are construction and agricultural workers. Additionally, the nonselective raising of dust during Project construction will carry the very small spores which measure 0.002–0.005 millimeters into nonendemic areas, potentially exposing large non-Project-related populations.

The FEIR acknowledges that the San Joaquin Valley is considered an endemic area for Valley Fever, and that hospitalizations for Valley Fever in the San Joaquin Valley increased from 230 (6.9 per 100,000 population) in 2000 to 701 (17.7 per 100,000 population) in 2007.[62] However, the data cited is of little use as it is woefully outdated and geographically vague as it covers the counties of Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare. N-9

Recent data from the California Department of Public Health ("CDPH") details that between 2008 and 2022, the cases in the County have increased, reaching a maximum of 281 cases in 2019 (a rate of 36.4 per 100,000).[63] Additionally, based on provisional reports from the CDPH for 2024, a new maximum of 379 cases has been reached in the first 9-months of the reporting year.[64] Due to the prevalence of Valley Fever in the County, the California Legislature mandates that employers at worksites in San Joaquin County provide effective awareness training on Valley Fever to all employees.[65]

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[62] RDEIR, PDF p. 79.
[63] California Department of Public Health, Epidemiologic Summary of Valley Fever (Coccidioidomycosis) in California, 2022 (November 2023) available at https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CocciEpiSummary2022.pdf
[64] CDPH, Provisional Valley Fever Cases in California (October 31, 2024) available at https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/ValleyFeverProvisionalDashboard.aspx
[65] California Labor Code § 6709(a)-(d).

Dr. Clark explains that Valley Fever is a disease that can spread when persons are exposed to *Cocci* fungus spores during ground disturbance.[66] Impacts to human health from Valley Fever can be severe, cause long lasting health problems, and can even result in death.[67] The fungus lives in the top 2 to 12 inches of soil, and when disturbed by activities such as digging, construction activities (e.g. site preparation and grading), dust storms, or during earthquakes, the fungal spores become airborne.[68] According to the CalEEMod output sheets included in the RDEIR, Project site preparation will occur over a total of 114 days, and on-site grading will take 125 days, resulting in the disturbance of approximately 180 acres of soil during site preparation and 930 acres of soil during the grading phases, which may lead to the release of fungus spores resulting in impacts to Project workers and nearby sensitive receptors.[69]

N-9 cont'd

Additionally, Dr. Clark explains that smaller particles like *Cocci* spores require significantly longer to settle out of air.[70] For particles 10 um in diameter the settling time is measured in minutes, but for particles less than 10 um in diameter, the settling time is measured in hours.[71] *Cocci* spores are five times smaller than typical PM10 dust particles, thus allowing the spores to travel significantly further, thereby impacting receptors at greater distances.

The FEIR assumes that meeting San Joaquin Valley Air Pollution Control District's Rule 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities) will be sufficient to control the impacts from Valley Fever exposure from the Project Site.[72] SJVAPCD Rule 8021 requires limitation of fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities, by implementing control measures such as pre-watering the Project site, phasing construction work to reduce the amount of disturbed surface at any one time, and applying water or other suppressants to unpaved haul/access roads and unpaved vehicle/equipment traffic areas.[73]

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[66] Clark, p. 11.
[67] California Department of Public Health ("CDPH"), Valley Fever Basics (May 7, 2020), *available at* https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/ValleyFeverBasics.aspx.
[68] Clark Comments, p. 10.
[69] RDEIR, PDF pp. 462 and 472.
[70] *Id*, p. 14.
[71] *Ibid.*
[72] RDEIR, PDF p. 81.
[73] *Ibid.*

However, Rule 8021 relies on a visual-opacity reading for dust control and is insufficient to prevent exposure to Valley Fever spores.[74] This rule is based on smoke-monitoring methods (U.S. EPA Methods 9 and 22) that require active monitoring by certified observers, rely on subjective observation, and are affected by variables such as lighting, distance, and weather conditions.[75] Due to these limitations, opacity readings do not provide accurate, continuous data on fine airborne particles.[76]

Additionally, though not explicitly stated, the City may be assuming that the awareness training required under California Labor Code § 6709 is sufficient to mitigate the impacts from Valley Fever.[77] However, according to Dr. Clark, the education provided by the Labor Code does not provide adequate active protection for workers and nearby sensitive receptors.[78]

N-9 cont'd

The FEIR fails to provide any information regarding the prevalence of *Cocci* fungus spores in the Project's vicinity, fails to discuss applicable construction worker Valley Fever training requirements and fails to include any Valley Fever-specific mitigation in the MMRP. This lack of disclosure by the City prevents meaningful analysis and mitigation of the potential health impacts the Project will cause to onsite construction workers and other individuals in close proximity to the Project site from disturbing soils which may be contaminated with Valley Fever spores site during Project construction.

The City lacks substantial evidence to conclude that the Project will not result in significant health risk impacts from Valley Fever. On the other hand, Dr. Clark's comments provide substantial evidence demonstrating the known presence of Valley Fever in the Project's vicinity and the potential impacts of exposure to the fungus spores.

The City must prepare a revised EIR which accurately analyzes and mitigates the Project's potentially significant health risk impacts from Valley Fever.

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[74] Clark Comments, p. 13.
[75] *Ibid.*
[76] *Ibid.*
[77] Labor Code § 6709(c)
[78] Clark Comments, p . 15

C. The FEIR Fails to Include Effective Mitigation Measures to Reduce the Project's Potentially Significant Health Risks from Valley Fever

Dr. Clark proposes a number of feasible mitigation measures the City should consider and adopt in the MMRP for the Project to reduce potential health impacts from Valley Fever.[79] In addition to the worker awareness training required under California Labor Code § 6709[80], the following mitigation measures must be included in the MMRP for the Project to reduce the potentially significant health risk impacts to construction workers and nearby sensitive receptors from exposure to *Cocci* spores during Project construction:

1. Include specific requirements in the Project's Injury and Illness Prevention Program regarding safeguards to prevent Valley Fever.

2. Control dust exposure through the following methods: N-10

- Apply chemical stabilizers at least 24-hours prior to high wind event;
- Apply water to all disturbed areas a minimum of three times per day. Watering frequency should be increased to a minimum of four times per day if there is any evidence of visible wind-driven fugitive dust;
- Provide National Institute for Occupational Safety and Health (NIOSH)-approved respirators for workers with a prior history of Valley Fever.
- Half-face respirators equipped with a minimum N-95 protection factor for use during worker collocation with surface disturbance activities. Half-face respirators equipped with N-100 or P-100 filters should be used during digging activities. Employees should wear respirators when working near earth-moving machinery.
- Prohibit eating and smoking at the worksite, and provide separate, clean eating areas with hand-washing facilities.
- Avoid outdoor construction operations during unusually windy conditions or in dust storms.
- Consider limiting outdoor construction during the fall to essential jobs only, as the risk of cocci infection is higher during this season.

[79] Clark Comments, pp. 12-14.
[80] Labor Code § 6709(c)

3. Prevent transport of *Cocci* outside endemic areas:

- Prevent spillage or loss of bulk material from holes or other openings in the cargo compartment's floor, sides, and/or tailgate.
- Provide workers with coveralls daily, lockers (or other systems for keeping work and street clothing and shoes separate), daily changing and showering facilities.
- Clothing should be changed after work every day, preferably at the work site.
- Train workers to recognize that cocci may be transported offsite on contaminated equipment, clothing, and shoes; alternatively, consider installing boot-washing.
- Post warnings onsite and consider limiting access to visitors, especially those without adequate training and respiratory protection.

4. Improve medical surveillance for employees:

- Employees should have prompt access to medical care, including suspected work-related illnesses and injuries.
- Work with a medical professional to develop a protocol to medically evaluate employees who have symptoms of Valley Fever.
- Consider preferentially contracting with 1-2 clinics in the area and communicate with the health care providers in those clinics to ensure that providers are aware that Valley Fever has been reported in the area. This will increase the likelihood that ill workers will receive prompt, proper and consistent medical care.
- Respirator clearance should include medical evaluation for all new employees, annual re-evaluation for changes in medical status, and annual training, and fit-testing.
- Skin testing is not recommended for evaluation of Valley Fever.[81]
- If an employee is diagnosed with Valley Fever, a physician must determine if the employee should be taken off work, when they may return to work, and what type of work activities they may perform.

N-10
cont'd

[81] Short-term skin tests that produce results within 48 hours are available. See Kerry Klein, NPR for Central California, New Valley Fever Skin Test Shows Promise, But Obstacles Remain, November 21, 2016; available at http://kvpr.org/post/new-valley-fever-skin-test-shows-promise-obstacles-remain.

Any mitigation measures must be included in the MMRP for the Project and be fully enforceable through permit conditions, agreements, or other legally binding instruments.[82] Failure to include enforceable mitigation measures is considered a failure to proceed in the manner required by CEQA.[83] In order to meet this requirement, the above mitigation measures must be incorporated directly into the EIR to be enforceable.[84] N-10 cont'd

The City must prepare a revised FEIR to include mitigation measures such as the those proposed by Dr. Clark to reduce the impacts of exposure to Valley Fever causing fungus spores and mitigate impacts to sensitive receptors.

D. The FEIR Fails to Address Health Risk Impacts from Stationary Sources

As explained above, the City failed to account for the use of backup generators and fire pumps during Project operation resulting in a failure to analyze the reasonably foreseeable air quality and health risk impacts from diesel particulate matter emissions. Although the City did prepare a Health Risk Assessment for the Project, failure to include all sources of DPM emissions renders the HRA incomplete.[85] As a result, the HRA cannot be relied upon by the City to conclude that the Project will not result in significant health risk impacts. N-11

The City must prepare a revised FEIR for the Project which includes a revised HRA, and provide the public the opportunity to review the analysis.

VI. CONCLUSION

For the reasons discussed above, the Planning Commission lacks substantial evidence to recommend approval of the Project. The FEIR does not comply with CEQA. It must be revised and recirculated to provide legally adequate analysis of, and mitigation for, all of the Project's significant impacts. Until the EIR has been revised and recirculated, as described herein, the City may not lawfully approve the Project. N-12

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[82] CEQA Guidelines §15126.4(a)(2).
[83] *San Joaquin Raptor Rescue Ctr. v. County of Merced* (2007) 149 Cal.App.4th 645, 672.
[84] *Lotus v. Dept of Transportation* (2014) 223 Cal. App. 4th 645, 651-52.
[85] RDEIR, PDF p. 159.

Thank you for your consideration of these comments. Please include them in the record of proceedings for the Project. N-12 cont'd

Sincerely,

Kevin Carmichael

KTC:ljl

EXHIBIT A

N-13

794 Sawnee Bean Road
Thetford Center VT 05075

Norman Marshall, President
(802) 356-2969

nmarshall@smartmobility.com

December 4, 2024

Kevin T. Carmichael
Adams Broadwell Joseph & Cardozo
520 Capitol Mall, Suite 350
Sacramento, CA 95814

Subject: Tracy Costco Depot Annex Project (SCH No. 2020080531)

Dear Mr. Carmichael,

I have reviewed vehicle miles traveled (VMT) impacts, traffic, and greenhouse gas emissions ("GHG") of the Draft Environmental Impact Report for the Tracy Costco Depot Annex Project dated September 2022 ("DEIR"), Recirculated Draft Environmental Impact Report for the Tracy Costco Depot Annex Project dated December 2023 ("RDEIR"), the Responses to Comments for the Tracy Costco Depot Annex Project dated September 2024 ("Responses"), and the Findings of Fact/Statement of Overriding Considerations for the Tracy Costco Depot Project dated October 2024 ("Findings"), collectively "FEIR". I make the following findings:

1) The trip generation estimates are not fully documented. Details about when and where the data were collected, and the observed trip generation rates, are omitted.
2) The trip generation rate applied is lower than for other warehouse categories, and may be unrealistically low, particularly as the industry is continuing to undergo rapid change.
3) The Project exceeds the VMT threshold by 164 percent.
4) CAPCOA states that up to 45% Commute Trip VMT mitigation is possible.
5) The FEIR variously claims that only a 12%, 13% or 15% reduction is feasible without clearly proposing any of these, and intends to satisfy at least a portion of the reduction through an impact fee structure that does not appear to be implemented yet, and for which no evidence is given that it would achieve significant VMT reduction.
6) A more robust TDM program is needed.

N-13 cont'd

Trip Generation Estimates are not Properly Documented and Likely Are Too Low

The RDEIR stated:

> Trip generation for the proposed Costco development was calculated using the E-Commerce trip generation rates provided by Kittleson's *Tracy Costco Depot Transportation Impact Analysis Report* (August 28, 2017). (RDEIR, PDF p. 663 of 1287)

However, the referenced report was not included in the RDEIR, and this omission was raised in RDEIR comments. The Responses state:

> The 2017 Kittleson Tracy Costco Depot Transportation Impact Analysis Report (2017 Report) is included as Appendix B of this Response to Comments document. The 2017 Report was prepared to assess the potential effects of changes to the then existing Costco Depot campus located at 25501 Gateway Blvd, Tracy, CA 95377. In 2017, Costco was considering expanding the then existing depot building and constructing a new ecommerce building on the campus. The e-commerce building would replace an existing Costco e-commerce facility located at that time at 25149 S Schulte Road. The report does not pertain to the Depot Annex but rather provided Costco-specific trip information that was used for the Traffic Study. Since the 2017 Report does not evaluate any component of the Project, revision and recirculation of the Transportation Section of the EIR is not required. (Responses, PDF p. 32 of 692)

N-13 cont'd

Responses Appendix B starts on Responses PDF p. 666 of 692. The report, as included, also appears to be incomplete. It includes estimates of AM and PM peak hour trip generation, but no trip generation rates are given, and there is no information provided about the underlying data. Instead, it states that this information is in an Appendix F, which is not included:

> Further details on the trip generation are also provided in *Appendix F* along with the data collected at the existing Tracy E-Commerce site. (Responses, PDF p. 679 of 692)

There is no Appendix F either in the RDEIR or in the Kittelson report as included in the Responses.

DEIR Comments by the California Department of Transportation dated October 22, 2022 stated:

> 3. The TIS that was submitted does not use the latest version of the ITE Trip Generation Manual (11th Edition). It is strongly suggested that future studies use the latest version.
> 4. Table 3.13-1 does not include daily trip generation, which is needed for the VMT analyses. (Responses, PDF p. 37 of 692)

The Responses to the Caltrans comments state:

> The e-commerce daily trip rate used in the DRAFT EIR is 2.17 trips per 1,000 square feet (KSF). (Responses, PDF p. 41 of 692)

This daily trip rate of 2.17 per 1,000 sq. ft. does not appear in either the DEIR or the RDEIR and no basis is given for it.

The Responses then put forward a claim that a rate of only 0.38 daily trips per 1,000 sq. ft. is appropriate based on "data collected at Costco DDCs in Stockton, CA, Gouldsboro, PA, and Romeoville, IL." (Responses, PDF, p. 40 of 692) The Responses state:

> The trip generation estimates presented in the Draft EIR are conservative based on the expected activity for this Project. The Draft EIR assumes that the Project buildings could be used for high turnover, high volume merchandise. Costco intends to use the larger of the two Project buildings (Building 2) as a Direct Delivery Center primarily for large and bulky items ordered online by Costco members for direct delivery through smaller Market Delivery Operations facilities located in various smaller cities in the Northern California region. Costco plans to deploy the smaller of the two Project buildings (Building 1) as an annex to the nearby Costco Depot, providing additional storage for merchandise processed through the Depot, a pallet repair facility, and a return-to-vendor facility. Given these planned uses, if Project-specific assumptions were used, the number of trips generated by the Project would be less than that reported in the Draft EIR. The information and data below were developed by Kittelson & Associates, Inc. on behalf of Costco. (Responses, PDF p. 40 of 692)

One fact highlighted by this excerpt is that retail, and especially home delivery retail, has been changing rapidly and is likely to continue to change. Therefore, unless the project is constrained to low trip generation uses by a binding condition of approval, the FEIR's trip generation rates remain unsupported, and actual VMT may be substantially higher than assumed in the FEIR. If the City were to approve the Project based on the low rates assumed in the FEIR, actual VMT may increase after a short period of time and remain unmitigated. N-13 cont'd

As shown in the figure below, the rate of 2.17 daily trips per 1,000 sq. ft. is lower than some warehouse types in ITE Trip Generation. The rate of 0.38 daily trips per 1,000 sq. ft. given in the Responses is so low that it does not appear plausible.

DEIR Daily Trip Rates Compared to ITE Trip Generation Daily Trip Generation Rates

The FEIR's trip generation assumptions must be properly documented, including information about when and where the data were collected, and appropriate trip generation rates should be used.

Significant VMT impacts Are Inadequately Mitigated (p. 141)

The FEIR discloses that the project would have a significant VMT impact that exceeds thresholds by 164 percent (even under the FEIR's low VMT assumptions). It states:

> The proposed Project was evaluated using the City of Tracy VMT Calculator. For the surrounding industrial land use area, the City's threshold is 9.2 VMT per employee. The City's VMT Calculator estimates that the Project would generate 24.8 VMT per employee, and the Project exceeds the threshold by 164 percent. This VMT per employee value is also applicable to the cumulative scenario, since it also applies under cumulative conditions. Because the Project exceeds the City threshold by 164 percent, a reduction below the City's VMT threshold is not feasible. (RDEIR, PDF p. 141 of 1287)

The FEIR summarily concludes that "a reduction below the City's VMT threshold is not feasible" without discussing VMT mitigation. A Kimley Horn memo dated September 12, 2022 re Costo Direct Delivery Traffic Analysis appears in the middle of the FEIR beginning on PDF p. 642 of 1287 that describes the TDM program, which is included in the FEIR as Mitigation Measure 3.13-1.

The FEIR, and consequently Mitigation Measure 3.13-1, arbitrarily establish a purported "feasible maximum of 15% VMT reduction." (RDEIR PDF p. 642 of 1287). In fact, the California Air Pollution Control Officers Association (CAPCOA) publication *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity: Designed for Local Governments, Communities, and Project Developers (Final Draft, December 2021)* establishes a 45% Commute Trip reduction as the maximum possible as shown in the excerpt here. N-13 cont'd

Subsector Maximum

($\sum A_{max\ T\text{-}5\ through\ T\text{-}13} \leq 45\%$) This measure is in the Trip Reduction Programs subsector. This subcategory includes Measures T-5 through T-13. The employee commute VMT reduction from the combined implementation of all measures within this subsector is capped at 45 percent.[1]

The FEIR provides no basis for assuming that a 15% reduction is the maximum possible.

TDM information is not included in the body of the FEIR, but the Responses instead reference the DEIR (which was superseded by the RDEIR). The Responses state:

> As discussed in Impact 3.13-1 in Section 3.13, Transportation and Circulation, of the Draft EIR, the Project would be required to prepare and implement a Transportation Demand Management (TDM) Plan. As part of Mitigation Measure 3.13-1, the proposed Project would be required to monitor and evaluate the effectiveness of the Project's TDM Plan and provide the results to the City of Tracy. Based on the results of the evaluation, modifications to the TDM Plan may be required by the City in order to improve effectiveness toward achieving the home-based work VMT per worker target. A list of TDM measures is included in Table 3.13-2 in Section 3.13 of the Draft EIR.

> Mitigation Measure 3.13-1 was revised as part of this Response to Comments document to include eight additional TDM strategies. See Chapter 3.0 of this Response to Comments document for the final mitigation language. (Responses PDF p. 39 of 692)

The measures proposed are:

- Reduce Parking Supply,
- Travel Behavior Change Program,
- Promotions and Marketing,
- Emergency Ride Home (ERH) Program,
- Ride Share Program,
- Designated Parking Spaces for Car Share Vehicles,
- Include Bike Parking Per City Code,
- Include Secure Bike Parking and Showers,
- Bicycle Repair Station/Services,
- Pedestrian Network Improvements, an
- Provide On-Site Meals. (Responses, PDF p. 617-618 of 692)

N-13 cont'd

The CAPCOA Handbook describes VMT reduction measures at the "Project/Site" and "Plan/Community" level. The Handbook states:

> *The GHG reductions of transportation measures from different scales of application should never be combined.* While it may be possible that a user's project involves measures that affect vehicle trips or VMT at both scales, it is likely that combining the percent reduction from measures of different scales would not be valid.

Most of the TDM measures proposed for this project are at the Project/Site level, but one measure listed, Pedestrian Network Improvements, is at the Plan/Community level and cannot be credited with a VMT reduction for this project.

The FEIR fails to demonstrate that the Project's significant VMT impact would be reduced to the greatest extent feasible by the TDM Plan required by Mitigation Measure 3.13-1. By committing to only a 15% reduction, and possibly achieving this reduction largely through impact fees rather than real reductions in commute trip VMT, the City fails to achieve the maximum feasible VMT mitigation. The FEIR must be revised to incorporate additional VMT mitigation.

The City must incorporate additional TDM reduction measures into the Project to further reduce the Project's significant VMT impacts and bring the Project as close to a 45% reduction as feasible. Absent additional VMT mitigation measures, the City lacks substantial evidence to support the conclusion that the Project's VMT, and corresponding GHG emissions impacts have been lessened to the extent feasible as required by CEQA.

Sincerely,

Norman L. Marshall

Norman L. Marshall

Resume

NORMAN L. MARSHALL, PRESIDENT

nmarshall@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982
Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE: (36 Years, 22 at Smart Mobility, Inc.)

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at RSG for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior and doing planning that coordinates multi-modal transportation with land use and community needs.

Regional Land Use/Transportation Scenario Planning

Portland Area Comprehensive Transportation System (PACTS) – the Portland Maine Metropolitan Planning Organization. Updating regional travel demand model with new data (including AirSage), adding a truck model, and multiclass assignment including differentiation between cash toll and transponder payments.

Loudoun County Virginia Dynamic Traffic Assignment – Enhanced subarea travel demand model to include Dynamic Traffic Assignment (Cube). Model being used to better understand impacts of roadway expansion on induced travel.

Vermont Agency of Transportation-Enhanced statewide travel demand model to evaluate travel impacts of closures and delays resulting from severe storm events. Model uses innovate Monte Carlo simulations process to account for combinations of failures.

California Air Resources Board – Led team including the University of California in $250k project that reviewed the ability of the new generation of regional activity-based models and land use models to accurately account for greenhouse gas emissions from alternative scenarios including more compact walkable land use and roadway pricing. This work included hands-on testing of the most complex travel demand models in use in the U.S. today.

Climate Plan (California statewide) – Assisted large coalition of groups in reviewing and participating in the target setting process required by Senate Bill 375 and administered by the California Air Resources Board to reduce future greenhouse gas emissions through land use measures and other regional initiatives.

Chittenden County (2060 Land use and Transportation Vision Burlington Vermont region) – led extensive public visioning project as part of MPO's long-range transportation plan update.

Flagstaff Metropolitan Planning Organization – Implemented walk, transit and bike models within regional travel demand model. The bike model includes skimming bike networks including on-road and off-road bicycle facilities with a bike level of service established for each segment.

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)— developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the enhanced

model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies.

Municipal Planning

City of Grand Rapids – Michigan Street Corridor – developed peak period subarea model including non-motorized trips based on urban form. Model is being used to develop traffic volumes for several alternatives that are being additional analyzed using the City's Synchro model

City of Omaha - Modified regional travel demand model to properly account for non-motorized trips, transit trips and shorter auto trips that would result from more compact mixed-use development. Scenarios with different roadway, transit, and land use alternatives were modeled.

City of Dublin (Columbus region) – Modified regional travel demand model to properly account for non-motorized trips and shorter auto trips that would result from more compact mixed-use development. The model was applied in analyses for a new downtown to be constructed in the Bridge Street corridor on both sides of an historic village center.

City of Portland, Maine – Implemented model improvements that better account for non-motorized trips and interactions between land use and transportation and applied the enhanced model to two subarea studies.

City of Honolulu – Kaka'ako Transit Oriented Development (TOD) – applied regional travel demand model in estimating impacts of proposed TOD including estimating internal trip capture.

City of Burlington (Vermont) Transportation Plan – Led team that developing Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluated alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Roadway Corridor Planning

I-30 Little Rock Arkansas – Developed enhanced version of regional travel demand model that integrates TransCAD with open source Dynamic Traffic Assignment (DTA) software, and used to model I-30 alternatives. Freeway bottlenecks are modeled much more accurately than in the base TransCAD model.

South Evacuation Lifeline (SELL) – In work for the South Carolina Coastal Conservation League, used Dynamic Travel Assignment (DTA) to estimate evaluation times with different transportation alternatives in coastal South Caroline including a new proposed freeway.

Hudson River Crossing Study (Capital District Transportation Committee and NYSDOT) – Analyzing long term capacity needs for Hudson River bridges which a special focus on the I-90 Patroon Island Bridge where a microsimulation VISSIM model was developed and applied.

PUBLICATIONS AND PRESENTATIONS (partial list)

DTA Love: Co-leader of workshop on Dynamic Traffic Assignment at the June 2019 Transportation Research Board Planning Applications Conference.

Forecasting the Impossible: The Status Quo of Estimating Traffic Flows with Static Traffic Assignment and the Future of Dynamic Traffic Assignment. *Research in Transportation Business and Management* 2018.

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MEMBERSHIPS/AFFILIATIONS

Associate Member, Transportation Research Board (TRB)

Member and Co-Leader Project for Transportation Modeling Reform, Congress for the New Urbanism (CNU)

Resume

NORMAN L. MARSHALL, PRESIDENT

nmarshall@smartmobility.com

EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982
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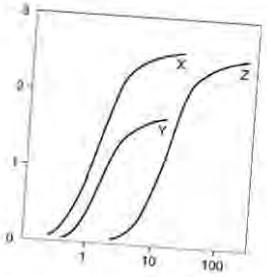
EXHIBIT B



Clark & Associates
Environmental Consulting, Inc.

OFFICE
12405 Venice Blvd
Suite 331
Los Angeles, CA 90066

PHONE
310-907-6165

EMAIL
jclark.assoc@gmail.com

December 3, 2024

Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

Attn: Mr. Kevin Carmichael

Subject: Comments On Final Environmental Impact Report (FEIR) For Tracy COSTCO Depot Annex Project, (SCH # 2020080531) Tracy, California

At the request of Adams Broadwell Joseph & Cardozo (ABJC), Clark and Associates (Clark) has reviewed the materials related to the City of Tracy's (the City's) FEIR,[1] including the Responses to Comments (RTC) for the above referenced project.

Clark's review does not constitute validation or endorsement of the conclusions or content presented in the FEIR. Any lack of comment on specific items should not be interpreted as acceptance or approval of those items.

N-14 cont'd

Project Description:

The Project proposes the construction and operation of two warehouse buildings that would serve as an annex to the existing Costco Depot located approximately 1.5 miles to the west of the Project and as a Direct Distribution Center (DDC). The two buildings (approximately 543,526 square foot (sq ft) for Building 1 and 1,193,198 sq ft for Building 2) would total approximately 1,736,724 square feet. The smaller Building 1 is anticipated to serve as the annex by providing additional storage for high-turnover merchandise processed through the nearby

N-15

[1] De Novo Planning Group. 2024. Final Environmental Impact Report (Response To Comments) For The Tracy COSTCO Depot Annex Project (SCH # 2020080531) Dated September 2024

Costco Depot, a pallet repair facility, and a return to vendor facility for large items returned to a Costco warehouse. The larger Building 2 is anticipated to serve as a DDC, an ecommerce distribution center primarily for large and bulky items ordered online for direct delivery. According to the Project Description, cold storage would not be provided as part of the proposed Project.[2] The FEIR further notes "that there would be no refrigerated warehouse operations or transport refrigeration units (TRUs) as part of the Project. If the Project is approved, the City would include a condition of approval precluding cold uses for the Project."[3] However, the Conditions of Approval for the Project do not include a provision prohibiting the use of the Project for cold storage, therefore it is still possible that cold storage could be part of the Project that is finally approved.

N-15 cont'd

[2] *Ibid.* pg ES-2

[3] *Ibid.* pg ES-2

Figure 1: Regional Location Map

According to the RDEIR[4] the Project Site (or **Annexation Area**) totals 104.46 acres and includes the whole of the Project, including the proposed 103.0-acre Development Area, and 1.46 acres of land along the Delta Mendota Canal (which would not be developed as part of the proposed Project). The Project Site is undeveloped land that was previously used for agricultural purposes. The Site is regularly disked and moved for weed abatement. Surrounding land uses include warehouse distribution and other industrial uses to the north (within the Cordes Ranch Specific Plan Area, located in the City of Tracy), vacant agricultural land within unincorporated San Joaquin County to the east, the Delta Mendota Canal and agricultural land within unincorporated San Joaquin County to the south, and a rural residence, CalFire station, and Delta Mendota Canal to the west (within unincorporated San Joaquin County).

N-15 cont'd

[4] De Novo Planning Group. 2024. Recirculated Draft EIR For The Tracy COSTCO Depot Annex Project (SCH # 2020080531) Dated December 2023. Pg 2.0-1

Figure 2: Project Site Location (Aerial Photo)

N-15 cont'd

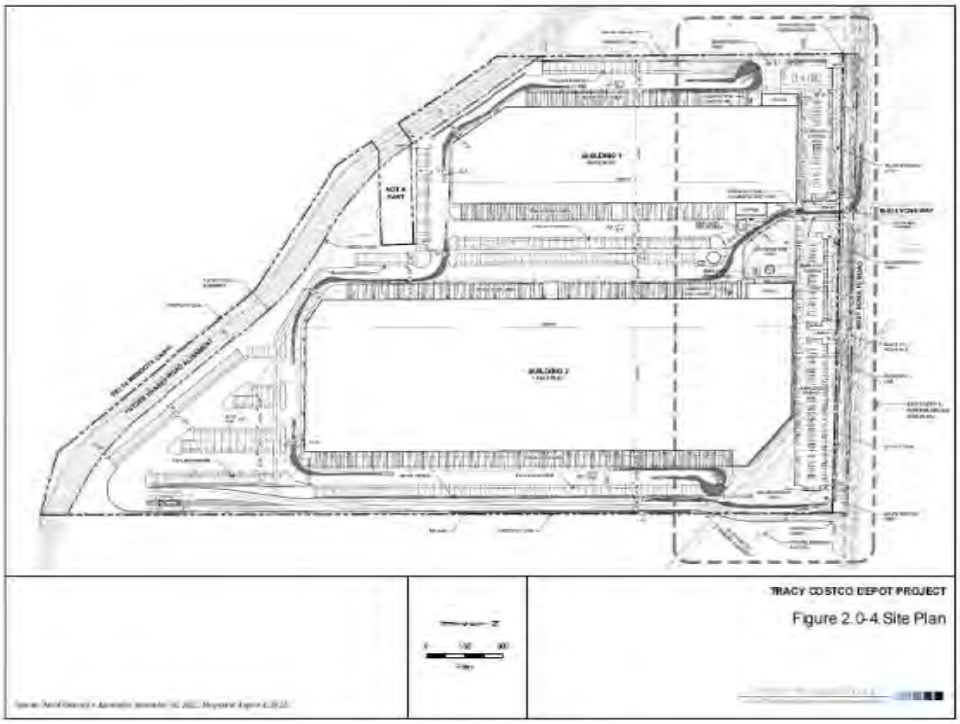


Figure 3: Project Site Plan

N-15 cont'd

The construction of the Project Site is expected to last for approximately 2 years.[5] Construction activities associated with the Project would result in emissions of VOCs, NO_X, SO_X, CO, PM_{10}, and $PM_{2.5}$.

N-16

[5] Ibid. pg 3.3-26

TABLE 3.3-8: ANTICIPATED CONSTRUCTION SCHEDULE

CALEEMOD PHASE	CALEEMOD PHASE START DATE	CALEEMOD PHASE END DATE
Site Preparation	Monday, 7/8/2024	Friday, 7/26/2024
Grading	Monday, 7/29/2024	Friday, 12/20/2024
Off-Site Grading	Tuesday, 12/24/2024	Monday, 12/15/2025
Off-Site Improvements	Monday, 4/14/2025	Monday, 10/20/2025
Off-Site Paving	Tuesday, 10/21/2025	Monday, 12/15/2025
Phase 1 Building Construction	Monday, 12/23/2024	Monday, 12/29/2025
Phase 1 Site Finishing	Monday, 9/29/2025	Sunday, 11/16/2025
Phase 1 Paving	Monday, 11/17/2025	Friday, 12/19/2025
Phase 2 Building Construction	Monday, 12/29/2025	Friday, 8/21/2026
Phase 2 Site Finishing	Monday, 5/18/2026	Monday, 7/20/2026
Phase 2 Paving	Tuesday, 7/21/2026	Friday, 8/7/2026

SOURCE: PROJECT APPLICANT (AUGUST 22, 2023).

N-16 cont'd

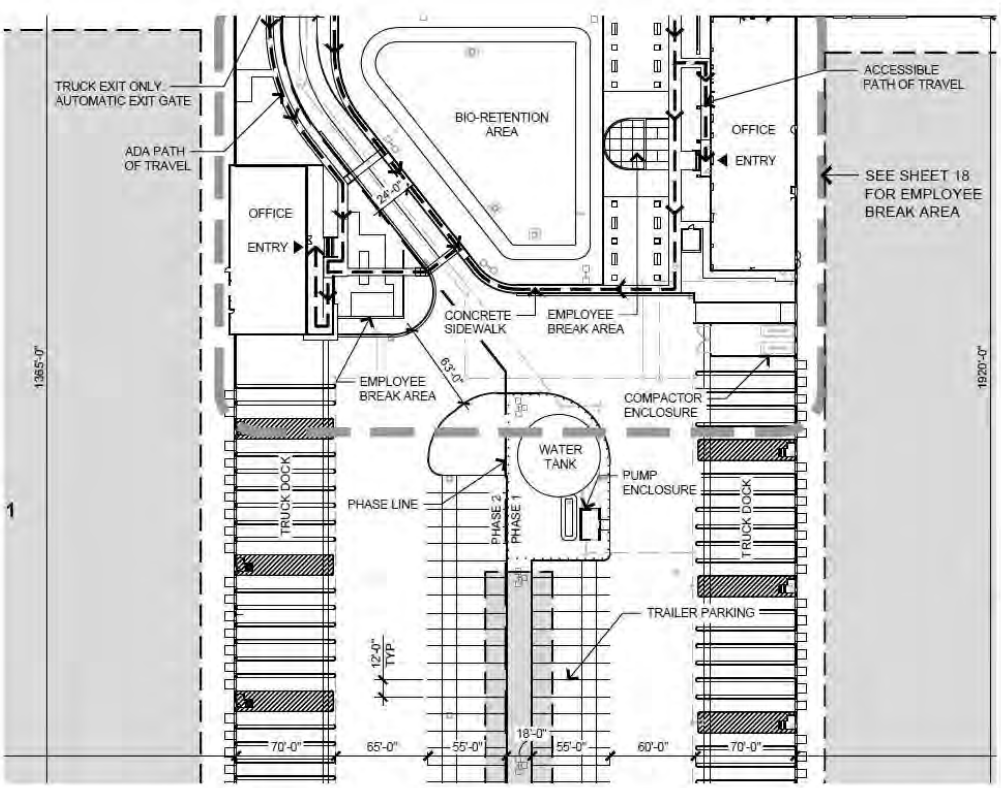
The FEIR's assertion that there are not additional mitigation measures that could impact the significant air quality impacts from the Project is not supported by the data contained in the FEIR.

Specific Comments

1. The Air Quality Analysis Omits Analysis of Onsite Stationary Source Emissions.

N-17

To comply with the California Fire Code and local fire authority requirements, the Project will need to install fire pump systems and likely an on-site back-up generator (BUG). A review of Appendix A to the RDEIR includes the Project Site Plans. On sheet 5 of Appendix A the plans detail the presence of a water tank and pump enclosure.



N-17 cont'd

Several sheets later, (sheet 14 of Appendix A) the plans described the presence of a fire pump house and tank in the same location.

The CalEEMOD analyses for the Project do not show a fire pump or backup generator(s) ("BUG") for the Project. A fire pump house typically contains several key components, each playing a vital role in maintaining the efficiency and reliability of the fire protection system:

1. **Fire Pumps:** The most critical component of the fire protection system is a fire pump house which is responsible for increasing the water pressure in the system. Fire pumps can be driven

by various power sources, including electric motors, diesel engines, and steam turbines.

2. **Controllers:** Fire pump controllers are devices that monitor and control the operation of the fire pump. They ensure the pump starts automatically in response to a drop in system pressure, providing consistent and reliable performance during an emergency.
3. **Jockey Pumps:** Also known as pressure maintenance pumps, jockey pumps are smaller pumps used to maintain system pressure during normal conditions. They compensate for small leaks and pressure drops, ensuring the fire pump remains primed and activated.
4. **Relief Valves:** These valves are designed to prevent excessive pressure buildup in the system, protecting the equipment from damage and ensuring safe operation.
5. **Flow Meters:** Flow meters measure the water flow rate in the system, providing crucial data for monitoring and maintaining optimal performance.
6. **Piping and Valves:** An extensive network of pipes and valves directs the water from the pump to the fire protection system, ensuring efficient and controlled distribution.

N-17 cont'd

Given that the pump enclosure indicated on sheet 14 of Appendix A clearly describes a fire pump house the source of power for the system must be included in the air quality analysis of the Project. According to Mitigation Measure 3.3-6 states that the Project applicant shall ensure that diesel generators shall not be used on site during project operations, except in emergency situations, in which case such generators shall have Best Available Control Technology (BACT) that meets CARB's final Tier IV emission standards. This would make it appear that the use of generators using alternative fuels to diesel would be preferred but does not explicitly prevent the use of diesel-powered generators. Since Mitigation Measure 3.3-5 requires that no natural gas service shall be supplied to the site it is clear that natural gas-powered generators would not be allowed.

Both the fire pump and BUG will require annual testing and maintenance. Under the California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines Guidance, the local air district may permit a new stationary emergency standby diesel-fueled CI engine (> 50 hp) to operate up to 100 hours per year for maintenance and testing if the DPM emissions are less than or equal to 0.01 g/bhp-hr. Assuming a generator for the fire pump house is approximately 900 brake horse power (bhp) and is operated for 100 hours a year to test and maintain the system, the system would generate 900 grams or approximately 2 pounds of DPM. This

additional emissions and resulting burden on the nearby sensitive receptors is unaccounted for in the FEIR. Beyond routine testing emissions, the air quality analysis in the FEIR must also account for the additional operational emissions from BUGs that occur due to unscheduled events, including Public Safety Power Shutoff events and extreme heat events. However, the City's analysis fails to include emissions from stationary equipment (i.e., fire pumps and or BUGs) in its operational emissions assessment, and these sources are omitted from the CalEEMOD modeling. The omission of fire pump and BUG emissions is a significant gap in the Project's emissions inventory, leaving a source of operational emissions unaddressed. N-17 cont'd

2. The FEIR Fails To Account For The Potential Hazards From Battery Storage On Site.

According to the FEIR, the Project would install a solar photovoltaic (PV) roof system, including on-site PV connection to the local electric grid. The on-site Solar PV roof system is anticipated to provide approximately 3-megawatts (MW) of building demand. In addition, a solar microgrid would be included within the Project with adequate battery storage. Sheet 4 from the RTCs indicates that the battery storage area would be adjacent to Building 2. N-18

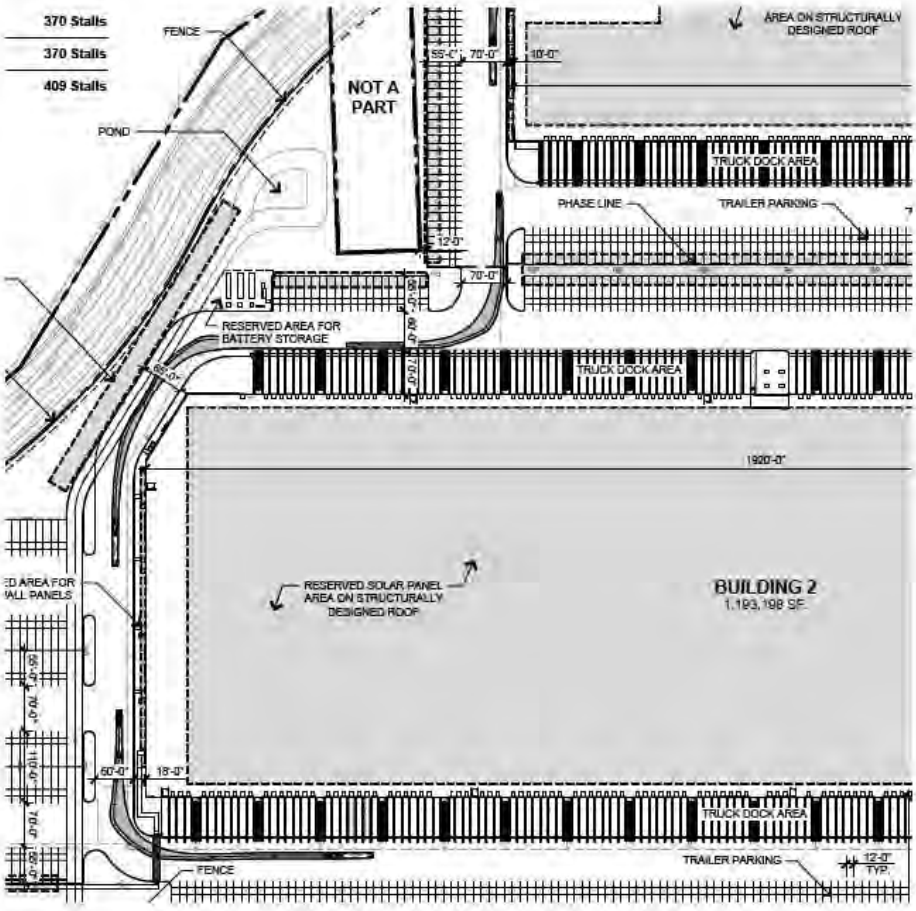


Figure 4: Location of Battery Storage Area

N-18 cont'd

Mitigation Measure 3.3-4 requires that the battery storage system have enough capacity to power the Project's basic building function for 48 hours. Based on the energy consumption rate in the FEIR,[6] the system would need to be able to store 60,494 kWh in the system. As battery systems increase in size so do the potential hazards that they present. Frequently identified hazards from storage batteries include thermal runaway, off-gassing, and stranded energy, along with discharges of

[6] De Novo Planning Group. 2024. Recirculated Draft EIR For The Tracy COSTCO Depot Annex Project (SCH # 2020080531) Dated December 2023. Pg 3.7-33

hazardous chemicals from the batteries themselves.

- Thermal runaway - Thermal runaway is the uncontrollable self-heating of a battery cell. It begins when the heat generated within a battery exceeds the amount of heat that can be dissipated to its surroundings. The initial overheated cell then generates flammable and toxic gasses and can reach a heat high enough to ignite those gasses. This phenomenon can cascade to adjacent cells and progress through the ESS, thus the term "runaway".
- Off Gassing – The gasses that are released from battery energy storage systems (ESS) are highly flammable and toxic. The type of gas released depends on the battery chemistry involved but typically includes gases such as: carbon monoxide, carbon dioxide, hydrogen, methane, ethane, and other hydrocarbons. If the gas is able to reach its lower explosive limit before finding an ignition source, then there is the potential for an explosion.
- Stranded Energy – Standard energy is the term used for when a battery has no safe way of discharging its stored energy. This commonly occurs after an ESS fire has been extinguished and the battery terminals have been damaged. This is a shock hazard to those working with the damaged ESS since it still contains an unknown amount of electrical energy. Stranded energy can also lead to reignition of a fire within minute, hours, or even days after the initial event.

N-18 cont'd

Additionally, the environmental impacts from the placement of batteries in the environment needs to be assessed. Specifically, environmental impacts can lead to battery failure. This can be the result of ambient temperature extremes, seismic activity, floods, ingress of debris or corrosive mists such as dust (deserts) or salt fog (marine locations), or rodent damage to wiring. Some locations subjected to rapid temperature variations such as in the mountains can experience dewing leading to damage within the ESS located outdoors if not well-controlled. It is clear that the FEIR fails to address how the battery storage will be maintained and does assess the hazards from the long-term use of the batteries.

3. Mitigation Measures To Reduce NO_x and Diesel Particulate Matter (DPM) Emissions From The Operational Phase Of The Project Do Not Go Far Enough To Reduce The Emissions.

The Project is anticipated to generate approximately 2,576 passenger vehicle trips and 1,224 heavy-duty truck trips per day. The truck trips would include vehicles delivering materials to the Project Site and vehicles delivering goods from the Project Site. Using the quantifiable Project Sustainability features the FEIR estimated that the Project would generate 15.6 tons (31,200 lbs) of NO_x per year, a significant and unavoidable impact based on the SJVAPCD's threshold. The impact of Mitigation Measure 3.3-1, which requires that during Project operation, operators of heavy-duty trucks that travel to and from the Project site are required to use trucks that have 2010 model year or newer engines that meet the CARB's 2010 engine emission standards of 0.01 g/bhp-hr for particulate matter (PM) and 0.20 g/bhp-hr of NOx emissions, or newer, cleaner trucks and equipment, was not included in the analysis.

Under a recent agreement between Costco and the Sierra Club (Enhanced Measures – EM-B), 72 percent (72%) of heavy-duty trucks transporting goods ***from*** the Project Site will be model year 2014 or zero emission (ZE) vehicles. This measure will only limit emissions starting from the Project Site and will not impact the emissions from vehicles delivering to the Project Site. N-19

By updating the Mitigation Measure to require the use of only heavy-duty vehicles produced in the year 2018 or later (rather than the proposed 2010 or later) delivering products ***to and from*** the Project Site (where not otherwise within the 72% of incoming trucks covered in the Sierra Club settlement), emissions NO_x and DPM would further decrease and result in substantial reductions in otherwise unmitigated emissions. Based on an analysis of emissions from the EMFAC model produced by the California Air Resources Board (CARB), it is clear that vehicles model year 2018 and newer produce 37 percent to 45 percent less emission of NOx, DPM, and reactive organic gases (ROGs) that contribute to GHG formation than those produced from 2010 through 2017. This simply mitigation measure would have no impact on the construction and operational costs of the Project but will net a significant decrease in the emissions from the Project.

4. The FEIR Fails To Address The Necessary Mitigation Measures To Reduce Valley Fever Risks From Particulate Matter Released During Project Construction.

The FEIR fails to adequately address the known presence and significant risk of *Coccidiodes Immitis* (Valley Fever fungus) in Central California. Under California Labor Code Section 6709[e], the county of San Joaquin is an area known to have a high endemic rate of Valley Fever. In the FEIR[7] it was noted that by geographic region, hospitalizations for Valley Fever in the San Joaquin Valley increased from 230 (6.9 per 100,000 population) in 2000 to 701 (17.7 per 100,000 population) in 2007. According to the California Department Of Public Health's (CDPH) Valley Fever Website[8], the rate of Valley Fever illnesses in the County of San Joaquin (location of the Project Site) ranged from 11 in 2001 (a rate of 1.9 per 100,000 population) to 47 in 2007 (a rate of 7.0 in 100,000). From 2008 through 2022, the cases in the County increased, reaching a maximum of 281 cases in 2019 (a rate of 36.4 per 100,000). Based on the provisional reports from the CDPH for 2024, a new maximum of 318 cases has been reached in the first 9-months of the reporting year. Since Valley Fever cases are directly related to the disturbance of soils in the area, the City must directly address the impacts that the Project's construction phase will have on the community. N-20

Dust exposure is a primary risk factor for contracting Valley Fever (via *Coccidiodes imimitis (cocci)* exposure). When soil containing the *cocci* spores are disturbed by construction activities, the fungal spores become airborne, exposing construction workers and other nearby sensitive receptors. The FEIR assumes that meeting San Joaquin Valley Air Pollution Control District's (SJV-APCD's) Rule 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities) would be sufficient to control the impacts from Valley Fever exposure from the Project Site. District Rule 8021 requires limitation of fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities, by implementing control measures such as pre-watering the Project site, phasing construction work to reduce the amount of disturbed surface at any one time, and applying water or other suppressants to unpaved haul/access roads and unpaved

[7] De Novo Planning Group. 2024. Recirculated Draft EIR For The Tracy COSTCO Depot Annex Project (SCH # 2020080531) Dated December 2023. Pg 3.3-39)

[8] CDPH. 2022. Epidemiologic Summary of Valley Fever (Coccidiodomycosis) In California, 2022. Surveillance and Statistics Section, Infection Diseases Branch, Division of Communicable Disease Control, Center For Infectious Diseases, California Department of Public Health.
https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CocciEpiSummary2022.pdf

vehicle/equipment traffic areas. Rule 8021 relies on a visual-opacity reading for dust control and is insufficient to prevent exposure to Valley Fever spores. This rule is based on smoke-monitoring methods (U.S. EPA Methods 9 and 22) that require active monitoring by certified observers, rely on subjective observation, and are affected by variable such as lighting, distance, and weather conditions. Due to these limitations, opacity readings do not provide accurate, continuous data on fine airborne particles.

The most at-risk populations are construction and agricultural workers.[9] Here, construction workers are the very population that would be most directly exposed by the Project. A refereed journal article on occupational exposures notes that "[l]abor groups where occupation involves close contact with the soil are at greater risk, especially if the work involves dusty digging operations."[10]

N-20 cont'd

The potentially exposed population in surrounding areas is much larger than construction workers because the nonselective raising of dust during Project construction will carry the very small spores, 0.002–0.005 millimeters ("mm"), into nonendemic areas, potentially exposing large non-Project-related populations.[11,12] These very small particles are not controlled by conventional construction dust control mitigation measures.

To address these shortcomings, the City should require active monitoring with dust monitors (particle measuring devices) immediately outside of the facility and around its perimeter. Continuous particle measures would offer several advantages. It eliminates the subjectivity inherent in visual opacity readings, leading to more reliable and consistent data. It allows for real-time tracking of dust particle levels, enabling prompt corrective actions if thresholds are exceeded. And it offers robust data sets that can be used for repeatability test and to validate compliance with air quality standards. Incorporating active dust monitoring systems would ensure that air quality impacts are accurately assessed and mitigated, fulfilling the intent of the mitigation measures and conditions of compliance

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[9] Lawrence L. Schmelzer and R. Tabershaw, Exposure Factors in Occupational Coccidioidomycosis, *American Journal of Public Health and the Nation's Health*, v. 58, no. 1, 1968, pp. 107–113, Table 3; available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1228046/?page=1.

[10] *Ibid.*, p. 110.

[11] Schmelzer and Tabershaw, 1968, p. 110; Pappagianis and Einstein, 1978

[12] Pappagianis and Einstein, 1978, p. 527 ("The northern areas were not directly affected by the ground level windstorm that had struck Kern County but the dust was lifted to several thousand feet elevation and, borne on high currents, the soil and arthrospores along with some moisture were gently deposited on sidewalks and automobiles as 'a mud storm' that vexed the residents of much of California." The storm originating in Kern County, for example, had major impacts in the San Francisco Bay Area and Sacramento).

to protect public health and the environment.

Based on the conventional mitigation measures and modeling of dust movement in the CalEEMOD model (utilized in the FEIR) watering exposed areas twice a day would reduce PM_{10} and $PM_{2.5}$ emissions by 61 percent (61%). Increasing the watering frequency to 3 times per day would reduce PM_{10} and $PM_{2.5}$ emissions by 74%. Conventional dust control measures primarily focus on visible dust or larger dust particles—the PM_{10} fraction—and fail to address the very fine particles that transport Valley Fever spores, which are approximately 5 times smaller than typical PM_{10} particles and remain airborne much longer.[13] These fine particles, when disturbed by soil-disturbing activities, spread widely beyond site, posing a significant risk to both onsite workers and nearby communities.

Additionally, sampling for and removal of impacted soils prior to the initiation of construction activities is the best solution to *Coccidiodes immitis* spores. Since *Coccidiodes immitis* resides in soils and are not subject to degradation, entrainment of the potentially impacted soils may cause additional issues to further development of the site. N-20 cont'd

The City may be assuming that California Labor Code Section 6709[e], which requires "awareness training" on Valley Fever, coupled with SJV-APCD's Rule 8021 would be sufficient to protect construction workers. However, the education component of Section 6709[e] would not be protective enough to ensure worker safety and prevent exposure. The City should require that the Proponent implement mitigation measures to actively suppress the spread of Valley Fever by:

1. Include specific requirements in the Project's Injury and Illness Prevention Program (as required by Title 8, Section 3203) regarding safeguards to prevent Valley Fever.
2. Control dust exposure:
    - Apply water to all disturbed areas a minimum of three times per day. Watering frequency should be increased to a minimum of *four times per day* if there is any evidence of visible wind-driven fugitive dust;
    - Provide and require the use of National Institute for Occupational Safety and Health (NIOSH)-approved respirators for workers with a prior history of Valley Fever.

[13] See, e.g., Cummings and others, 2010, p. 509; Schneider et al., 1997, p. 908 ("Primary prevention strategies (e.g., dust-control measures) for coccidioidomycosis in endemic areas have limited effectiveness.").

- Require the use of half-face respirators equipped with a minimum N-95 protection factor for use during worker collocation with surface disturbance activities. Half-face respirators equipped with N-100 or P-100 filters should be used during digging activities. Employees should wear respirators when working near earth-moving machinery.
- Prohibit eating and smoking at the worksite, and provide separate, clean eating areas with hand-washing facilities.
- Avoid outdoor construction operations during unusually windy conditions or in dust storms.
- Consider limiting outdoor construction during the fall to essential jobs only, as the risk of cocci infection is higher during this season.

3. Prevent transport of cocci outside endemic areas:
   - Thoroughly clean equipment, vehicles, and other items before they are moved off-site to other work locations.
   - Prevent spillage or loss of bulk material from holes or other openings in the cargo compartment's floor, sides, and/or tailgate;
   - Load all haul trucks such that the freeboard is not less than six inches when material is transported on any paved public access road and apply water to the top of the load and then cover haul trucks with a tarp or other suitable cover.
   - Provide workers with coveralls daily, lockers (or other systems for keeping work and street clothing and shoes separate), daily changing and showering facilities.
   - Clothing should be changed after work every day, preferably at the work site.
   - Train workers to recognize that cocci may be transported offsite on contaminated equipment, clothing, and shoes; alternatively, consider installing boot-washing.
   - Post warnings onsite and consider limiting access to visitors, especially those without adequate training and respiratory protection.
4. Improve medical surveillance for employees:
   - Employees should have prompt access to medical care, including suspected work-related illnesses and injuries.
   - Work with a medical professional to develop a protocol to medically evaluate employees who have symptoms of Valley Fever.

N-20 cont'd

- Consider preferentially contracting with 1-2 clinics in the area and communicate with the health care providers in those clinics to ensure that providers are aware that Valley Fever has been reported in the area. This will increase the likelihood that ill workers will receive prompt, proper and consistent medical care.
- Respirator clearance should include medical evaluation for all new employees, annual re-evaluation for changes in medical status, and annual training, and fit-testing.
- Skin testing is not recommended for evaluation of Valley Fever.[14]
- If an employee is diagnosed with Valley Fever, a physician must determine if the employee should be taken off work, when they may return to work, and what type of work activities they may perform.

N-20 cont'd

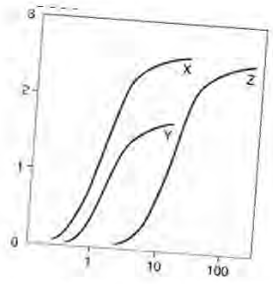
The City must adopt these evidence-based mitigation measures – proven effective in similar construction projects in endemic areas to ensure comprehensive protection of public health. Standard dust control measures are insufficient for preventing Valley Fever exposure, and only concrete, enforceable steps like those listed above will safeguard both onsite workers and surrounding communities.

Conclusion

The facts presented in this comment letter lead me to reasonably conclude that the Project will result in significant impacts without additional mitigation efforts. N-21

Sincerely,

[14] Short-term skin tests that produce results within 48 hours are now available. See Kerry Klein, NPR for Central California, New Valley Fever Skin Test Shows Promise, But Obstacles Remain, November 21, 2016; available at http://kvpr.org/post/new-valley-fever-skin-test-shows-promise-obstacles-remain.



Clark & Associates
Environmental Consulting, Inc

OFFICE
12405 Venice Blvd.
Suite 331
Los Angeles, CA 90066

PHONE
310-907-6165

FAX
310-398-7626

EMAIL
jclark.assoc@gmail.com

James J. J. Clark, Ph.D.

Principal Toxicologist

Toxicology/Exposure Assessment Modeling
Risk Assessment/Analysis/Dispersion Modeling

Education:

Ph.D., Environmental Health Science, University of California, 1995
M.S., Environmental Health Science, University of California, 1993
B.S., Biophysical and Biochemical Sciences, University of Houston, 1987

Professional Experience:

Dr. Clark is a well recognized toxicologist, air modeler, and health scientist. He has 20 years of experience in researching the effects of environmental contaminants on human health including environmental fate and transport modeling (SCREEN3, AEROMOD, ISCST3, Johnson-Ettinger Vapor Intrusion Modeling); exposure assessment modeling (partitioning of contaminants in the environment as well as PBPK modeling); conducting and managing human health risk assessments for regulatory compliance and risk-based clean-up levels; and toxicological and medical literature research.

Significant projects performed by Dr. Clark include the following:

LITIGATION SUPPORT

Case: James Harold Caygle, et al, v. Drummond Company, Inc. Circuit Court for the Tenth Judicial Circuit, Jefferson County, Alabama. Civil Action. CV-2009

Client: Environmental Litgation Group, Birmingham, Alabama

Dr. Clark performed an air quality assessment of emissions from a coke factory located in Tarrant, Alabama. The assessment reviewed include a comprehensive review of air quality standards, measured concentrations of pollutants from factory, an inspection of the facility and detailed assessment of the impacts on the community. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Settlement in favor of plaintiff.

Case: Rose Roper V. Nissan North America, et al. Superior Court of the State Of California for the County Of Los Angeles – Central Civil West. Civil Action. NC041739

Client: Rose, Klein, Marias, LLP, Long Beach, California

Dr. Clark performed a toxicological assessment of an individual occupationally exposed to multiple chemicals, including benzene, who later developed a respiratory distress. A review of the individual's medical and occupational history was performed to prepare an exposure assessment. The exposure assessment was evaluated against the known outcomes in published literature to exposure to respiratory irritants. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Settlement in favor of plaintiff.

Case: O'Neil V. Sherwin Williams, et al. United States District Court Central District of California

Client: Rose, Klein, Marias, LLP, Long Beach, California

Dr. Clark performed a toxicological assessment of an individual occupationally exposed to petroleum distillates who later developed a bladder cancer. A review of the individual's medical and occupational history was performed to prepare a quantitative exposure assessment. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Summary judgment for defendants.

Case: Moore V., Shell Oil Company, et al. Superior Court of the State Of California for the County Of Los Angeles

Client: Rose, Klein, Marias, LLP, Long Beach, California

Dr. Clark performed a toxicological assessment of an individual occupationally exposed to chemicals while benzene who later developed a leukogenic disease. A review of the individual's medical and occupational history was performed to prepare a quantitative exposure assessment. The exposure assessment was evaluated against the known outcomes in published literature to exposure to refined petroleum hydrocarbons. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Settlement in favor of plaintiff.

Case: Raymond Saltonstall V. Fuller O'Brien, KILZ, and Zinsser, et al. United States District Court Central District of California

Client: Rose, Klein, Marias, LLP, Long Beach, California

Dr. Clark performed a toxicological assessment of an individual occupationally exposed to benzene who later developed a leukogenic disease. A review of the individual's medical and occupational history was performed to prepare a quantitative exposure assessment. The exposure assessment was evaluated against the known outcomes in published literature to exposure to refined petroleum hydrocarbons. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Settlement in favor of plaintiff.

Case: Richard Boyer and Elizabeth Boyer, husband and wife, V. DESCO Corporation, et al. Circuit Court of Brooke County, West Virginia. Civil Action Number 04-C-7G.

Client: Frankovitch, Anetakis, Colantonio & Simon, Morgantown, West Virginia.

Dr. Clark performed a toxicological assessment of a family exposed to chlorinated solvents released from the defendant's facility into local drinking water supplies. A review of the individual's medical and occupational history was performed to prepare a qualitative exposure assessment. The exposure assessment was evaluated against the known outcomes in published literature to exposure to chlorinated solvents. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Settlement in favor of plaintiff.

Case: JoAnne R. Cook, V. DESCO Corporation, et al. Circuit Court of Brooke County, West Virginia. Civil Action Number 04-C-9R

Client: Frankovitch, Anetakis, Colantonio & Simon, Morgantown, West Virginia.

Dr. Clark performed a toxicological assessment of an individual exposed to chlorinated solvents released from the defendant's facility into local drinking water supplies. A review of the individual's medical and occupational history was performed to prepare a qualitative exposure assessment. The exposure assessment was evaluated against the known outcomes in published literature to exposure to chlorinated solvents. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Settlement in favor of plaintiff.

Case: Patrick Allen And Susan Allen, husband and wife, and Andrew Allen, a minor, V. DESCO Corporation, et al. Circuit Court of Brooke County, West Virginia. Civil Action Number 04-C-W

Client: Frankovitch, Anetakis, Colantonio & Simon, Morgantown, West Virginia.

Dr. Clark performed a toxicological assessment of a family exposed to chlorinated solvents released from the defendant's facility into local drinking water supplies. A review of the individual's medical and occupational history was performed to prepare a qualitative exposure assessment. The exposure assessment was evaluated against the known outcomes in published literature to exposure to chlorinated solvents. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Settlement in favor of plaintiff.

Case: Michael Fahey, Susan Fahey V. Atlantic Richfield Company, et al. United States District Court Central District of California Civil Action Number CV-06 7109 JCL.

Client: Rose, Klein, Marias, LLP, Long Beach, California

Dr. Clark performed a toxicological assessment of an individual occupationally exposed to refined petroleum hydrocarbons who later developed a leukogenic disease. A review of the individual's medical and occupational history was performed to prepare a qualitative exposure assessment. The exposure assessment was evaluated against the known outcomes in published literature to exposure to refined petroleum hydrocarbons. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Settlement in favor of plaintiff.

Case: Constance Acevedo, et al., V. California Spray-Chemical Company, et al., Superior Court of the State Of California, County Of Santa Cruz. Case No. CV 146344

Dr. Clark performed a comprehensive exposure assessment of community members exposed to toxic metals from a former lead arsenate manufacturing facility. The former manufacturing site had undergone a DTSC mandated removal action/remediation for the presence of the toxic metals at the site. Opinions were presented regarding the elevated levels of arsenic and lead (in attic dust and soils) found throughout the community and the potential for harm to the plaintiffs in question.

Case Result: Settlement in favor of defendant.

Case: Michael Nawrocki V. The Coastal Corporation, Kurk Fuel Company, Pautler Oil Service, State of New York Supreme Court, County of Erie, Index Number 12001-11247

Client: Richard G. Berger Attorney At Law, Buffalo, New York

Dr. Clark performed a toxicological assessment of an individual occupationally exposed to refined petroleum hydrocarbons who later developed a leukogenic disease. A review of the individual's medical and occupational history was performed to prepare a qualitative exposure assessment. The exposure assessment was evaluated against the

known outcomes in published literature to exposure to refined petroleum hydrocarbons. The results of the assessment and literature have been provided in a declaration to the court.

Case Result: Judgement in favor of defendant.

SELECTED AIR MODELING RESEARCH/PROJECTS

Client – Confidential

Dr. Clark performed a comprehensive evaluation of criteria pollutants, air toxins, and particulate matter emissions from a carbon black production facility to determine the impacts on the surrounding communities. The results of the dispersion model will be used to estimate acute and chronic exposure concentrations to multiple contaminants and will be incorporated into a comprehensive risk evaluation.

Client – Confidential

Dr. Clark performed a comprehensive evaluation of air toxins and particulate matter emissions from a railroad tie manufacturing facility to determine the impacts on the surrounding communities. The results of the dispersion model have been used to estimate acute and chronic exposure concentrations to multiple contaminants and have been incorporated into a comprehensive risk evaluation.

Client – Los Angeles Alliance for a New Economy (LAANE), Los Angeles, California

Dr. Clark is advising the LAANE on air quality issues related to current flight operations at the Los Angeles International Airport (LAX) operated by the Los Angeles World Airport (LAWA) Authority. He is working with the LAANE and LAX staff to develop a comprehensive strategy for meeting local community concerns over emissions from flight operations and to engage federal agencies on the issue of local impacts of community airports.

Client – City of Santa Monica, Santa Monica, California

Dr. Clark is advising the City of Santa Monica on air quality issues related to current flight operations at the facility. He is working with the City staff to develop a comprehensive strategy for meeting local community concerns over emissions from flight operations and to engage federal agencies on the issue of local impacts of community airports.

Client: Omnitrans, San Bernardino, California

Dr. Clark managed a public health survey of three communities near transit fueling facilities in San Bernardino and Montclair California in compliance with California Senate Bill 1927. The survey included an epidemiological survey of the effected communities, emission surveys of local businesses, dispersion modeling to determine potential emission concentrations within the communities, and a comprehensive risk assessment of each community. The results of the study were presented to the Governor as mandated by Senate Bill 1927.

Client: Confidential, San Francisco, California

Summarized cancer types associated with exposure to metals and smoking. Researched the specific types of cancers associated with exposure to metals and smoking. Provided causation analysis of the association between cancer types and exposure for use by non-public health professionals.

Client: Confidential, Minneapolis, Minnesota

Prepared human health risk assessment of workers exposed to VOCs from neighboring petroleum storage/transport facility. Reviewed the systems in place for distribution of petroleum hydrocarbons to identify chemicals of concern (COCs), prepared comprehensive toxicological summaries of COCs, and quantified potential risks from carcinogens and non-carcinogens to receptors at or adjacent to site. This evaluation was used in the support of litigation.

Client – United Kingdom Environmental Agency

Dr. Clark is part of team that performed comprehensive evaluation of soil vapor intrusion of VOCs from former landfill adjacent residences for the United Kingdom's Environment

Agency. The evaluation included collection of liquid and soil vapor samples at site, modeling of vapor migration using the Johnson Ettinger Vapor Intrusion model, and calculation of site-specific health based vapor thresholds for chlorinated solvents, aromatic hydrocarbons, and semi-volatile organic compounds. The evaluation also included a detailed evaluation of the use, chemical characteristics, fate and transport, and toxicology of chemicals of concern (COC). The results of the evaluation have been used as a briefing tool for public health professionals.

EMERGING/PERSISTENT CONTAMINANT RESEARCH/PROJECTS

Client: Ameren Services, St. Louis, Missouri

Managed the preparation of a comprehensive human health risk assessment of workers and residents at or near an NPL site in Missouri. The former operations at the Property included the servicing and repair of electrical transformers, which resulted in soils and groundwater beneath the Property and adjacent land becoming impacted with PCB and chlorinated solvent compounds. The results were submitted to U.S. EPA for evaluation and will be used in the final ROD.

Client: City of Santa Clarita, Santa Clarita, California

Dr. Clark is managing the oversight of the characterization, remediation and development activities of a former 1,000 acre munitions manufacturing facility for the City of Santa Clarita. The site is impacted with a number of contaminants including perchlorate, unexploded ordinance, and volatile organic compounds (VOCs). The site is currently under a number of regulatory consent orders, including an Immanent and Substantial Endangerment Order. Dr. Clark is assisting the impacted municipality with the development of remediation strategies, interaction with the responsible parties and stakeholders, as well as interfacing with the regulatory agency responsible for oversight of the site cleanup.

Client: Confidential, Los Angeles, California

Prepared comprehensive evaluation of perchlorate in environment. Dr. Clark evaluated the production, use, chemical characteristics, fate and transport, toxicology, and remediation of perchlorate. Perchlorates form the basis of solid rocket fuels and have recently been detected in water supplies in the United States. The results of this research

were presented to the USEPA, National GroundWater, and ultimately published in a recent book entitled *Perchlorate in the Environment.*

Client – Confidential, Los Angeles, California

Dr. Clark is performing a comprehensive review of the potential for pharmaceuticals and their by-products to impact groundwater and surface water supplies. This evaluation will include a review if available data on the history of pharmaceutical production in the United States; the chemical characteristics of various pharmaceuticals; environmental fate and transport; uptake by xenobiotics; the potential effects of pharmaceuticals on water treatment systems; and the potential threat to public health. The results of the evaluation may be used as a briefing tool for non-public health professionals.

PUBLIC HEALTH/TOXICOLOGY

Client: Brayton Purcell, Novato, California

Dr. Clark performed a toxicological assessment of residents exposed to methyl-tertiary butyl ether (MTBE) from leaking underground storage tanks (LUSTs) adjacent to the subject property. The symptomology of residents and guests of the subject property were evaluated against the known outcomes in published literature to exposure to MTBE. The study found that residents had been exposed to MTBE in their drinking water; that concentrations of MTBE detected at the site were above regulatory guidelines; and, that the symptoms and outcomes expressed by residents and guests were consistent with symptoms and outcomes documented in published literature.

Client: Confidential, San Francisco, California

Identified and analyzed fifty years of epidemiological literature on workplace exposures to heavy metals. This research resulted in a summary of the types of cancer and non-cancer diseases associated with occupational exposure to chromium as well as the mortality and morbidity rates.

Client: Confidential, San Francisco, California

Summarized major public health research in United States. Identified major public health research efforts within United States over last twenty years. Results were used as a briefing tool for non-public health professionals.

Client: Confidential, San Francisco, California

Quantified the potential multi-pathway dose received by humans from a pesticide applied indoors. Part of team that developed exposure model and evaluated exposure concentrations in a comprehensive report on the plausible range of doses received by a specific person. This evaluation was used in the support of litigation.

Client: Covanta Energy, Westwood, California

Evaluated health risk from metals in biosolids applied as soil amendment on agricultural lands. The biosolids were created at a forest waste cogeneration facility using 96% whole tree wood chips and 4 percent green waste. Mass loading calculations were used to estimate Cr(VI) concentrations in agricultural soils based on a maximum loading rate of 40 tons of biomass per acre of agricultural soil. The results of the study were used by the Regulatory agency to determine that the application of biosolids did not constitute a health risk to workers applying the biosolids or to residences near the agricultural lands.

Client – United Kingdom Environmental Agency

Oversaw a comprehensive toxicological evaluation of methyl-*tertiary* butyl ether (M*t*BE) for the United Kingdom's Environment Agency. The evaluation included available data on the production, use, chemical characteristics, fate and transport, toxicology, and remediation of M*t*BE. The results of the evaluation have been used as a briefing tool for public health professionals.

Client – Confidential, Los Angeles, California

Prepared comprehensive evaluation of *tertiary* butyl alcohol (TBA) in municipal drinking water system. TBA is the primary breakdown product of M*t*BE, and is suspected to be the primary cause of M*t*BE toxicity. This evaluation will include available information on the production, use, chemical characteristics, fate and transport in the environment, absorption, distribution, routes of detoxification, metabolites, carcinogenic potential, and remediation of TBA. The results of the evaluation were used as a briefing tool for non-public health professionals.

Client – Confidential, Los Angeles, California

Prepared comprehensive evaluation of methyl *tertiary* butyl ether (MTBE) in municipal drinking water system. MTBE is a chemical added to gasoline to increase the octane

rating and to meet Federally mandated emission criteria. The evaluation included available data on the production, use, chemical characteristics, fate and transport, toxicology, and remediation of MTBE. The results of the evaluation have been were used as a briefing tool for non-public health professionals.

Client – Ministry of Environment, Lands & Parks, British Columbia

Dr. Clark assisted in the development of water quality guidelines for methyl tertiary-butyl ether (MTBE) to protect water uses in British Columbia (BC). The water uses to be considered includes freshwater and marine life, wildlife, industrial, and agricultural (e.g., irrigation and livestock watering) water uses. Guidelines from other jurisdictions for the protection of drinking water, recreation and aesthetics were to be identified.

Client: Confidential, Los Angeles, California

Prepared physiologically based pharmacokinetic (PBPK) assessment of lead risk of receptors at middle school built over former industrial facility. This evaluation is being used to determine cleanup goals and will be basis for regulatory closure of site.

Client: Kaiser Venture Incorporated, Fontana, California

Prepared PBPK assessment of lead risk of receptors at a 1,100-acre former steel mill. This evaluation was used as the basis for granting closure of the site by lead regulatory agency.

RISK ASSESSMENTS/REMEDIAL INVESTIGATIONS

Client: Confidential, Atlanta, Georgia

Researched potential exposure and health risks to community members potentially exposed to creosote, polycyclic aromatic hydrocarbons, pentachlorophenol, and dioxin compounds used at a former wood treatment facility. Prepared a comprehensive toxicological summary of the chemicals of concern, including the chemical characteristics, absorption, distribution, and carcinogenic potential. Prepared risk characterization of the carcinogenic and non-carcinogenic chemicals based on the exposure assessment to quantify the potential risk to members of the surrounding community. This evaluation was used to help settle class-action tort.

Client: Confidential, Escondido, California

Prepared comprehensive Preliminary Endangerment Assessment (PEA) of dense non-aqueous liquid phase hydrocarbon (chlorinated solvents) contamination at a former printed circuit board manufacturing facility. This evaluation was used for litigation support and may be used as the basis for reaching closure of the site with the lead regulatory agency.

Client: Confidential, San Francisco, California

Summarized epidemiological evidence for connective tissue and autoimmune diseases for product liability litigation. Identified epidemiological research efforts on the health effects of medical prostheses. This research was used in a meta-analysis of the health effects and as a briefing tool for non-public health professionals.

Client: Confidential, Bogotá, Columbia

Prepared comprehensive evaluation of the potential health risks associated with the redevelopment of a 13.7 hectares plastic manufacturing facility in Bogotá, Colombia. The risk assessment was used as the basis for the remedial goals and closure of the site.

Client: Confidential, Los Angeles, California

Prepared comprehensive human health risk assessment of students, staff, and residents potentially exposed to heavy metals (principally cadmium) and VOCs from soil and soil vapor at 12-acre former crude oilfield and municipal landfill. The site is currently used as a middle school housing approximately 3,000 children. The evaluation determined that the site was safe for the current and future uses and was used as the basis for regulatory closure of site.

Client: Confidential, Los Angeles, California

Managed remedial investigation (RI) of heavy metals and volatile organic chemicals (VOCs) for a 15-acre former manufacturing facility. The RI investigation of the site included over 800 different sampling locations and the collection of soil, soil gas, and groundwater samples. The site is currently used as a year round school housing approximately 3,000 children. The Remedial Investigation was performed in a manner

that did not interrupt school activities and met the time restrictions placed on the project by the overseeing regulatory agency. The RI Report identified the off-site source of metals that impacted groundwater beneath the site and the sources of VOCs in soil gas and groundwater. The RI included a numerical model of vapor intrusion into the buildings at the site from the vadose zone to determine exposure concentrations and an air dispersion model of VOCs from the proposed soil vapor treatment system. The Feasibility Study for the Site is currently being drafted and may be used as the basis for granting closure of the site by DTSC.

Client: Confidential, Los Angeles, California

Prepared comprehensive human health risk assessment of students, staff, and residents potentially exposed to heavy metals (principally lead), VOCs, SVOCs, and PCBs from soil, soil vapor, and groundwater at 15-acre former manufacturing facility. The site is currently used as a year round school housing approximately 3,000 children. The evaluation determined that the site was safe for the current and future uses and will be basis for regulatory closure of site.

Client: Confidential, Los Angeles, California

Prepared comprehensive evaluation of VOC vapor intrusion into classrooms of middle school that was former 15-acre industrial facility. Using the Johnson-Ettinger Vapor Intrusion model, the evaluation determined acceptable soil gas concentrations at the site that did not pose health threat to students, staff, and residents. This evaluation is being used to determine cleanup goals and will be basis for regulatory closure of site.

Client –Dominguez Energy, Carson, California

Prepared comprehensive evaluation of the potential health risks associated with the redevelopment of 6-acre portion of a 500-acre oil and natural gas production facility in Carson, California. The risk assessment was used as the basis for closure of the site.

Kaiser Ventures Incorporated, Fontana, California

Prepared health risk assessment of semi-volatile organic chemicals and metals for a fifty-year old wastewater treatment facility used at a 1,100-acre former steel mill. This evaluation was used as the basis for granting closure of the site by lead regulatory agency.

ANR Freight - Los Angeles, California

Prepared a comprehensive Preliminary Endangerment Assessment (PEA) of petroleum hydrocarbon and metal contamination of a former freight depot. This evaluation was as the basis for reaching closure of the site with lead regulatory agency.

Kaiser Ventures Incorporated, Fontana, California

Prepared comprehensive health risk assessment of semi-volatile organic chemicals and metals for 23-acre parcel of a 1,100-acre former steel mill. The health risk assessment was used to determine clean up goals and as the basis for granting closure of the site by lead regulatory agency. Air dispersion modeling using ISCST3 was performed to determine downwind exposure point concentrations at sensitive receptors within a 1 kilometer radius of the site. The results of the health risk assessment were presented at a public meeting sponsored by the Department of Toxic Substances Control (DTSC) in the community potentially affected by the site.

Unocal Corporation - Los Angeles, California

Prepared comprehensive assessment of petroleum hydrocarbons and metals for a former petroleum service station located next to sensitive population center (elementary school). The assessment used a probabilistic approach to estimate risks to the community and was used as the basis for granting closure of the site by lead regulatory agency.

Client: Confidential, Los Angeles, California

Managed oversight of remedial investigation most contaminated heavy metal site in California. Lead concentrations in soil excess of 68,000,000 parts per billion (ppb) have been measured at the site. This State Superfund Site was a former hard chrome plating operation that operated for approximately 40-years.

Client: Confidential, San Francisco, California

Coordinator of regional monitoring program to determine background concentrations of metals in air. Acted as liaison with SCAQMD and CARB to perform co-location sampling and comparison of accepted regulatory method with ASTM methodology.

Client: Confidential, San Francisco, California

Analyzed historical air monitoring data for South Coast Air Basin in Southern California and potential health risks related to ambient concentrations of carcinogenic metals and volatile organic compounds. Identified and reviewed the available literature and calculated risks from toxins in South Coast Air Basin.

IT Corporation, North Carolina

Prepared comprehensive evaluation of potential exposure of workers to air-borne VOCs at hazardous waste storage facility under SUPERFUND cleanup decree. Assessment used in developing health based clean-up levels.

Professional Associations

American Public Health Association (APHA)
Association for Environmental Health and Sciences (AEHS)
American Chemical Society (ACS)
California Redevelopment Association (CRA)
International Society of Environmental Forensics (ISEF)
Society of Environmental Toxicology and Chemistry (SETAC)

Publications and Presentations:

Books and Book Chapters

Sullivan, P., **J.J. J. Clark,** F.J. Agardy, and P.E. Rosenfeld. (2007). *Synthetic Toxins In The Food, Water and Air of American Cities.* Elsevier, Inc. Burlington, MA.

Sullivan, P. and **J.J. J. Clark**. 2006. *Choosing Safer Foods, A Guide To Minimizing Synthetic Chemicals In Your Diet.* Elsevier, Inc. Burlington, MA.

Sullivan, P., Agardy, F.J., and **J.J.J. Clark**. 2005. *The Environmental Science of Drinking Water.* Elsevier, Inc. Burlington, MA.

Sullivan, P.J., Agardy, F.J., **Clark, J.J.J.** 2002. *America's Threatened Drinking Water: Hazards and Solutions.* Trafford Publishing, Victoria B.C.

Clark, J.J.J. 2001. "TBA: Chemical Properties, Production & Use, Fate and Transport, Toxicology, Detection in Groundwater, and Regulatory Standards" in *Oxygenates in the Environment.* Art Diaz, Ed.. Oxford University Press: New York.

Clark, J.J.J. 2000. "Toxicology of Perchlorate" in *Perchlorate in the Environment.* Edward Urbansky, Ed. Kluwer/Plenum: New York.

Clark, J.J.J. 1995. Probabilistic Forecasting of Volatile Organic Compound Concentrations At The Soil Surface From Contaminated Groundwater. UMI.

Baker, J.; **Clark, J.J.J.**; Stanford, J.T. 1994. Ex Situ Remediation of Diesel Contaminated Railroad Sand by Soil Washing. Principles and Practices for Diesel Contaminated Soils, Volume III. P.T. Kostecki, E.J. Calabrese, and C.P.L. Barkan, eds. Amherst Scientific Publishers, Amherst, MA. pp 89-96.

Journal and Proceeding Articles

Tam L. K.., Wu C. D., Clark J. J. and **Rosenfeld, P.E.** (2008) A Statistical Analysis Of Attic Dust And Blood Lipid Concentrations Of Tetrachloro-p-Dibenzodioxin (TCDD) Toxicity Equialency Quotients (TEQ) In Two Populations Near Wood Treatment Facilities. Organohalogen Compounds, Volume 70 (2008) page 002254.

Tam L. K.., Wu C. D., Clark J. J. and **Rosenfeld, P.E.** (2008) Methods For Collect Samples For Assessing Dioxins And Other Environmental Contaminants In Attic Dust: A Review. Organohalogen Compounds, Volume 70 (2008) page 000527

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Hensley A.R., Scott, A., Rosenfeld P.E., **Clark, J.J.J.** 2006. "Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility." The 26th International Symposium on Halogenated Persistent Organic Pollutants – DIOXIN2006, August 21 – 25, 2006. Radisson SAS Scandinavia Hotel in Oslo Norway.

Rosenfeld, P.E., **Clark, J. J.** and Suffet, I.H. 2005. "The Value Of An Odor Quality Classification Scheme For Compost Facility Evaluations" The U.S. Composting Council's 13th Annual Conference January 23 - 26, 2005, Crowne Plaza Riverwalk, San Antonio, TX.

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Response to Letter N: San Joaquin Residents for Responsible Development

Response N-1: This comment includes introductory statements to the comment letter. The commenter has correctly described the project description, public review process for the Draft EIR and Recirculated Draft EIR, and the Settlement Agreement. No further response is warranted.

Response N-2: The commenter's individual concerns described in this comment are addressed in Responses N-3 through N-21. The project and the responses herein comply with CEQA and recirculation of the Final EIR is not required or warranted.

Response N-3: This comment does not address CEQA or the EIR. No further response is warranted.

Response N-4: Significant new information has not been added to the EIR. As such, recirculation of the EIR is not warranted or required. See Responses N-5 through N-21 for detailed responses to the commenter's concerns.

Response N-5: The commentor notes that various Project documentation, including site plans and Mitigation Measure 3.3-6, indicate the use of a fire pump and allow for the use of Tier 4 back-up diesel generators in emergency situations. The commentor goes on to state that use of diesel-powered fire pump and back-up power will generate diesel particulate matter (DPM), resulting in the potential for air quality, greenhouse gas, and health impacts. While the Project will utilize a fire pump and back-up power, it is not anticipated that such activities would result in Project-related air quality and greenhouse gas impacts.

The site will utilize one fire pump as part of its fire protection system. This fire pump will be a Tier 3 diesel fire pump, which will provide high-pressure water to the fire protection system. A Tier 3 pump is the highest available tier for such engines. The Fire Department requires that the fire pump be powered by diesel in order to fully ensure that it will work when needed, even if there is power interruption to the site. This unit would only be used in emergency situations requiring use of the fire protection system. Otherwise, the diesel fire pump would only be employed during maintenance and testing periods to ensure proper operation of the unit. A calculation was prepared for the diesel fire pump based on project-specific equipment specifications, as discussed below.

In the event of a site-wide power outage, the battery energy storage system ("BESS") would provide immediate power to the building. If it is determined that the outage would be prolonged beyond 24 hours, the operator would contact its provider for emergency services. This provider would be a contracted entity with the capability to provide an emergency generator to provide supplemental power by plugging into the BESS. Use of any emergency units would occur only on an as-needed basis, and no diesel generators are planned or allowed to be permanently installed on-site. If such a rented unit were needed, per Mitigation Measure 3.3-6, it would "have Best Available Control Technology (BACT) that meets CARB's final Tier IV emission standards." Maintenance and testing emissions associated with this type of unit would occur off-site, and any reporting or permitting would be completed by the third-party equipment provider. The location and identity of such third-party provider is not known and the possible need for and duration of using such third-party units is speculative. Given these factors, the operation of these units is not considered to be part of the Project's impacts.

A calculation was prepared for a hypothetical diesel generator supporting the fire pump. In this analysis, the fire pump was modeled as a Tier 3 diesel unit, rated at 304 HP based on project-specific equipment specifications. This unit was modeled assuming a maximum operation of 100 hours/year based on the maximum allowable per SJVAPCD regulations.

The updated modeling results show that the air quality emissions associated with the fire pump would be virtually negligible. Specifically, the operational-related air quality emissions associated with the fire pump

would only change the operational-related emissions reported within the Recirculated Draft EIR extremely slightly. Specifically, operational-related emissions would be revised as follows, for operational Project-generated emissions (tons per year): CO emissions would be 40.0 tons/year instead of 39.9; NOx emissions would be 23.5 tons/year instead of 23.4; ROG emissions would be 7.72 tons/year instead of 7.69; and PM2.5 emissions would be 3.34 tons/year, instead of 3.33. No other emissions results would be affected by the inclusion of the fire pump within the modeling. These results are extremely minor, relative to the emissions results provided in the published Recirculated Draft EIR, and Final EIR; more detail is provided in the Errata chapter, included the full revised CalEEMod model results. Moreover, given the extremely limited usage of the fire pump, health risks associated with TACs would not be meaningfully affected by the consideration of these additional negligible sources.[2],[3] No further response to this comment is warranted.

Response N-6: The comment's focus on Mitigation Measure 3.3-4 and the BESS it addresses is incomplete, as it ignores the related systems and mitigation measures 3.3-2 and 3.3-3 requiring the project to supply 100% of the project's electricity demand from renewable sources, including through the generation of at least 3.8 MW of renewable electricity from solar PV facilities to be located on site. The comment also ignores the fact that it was actually the applicant who proposed the 100% commitment to renewable energy sources and these onsite solar PV, BESS and microgrid measures when it significantly enhanced the project's goals and related sustainability features in response to comments on the initial Draft EIR (*see* RDEIR, Project Description, pp. 2.0-2 to 2.0-3; 2.0-5, and 2.0-9). The EIR incorporated these applicant commitments to 100% renewable energy and onsite solar PV and BESS facilities as mitigation measures to better inform the public and for future monitoring and enforcement purposes.

With respect to Mitigation Measure 3.3-4 itself, the comment is correct in noting that it requires the Project to be designed and constructed to allow for future expansion of solar facilities on site as electricity demand increases. This measure also requires that the Project applicant shall, as part of the site's solar microgrid, install a BESS with enough capacity to power the project's basic building functions for 48 hours. The remainder of the comment, together with the related comment N-18, raises speculative concerns about potential impacts from the proposed BESS that are without merit because they are based on incorrect assumptions about the size, manufacturer and chemical components, and location/layout of the BESS.

As explained and demonstrated in the letter from Trinity Structures (refer to the Errata chapter for further detail), the experts who developed and designed Costco's proposed BESS, that was submitted to the City, no significant fire hazard or other environmental impacts will result from use of the BESS proposed as part of the project because the Tesla Megapack 2XL units that will be used for this project's BESS: (1) will be located on the ground outside in the open air, far away from any other structures and separated from each other at distances that meet or exceed all applicable fire codes and manufacturer specifications; and (2) will not use outdated, dangerous Nickel Manganese Cobalt ("NMC") batteries but instead will utilize batteries that are newer, have safer chemistry (i.e., Lithium Iron Phosphate ["LFP"]) and employ all of the latest and most sophisticated fire protection equipment and safety systems and technologies. Those fire protection and safety systems include a thermal management system containing a closed-loop liquid cooling system, a battery management system, site controls and monitoring systems, electrical fault protection devices, and a state-of-the-art explosion control system, among others. As a result of these newer, safer batteries and fire protection and safety systems, fires and other hazardous events are not anticipated and research and testing

[2] It should also be noted that the Air District does not require or recommend inclusion of fire pump and back-up generator TACs within an Air Toxics Health Risk Assessment.

[3] This is true even if assuming the commentor's numerical claims under Comment N-17 are true. That is, even if the amount of DPM to be generated by these sources is consistent with the amount claimed by the commentor under Comment N-17, such emissions would be extremely minor, especially when compared to the DPM generated by mobile vehicle (i.e. heavy-duty truck) sources. See the Project Air Toxic Health Risk Assessment for further detail.

done on the Tesla Megapack units demonstrate that if a fire were to occur, it would likely be contained in the enclosure where it started and would not spread to other nearby Megapack units or buildings.

The comment goes on to reference a number of incidents that have occurred at other battery storage sites, including battery fires and explosions at facilities in Arizona in 2019 and 2022, implying that similar incidents and hazards/impacts could result from the BESS proposed for the Costco Depot Annex Project and injure first responders or damage the environment. Those references, however, are inapt and inapplicable here because the incidents at those Arizona facilities and even the recent fire at Vistra's large battery storage facility in Moss Landing, California, all involved older batteries that were made by LG and utilized flawed and dated NMC chemistry, not the newer Tesla Megapack 2XL batteries that use much safer LFP chemistry proposed for use here.[4]

Finally, no significant hazards or impacts would result because, as noted in Section 3.8, Hazards and Hazardous Materials, of the Draft EIR, any operations that involve the use of hazardous materials would be required to have the hazardous material transported, stored, used, and disposed of in compliance with local, state, and federal regulations. The San Joaquin County Department of Environmental Health is the Certified Unified Program Agency (CUPA) for San Joaquin County and is responsible for the implementation of statewide programs within the city, including Hazardous Materials Business Plan (HMBP) requirements, among numerous other programs. Additionally, businesses are regulated by Cal/Occupational Safety and Health Administration (OSHA) and are therefore required to ensure employee safety. Specific requirements include identifying hazardous materials in the workplace, providing safety information to workers that handle hazardous materials, and adequately training workers. To further ensure the safety of employees, and reduce the potential for accidental release of hazardous materials into the environment, the applicant must submit a HMBP to San Joaquin County Department of Environmental Health for review and approval prior to bringing hazardous materials onsite, as required by Mitigation Measure 3.8-2.

Further, as with construction, operation of the proposed Project is required to be consistent with federal, State, and local laws and regulations addressing hazardous materials management and environmental protection, including, but not limited to 49 CFR 173 and 177, and CCR Title 26, Division 6 for transportation of hazardous materials, and CCR Titles 8 and 22, Uniform Fire Code, and Division 20 of the California Health and Safety Code for routine use of hazardous materials. These regulations and codes must be implemented, as appropriate, and are monitored by the State and/or local jurisdictions, including Caltrans, the California Highway Patrol, and the San Joaquin County Department of Environmental Health.

Response N-7: The appendices to Kittelson's 2017 Tracy Costco Depot Transportation Impact Analysis Report are included as Appendix A of this document. These appendices provide information and data supporting the trip generation and analysis documented in that report.

The comment asserts the EIR does not provide sufficient evidence to substantiate the VMT analysis of the Project by raising questions pertaining to daily trip generation of the Project and suggesting that certain trip rates from the Institute of Transportation Engineers (ITE) standard reference *Trip Generation Manual* should have been used for the VMT analysis. Raising questions of daily trip generation is misguided as the VMT analysis uses a broader dataset and more sophisticated methodology to analyze project VMT than simply daily trip rates.

As stated on page 12 of the Costco Direct Delivery Center Traffic Analysis dated August 19, 2022 (Transportation Study), Appendix F to the Draft EIR (DEIR), "The proposed Costco Direct Delivery Center project was evaluated using the City of Tracy VMT Calculator." The City's VMT Calculator implements

[4] *See* https://www.canarymedia.com/articles/energy-storage/moss-landing-fire-reveals-flaws-in-the-battery-industrys-early-designs?mc_cid=440664dbd7&mc_eid=e0841ae528

the City's methodology for evaluating VMT impacts for all proposed land use development under City review. The VMT Calculator is described in detail in the City's Final Draft Transportation Master Plan Update, August 2022:[5]

> "The City of Tracy VMT Calculator was developed using a combination of two datasets, Streetlight Data and a modified version of the Tri-County Travel Demand Model (Model). Streetlight Data was used to develop average trip distances at the Census Block Group level while the travel demand model was used to develop the number of residential and work trips at the Traffic Analysis Zone (TAZ) level.
>
> ... the total home-based work attraction trips from the Model were multiplied by the average trip length for work trips to determine total employment VMT. This was then divided by the total employment from the Model for all TAZs within each Census Block Group to determine VMT per Capita for each Census Block Group. Thresholds for VMT per Capita and VMT per Employment were determined by dividing the total VMT within the Tracy SOI [(Sphere of Influence)] for both trip types and dividing them by the total population and total employment, respectively within the Tracy SOI."

The VMT Calculator uses trip information, land use attraction, and other factors in the Tri-County Travel Demand Model to evaluate VMT for land use developments and does not rely on a daily trip rate for a specific land use type to develop a project VMT estimate. The comment mistakenly focuses on suggesting that the model use daily trips rates provided by ITE when, in fact, the Tri-County Travel Demand Model underpinning the VMT Calculator uses a broader dataset and more sophisticated methodology to analyze project VMT than simply using ITE trip rates.

Moreover, despite the City's use of the VMT Calculator to analyze VMT for the Project, as stated in the Transportation Study and DEIR, the comment asserts a 2.17 daily trip rate for the Project is not appropriate and provides in a chart several ITE trip rates. However, the 2.17 daily trip rate is a rate derived and developed for air quality and GHG analyses and does not pertain to the Project VMT analysis in the Transportation section of the EIR. The 2.17 daily trip rate is provided in the Recirculated Draft EIR (RDEIR) Appendix A, Air Quality, Greenhouse Gas, and Energy Appendices.

The trip rates chart in the comment provides multiple ITE trip rates for different warehouse land use categories that do not represent the Project land use. The Project is a Depot Annex with a Direct Delivery Center (DDC). The DDC component of the Project involves deliveries made from the Project site to Costco's regional delivery hubs. It does not involve deliveries made from the DDC to Costco members' houses. This component of the Project is not an online order fulfillment center warehouse with sorting or a parcel hub warehouse, which are the two ITE warehouse land use types in the chart with daily trip rates greater than the 2.17 trip rate mentioned in the FEIR. Moreover, data collected at Costco DDCs in Stockton, CA, Gouldsboro, PA, and Romeoville, IL, have demonstrated a Costco DDC has a daily trip rate of 0.38. This daily trip rate was mentioned in the FEIR for informational purposes and was not used for any analyses.

Based on the description of the ITE land use categories included in the chart, the most closely representative category to the proposed project would be ITE Land Use 150, Warehousing, which has a daily trip rate of 1.71, as indicated in the chart. The other warehouse land uses presented in the chart would not correlate with the Project. The 1.71 daily trip rate for ITE Land Use 150, Warehousing, is lower than the 2.17 daily trip rate mentioned in the EIR. Therefore, the ITE rates in the chart do not better represent the Project land use.

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[5] https://www.cityoftracy.org/our-city/departments/engineering/infrastructure-master-plans

The comment also refers to the Enhanced Measures provided through the Sierra Club Settlement Agreement and claims the lack of enhanced measures applying to inbound trucks necessitates additional mitigation. Inbound trucks are from 3rd parties and are not under Costco's control. Thus, mitigation measures requiring emission requirements above and beyond existing State and Federal requirements are not feasible as Costco has no authority over other businesses or their equipment. The reduction of air quality and GHG emissions due to the Enhanced Measures has not been quantified and assumed in the EIR such that the analysis and conclusions in the EIR are on the conservative side. Contrary to the commenter's statement, the EIR does recognize the air quality impacts from truck trips as a significant and unavoidable impact. The comment refers to a 45% maximum possible reduction in GHG/VMT and misrepresents the meaning of the referenced 45% reduction as though it were a threshold to be expected of and achieved by any land development. This 45% reduction in GHG/VMT is documented in the CAPCOA *Handbook for Analyzing Greenhouse Gas Emissions, Assessing Climate Vulnerabilities, and Advancing Health and Equity*, 2021 (CAPCOA Handbook) as the maximum possible GHG/VMT credit that could be assumed in an analysis for a development implementing a commute trip reduction program that includes transportation measures either T-5 or T-6 plus T-7 through T-13 of the CAPCOA Handbook. Those transportation measures are:

T-5, Implement Commute Trip Reduction Program (Voluntary)

T-6, Implement Commute Trip Reduction Program (Mandatory Implementation and Monitoring)

T-7, Implement Commute Trip Reduction Marketing

T-8, Provide Ridesharing Program

T-9, Implement Subsidized or Discounted Transit Program

T-10, Provide End-of-Trip Bicycle Facilities

T-11, Provide Employer-Sponsored Vanpool

T-12, Price Workplace Parking

T-13, Implement Employee Parking Cash-Out

The 45% value represents the maximum allowable credit that could be applied in an analysis that assumes transportation measures either T-5 or T-6 plus T-7 through T-13 are feasible and assumes the greatest amount of effectiveness for each measure. The 45% value does not represent a GHG/VMT reduction level that is achievable by or could be expected of all developments that implement a commute trip reduction program. Developments in a suburban setting, such as in the City of Tracy, would not achieve the maximum allowable credit for the transportation measures. For example, measure T-8, Provide Ridesharing Program, allows an 8% reduction in urban communities, a 4% reduction in suburban communities, and no reduction in rural communities.[6] Measure T-9, Implement Subsidized or Discounted Transit Program, provides different factors for computing the VMT reduction based on the Federal Highway Administration (FHWA) California Core-Based Statistical Areas that are known in the transportation engineering industry to have varying land use densities and varying provision of transit services and bicycle infrastructure.[7] The location-specific factors yield different maximum-possible VMT reductions. Thus, characteristics of a development

[6] CAPCOA Handbook, Table T-8.1. Reduction in Employee Commute Vehicle Miles Traveled by Place Type

[7] CAPCOA Handbook, Table T-9.1. Average Transit Mode Share of Work Trips by California Core-Based Statistical Area

that potentially could achieve a 45% trip reduction include being located in a dense, urban community; having reliable and frequent transit service nearby; having high-quality bicycle and pedestrian infrastructure connected to likely destinations; and having high-quality ridesharing programs available in the area.

Tracy is a suburban, non-dense community. The Project is an industrial development located in an industrial area near the city limit of Tracy. The Project site is not served by transit, bike facilities are not present on W Schulte Rd, and pedestrian access is not available to desired destinations, such as neighborhoods where employees may live. Thus, a 45% GHG/VMT reduction is not achievable or feasible for the Project. Therefore, substantial evidence is provided that all feasible mitigation measures have been considered and will be required of the Project, and transportation impacts are mitigated to the greatest extent feasible regardless of not achieving a 45% reduction in VMT.

Additionally, the Governor's Office of Planning and Research (OPR), now known as the Office of Land Use and Climate Innovation, issued its *Technical Advisory on Evaluating Transportation Impacts in CEQA* in 2018. The document states:

> "achieving 15 percent lower per capita (residential) or per employee (office) VMT than existing development is both generally achievable and is supported by evidence that connects this level of reduction to the State's emissions goals"

This supports the EIR's approach to mitigating VMT impacts. Mitigation Measure 3.13-1 focuses on and requires measures aimed at reducing VMT by 15%. Consistent with the Technical Advisory, this approach is connected to the level of reduction necessary to achieve State reduction goals. Note, however, that the EIR fully recognizes that even with feasible trip reduction measures incorporated, due to the location and nature of the Project, the VMT impact will remain significant and unavoidable.

The EIR adequately analyzed the Project for environmental impacts and provided substantial evidence to support its findings and conclusions. Therefore, revisions to the EIR are not necessary, and recirculation of the Final EIR is not required or necessary.

Response N-8: The Final EIR includes 36 air quality mitigation measures, and as stated by the commentor, the Project will include additional Enhanced Measures as agreed upon through the Sierra Club Settlement Agreement.

The commentor highlights Mitigation 3.3-1, which requires the use of heavy-duty vehicles that are model year 2010 and later. This is in alignment with CARB's Truck and Bus Regulation, as well as what is required per warehouse guidance recommendations, such as the Attorney General's Warehouse Projects: Best Practices and Mitigation Measures to Comply with the California Environmental Quality Act guidance. While the Project Applicant has made commitments to accelerate the advancement to electric trucks, Mitigation Measure 3.3-1 will be updated to include the following new additional sentence, which reflects that the Project Applicant has control over its own vehicles and cannot control those owned by third parties: "Heavy-duty trucks that travel to and from the Project site and are owned by Costco are required to be model year 2018 or later."

Response N-9: The commentor describes potential risks associated with Valley Fever. As a starting point, it is important to note that this comment is not discussing risks associated with the proposed project, but rather, focuses on potential risks stemming from existing environmental conditions *(i.e.*, soil that may contain the microscopic fungus known as *Coccidioides immitis* which can cause the illness known as Valley Fever). CEQA is generally not concerned with the effect the existing environment might have on proposed projects, and such effects are not treated as changes in the physical environment. Indeed, because the purpose of CEQA is to protect the physical environment, CEQA is only concerned with adverse changes to the environment that may be brought about by approval of a proposed project and CEQA does not apply

in reverse. (See *California Bldg. Indus. Ass'n v. Bay Area Air Quality Mgmt. Dist.* (2015) 62 Cal.4th 369, 378 [CEQA does not require analysis in reverse, meaning CEQA does not require analysis of impacts that existing environmental conditions might have on a project, its residents, or its users, except when required by specific statutory exception].) As such, this comment and its CEQA-in-reverse basis does not raise a cognizable CEQA impact requiring any further analysis let alone the imposition of any additional protective measures.

Further, it is important to note that no agency (e.g., San Joaquin Air Pollution Control District (SJVAPC), Cal/OSHA, California Department of Public Health (CDPH)) has established a significance threshold for Valley Fever. The EIR has fully evaluated the air quality and health risk impacts in line with SJVAPCD significance thresholds and guidance. There is no scientifically accepted threshold or methodology to analyze possible Valley Fever effects under CEQA. While there is not a specific requirement under CEQA relating to Valley Fever nor a requirement to assess Valley Fever Impacts in SVJAPCD's CEQA Guidance for Assessment and Mitigating Air Quality Impacts, a thorough discussion of Valley Fever is provided under Impact 3.3-3, within Section 3-3: Air Quality of the Recirculated Draft EIR. As stated therein, the Project site is relatively undeveloped and is surrounded by undeveloped, agricultural, industrial, and residential land uses that are semi-rural to urban in character. Because the majority of the Project site and the immediately surrounding vicinity consists of urbanized development or cultivated fields, the Project site is an area that would lead to a low probability of having C. immitis growth sites and exposure from disturbed soil. Because the EIR does not identify any significant impact in this regard, there is no requirement to impose as mitigation measures the strategies suggested by the commentor. However, as explained in greater detail below and in the letter from Michelle Campbell, an experienced industrial hygienist with deep knowledge of Valley Fever [see the letter dated February 14, 2025, within the Errata chapter, for further detail], given legal requirements and the actions that will be employed by the project applicant and its contractor(s) to comply with such requirements, myriad and commonly-accepted protections will be employed to minimize potential exposure to Valley Fever.

Valley Fever is a well-known and studied disease, which is required to be tracked and reported to local California health departments. State health agencies, including the California Department of Public Health and the California Occupational Safety and Health Administration (Cal/OSHA,) have issued guidance regarding the prevention of Valley Fever and requirements for education, planning, reporting, and mitigation of Valley Fever risks. Project construction activities would be overseen by contractors with an extensive working knowledge within this endemic region and who have well established prevention measures within their work plans to prevent the transmission of Valley Fever as discussed within this response.

As discussed in Section 3.3: Air Quality of the Recirculated Draft EIR, the proposed Project would be required to minimize the generation of fugitive dust during construction activities by complying with the SJVAPCD's District Rule 8021. District Rule 8021 requires limitation of fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities, by implementing control measures such as pre-watering the Project site, phasing construction work to reduce the amount of disturbed surface at any one time, and applying water or other suppressants to unpaved haul/access roads and unpaved vehicle/equipment traffic areas. The commentor incorrectly suggests that active continuous monitoring is required rather than the visual-opacity approach of Rule 8021. First, active continuous dust monitoring has existed even before Rule 8021 was adopted, and the SJVAPCD chose to incorporate the opacity monitoring approach. Second, it's notable that Cal/OSHA and CDPH also have not required such monitoring requirements. Third, the best management practices as described below are expected to minimize fugitive dust and the *Coccidioides* spores emissions and exposure. Thus, with the comprehensive approach to employ the best management practices, additional monitoring is not necessary.

Beyond requirements issued by the SJVAPCD, the Project would also be required to comply with California Labor Code § 6709, as added by Assembly Bill (AB) 203 in 2019. The commentor's claim that California

Labor Code § 6709 is insufficient to address impacts from Valley Fever is not supported by evidence. This law requires construction employers who work in counties with high rates of Valley Fever (such as San Joaquin County) to train their employees annually on minimizing the risk of Valley Fever exposure. Cal/OSHA considers Valley Fever an occupational disease and has issued citations to employers for failing to prevent employee exposure, even when no disease was found. Additionally, nearly all of the recommended mitigation measures as discussed in Response to Comment N-10 would be implemented where feasible, further reducing the risks of Valley Fever. See Response N-10 regarding the measures that will be included to comply with laws and regulations aimed at reducing potential health impacts to Valley Fever.

During operations, dust emissions are anticipated to be negligible, because the Project site would be occupied by buildings, pavement, and landscaped areas after construction is complete. Project operations would not occur on undeveloped sites and dust emissions typically associated with activity on unpaved surfaces would be negligible. Thus, the proposed Project is not expected to generate significant fugitive dust that will contribute to Valley Fever exposure. . Moreover, it should be noted that sensitive receptors are not located particularly close to the Project site, with the closest sensitive receptors upon commencement of construction activities being approximately 900 feet to the southeast of the Project site. No further response to this comment is warranted, but for additional details, please see the supporting letter provided in the Errata chapter.

Response N-10: The commentor proposes a number of mitigation measures relating to Valley Fever. As discussed above, there is no significance threshold for Valley Fever and thus no significance determination to identify a need for mitigation measures. Nevertheless, these suggested measures have been carefully reviewed. Please see the following table, which describes how best management practices will be implemented during construction consistent with existing regulatory requirements. Refer to the supporting letter dated February 14, 2025, provided in the Errata chapter, for further detail.

Requested 'Mitigation Measure'	***Project Best Management Practice***
1. Include specific requirements in the Project's Injury and Illness Prevention Program regarding safeguards to prevent Valley fever.	Costco and its contractor(s) will prepare an Injury and Illness Prevention Program prior to the commencement of construction in compliance with CCR Title 8, §3203, Injury and Illness Prevention Program. The IIPP will outline roles and responsibilities for implementing the Program, outline specific safe and healthy work practices including recognizing workplace hazards resulting from earth-moving construction tasks, include a communication system for sharing hazard identification and reporting for all affected employees and provide resources for employees seeking medical care.
2. Control dust exposure through the following methods:	
Apply chemical stabilizers at least 24-hours prior to high wind event;	Costco and its contractor(s) will address fugitive dust control notably as related to high wind events in compliance with San Joaquin Valley Air Pollution Control District (SJVAPCD) Rule 8021. A lime treatment will be applied to the soil to reduce fugitive dust emissions during construction activities.

Requested 'Mitigation Measure'	*Project Best Management Practice*
Apply water to all disturbed areas a minimum of three times per day. Watering frequency should be increased to a minimum of four times per day if there is any evidence of visible wind-driven fugitive dust;	Costco and its contractor(s) will apply water to disturbed areas a minimum of four times a day, watering will also be conducted continuously during excavation activities consistent with SJVAPCD fugitive dust rule requirements.
Provide National Institute for Occupational Safety and Health (NIOSH)-approved respirators for workers with a prior history of Valley fever.	In accordance with CCR Title 8, §5144, Respiratory Protection, NIOSH-approved respirators will be made available for workers who request additional PPE, including those who are requesting such equipment due to prior Valley Fever history. The Health and Safety Plan will identify job tasks and work activities when a respirator is required.
Half-face respirators equipped with a minimum N-95 protection factor for use during worker collocation with surface disturbance activities. Half-face respirators equipped with N-100 or P-100 filters should be used during digging activities. Employees should wear respirators when working near earth-moving machinery.	In accordance with CCR Title 8, §5144, Respiratory Protection, NIOSH-approved respirators will be made available for workers who request additional PPE, including those who are requesting such equipment due to prior Valley Fever history. Heavy-duty equipment will include enclosed cabs that utilize cabin HEPA-grade filters and air conditioning. Operators will be instructed to keep the windows and air vents closed. These controls will be implemented in compliance with CCR Title 8, §5141, Control of Harmful Exposures to Employees.
Prohibit eating and smoking at the worksite, and provide separate, clean eating areas with hand-washing facilities.	Costco and its contractor(s) will provide hygiene facilities for hand washing and designated break and/or smoking areas in compliance with CCR Title 8, §5141, Control of Harmful Exposures to Employees. Signage will be posted throughout the site location to highlight the risks of dust exposure and reiterated to employees during weekly safety briefings.
Avoid outdoor construction operations during unusually windy conditions or in dust storms.	Costco and its contractor(s) will cease earth-moving activities during high wind events consistent with SJVAPCD fugitive dust rule requirements.
Consider limiting outdoor construction during the fall to essential jobs only, as the risk of cocci infection is higher during this season.	Costco and its contractor(s) will limit outdoor construction in the fall season as feasible. Paving and hardscaping activities will be completed as soon as possible.
3. Prevent transport of Cocci outside endemic areas:	
Prevent spillage or loss of bulk material from holes or other openings in the cargo compartment's floor, sides, and/or tailgate.	Costco and its contractor(s) will include best management practices in their dust control plan for securing loads on trucks during transport. The perimeter of the site will comply with SJVAPCD Rule 8041, which prevents or limits fugitive dust emissions from carryout and trackout.

Requested 'Mitigation Measure'	*Project Best Management Practice*
Provide workers with coveralls daily, lockers (or other systems for keeping work and street clothing and shoes separate), daily changing and showering facilities.	Costco and its contractor(s) will include best management practices in their dust control plan to provide a dedicated onsite changing area, hygiene facilities and posted procedures on correct methods to minimize dust carryout. The contractor(s) will also review dust control procedures during the weekly safety meetings. These controls will be implemented in accordance with CCR Title 8, §5141, Control of Harmful Exposures to Employees and CCR Title 8, §3203, Injury and Illness Prevention Program.
Clothing should be changed after work every day, preferably at the work site.	Costco and its contractor(s) will incorporate education related to dust exposure from clothing in their site-specific Health and Safety Plan (HASP) and in compliance with CCR Title 8, §3203, Injury and Illness Prevention Program.
Train workers to recognize that cocci may be transported offsite on contaminated equipment, clothing, and shoes; alternatively, consider installing boot-washing.	Costco and its contractor(s) will provide initial and annual awareness training in accordance with California Labor Code 6709 and will incorporate regular safety briefings. Costco and its contractor(s) will provide hygiene requirements and decontamination protocols related to dust exposure from clothing in their site-specific Health and Safety Plan (HASP) and in compliance with CCR Title 8, §5141, Control of Harmful Exposures to Employees and CCR Title 8, §3203, Injury and Illness Prevention Program.
Post warnings onsite and consider limiting access to visitors, especially those without adequate training and respiratory protection.	Costco and its contractor(s) will post signage to communicate dust-related hazards in compliance with CCR Title 8, §3203, Injury and Illness Prevention Program. Site access will be controlled with all visitors required to sign in and complete a safety briefing. All visitors will be escorted by a contractor(s) representative and access will be restricted to authorized personnel during high earth-moving activity.
4. Improve medical surveillance for employees:	
Employees should have prompt access to medical care, including suspected work-related illnesses and injuries.	The site-specific Health and Safety Plan and Injury Illness Prevention Program will be used to communicate reporting, first aid and medical treatment protocols. The contractor(s) will post local clinic listings, including phone number, address, and maps onsite for worker access. Relevant health and
Work with a medical professional to develop a protocol to medically evaluate employees who have symptoms of Valley fever.	

Requested 'Mitigation Measure'	*Project Best Management Practice*
Consider preferentially contracting with 1-2 clinics in the area and communicating with the health care providers in those clinics to ensure that providers are aware that Valley fever has been reported in the area. This will increase the likelihood that ill workers will receive prompt, proper and consistent medical care.	safety information, including these resources, will be reviewed in weekly safety briefings in compliance with CCR Title 8, §3203. Injury and Illness Prevention Program. Respiratory protection will be provided in accordance with CCR Title 8, §5144, Respiratory Protection. If a Valley fever diagnosis is identified by a medical office, a medical release will be required prior to returning to the jobsite to ensure worker safety.
Respirator clearance should include medical evaluation for all new employees, annual re-evaluation for changes in medical status, annual training, and fit-testing.	
Skin testing is not recommended for evaluation of Valley Fever.	
If an employee is diagnosed with Valley fever, a physician must determine if the employee should be taken off work, when they may return to work, and what type of work activities they may perform.	

Implementing these best management practices as part of continued compliance with SJVAPCD, Cal/OSHA, and the CDPH standards, requirements and recommendations, serve to ensure that the Project will not result in any significant environmental impacts related to Valley Fever. See Response N-9, above, for further detail.

Response N-11: See Response N-5 regarding the emissions associated with backup generators and fire pumps during Project operation.

Response N-12: This comment includes conclusion statements to the comment letter. As stated previously, and as demonstrated throughout these responses and in the Final EIR itself, the record is replete with substantial evidence supporting all of the methodologies used, thresholds of significance identified, impact analyses performed and conclusions made in the EIR regarding the proposed project's potential environmental impacts. Further, nothing provided in the responses to the timely comments provided on the Draft EIR and on the Recirculated Draft EIR nor in the responses here to these late comments amount to significant new information requiring recirculation of the EIR for additional public review and comment because nothing in the responses demonstrates that a new or more severe significant impact exists or has come to light that has not already been identified and adequately addressed. Indeed, these and all of the other responses to comments on the EIR merely clarify and amplify the information and impact analyses in the Draft EIR and Recirculated Draft EIR.

Response N-13: See Response N-7 regarding the data sources and methodology informing and underpinning the Project VMT estimate. The 2.17 daily trip rate is a rate derived and developed for air quality and GHG analyses and does not pertain to the Project VMT analysis in the Transportation section of the EIR. As discussed in greater detail in Response N-7, Project VMT was estimated using the City's VMT Calculator tool, which was developed using data and information available from the Tri-County Travel Demand Model. The 2.17 daily trip rate is provided in the Recirculated Draft EIR (RDEIR) Appendix A, Air Quality, Greenhouse Gas, and Energy Appendices. As also discussed in Response N-17,

the 0.38 daily trip rate was provided for informational purposes in the DEIR and was not used for any Project analyses.

With respect to achieving up to a 15% reduction in Project VMT through TDM measures, according to the California Governor's Office of Planning and Research's Technical Advisory on Evaluating Transportation Impacts in CEQA (April 2018),[8] "Achieving 15 percent lower per capita (residential) or per employee (office) VMT than existing development is both generally achievable and is supported by evidence that connects this level of reduction to the State's emissions goals."

The Trip Reduction Programs subsector VMT reduction measures in the CAPCOA Handbook (August 2021)[9] were considered for the proposed Project.

The Trip Reduction Programs subcategory in the CAPCOA Handbook includes Measures T-4 through T-12. The employee commute VMT reduction from the combined implementation of all measures within this subsector is capped at 45 percent.

As noted in Response N-7, with respect to the commenter's claim that the CAPCOA Handbook states that a 45% Commute Trip reduction is the maximum possible, the CAPCOA Handbook also states that per Chart 6-2 of the CAPCOA Quantifying Greenhouse Gas Mitigation Measures (August 2010), a global maximum reduction for a suburban area can be 15%. The Project site is located in a suburban area.

The TDM Program for the proposed Project recommends TDM measures that would individually reduce the Project's VMT and trips with the goal of obtaining a feasible maximum of 15%VMT reduction. Table 3.13-2 of the Draft EIR (reproduced below) lists the TDM measures that could partially mitigate the Project's VMT impact. The table also includes a column for those 11 TDM measures that have been deemed feasible to employ. It is noted that not all of the TDM measures listed in the table have been deemed feasible for the proposed Project. All feasible TDM measures have been identified to mitigate the VMT impact to the extent feasible. These mitigation measures could result in as much as a 12% reduction in VMT.

To further reduce the Project impact due to VMT, if an adopted VMT impact fee is available at the time of Project approval, the applicant will be required to pay such a fee in the amount that would achieve a full 15% VMT reduction in accordance with the City's calculation of the VMT reduction due to the Project TDM measures. If an adopted fee is not available at that time, the applicant will be required to make a contribution to the City in the amount of such a fee to reach the full 15% VMT reduction, thereby contributing toward VMT-reducing transportation improvements in the City, such as transit service improvements, and further reducing the impact of the Project above and beyond employing all feasible TDM measures.

[8] Available at: https://lci.ca.gov/docs/20180416-743_Technical_Advisory_4.16.18.pdf
[9] Available at: https://www.airquality.org/ClimateChange/Documents/Handbook%20Public%20Draft_2021-Aug.pdf

TABLE 3.13-2: TDM MEASURES

TDM MEASURE	*DESCRIPTION*	*MAX. VMT REDUCTION*	*MEASURES DETERMINED TO BE FEASIBLE BY THE APPLICANT*	*VMT REDUCTION APPLIED*
PARKING STRATEGIES				
Reduce Parking Supply	Reduce the number of available parking spots provided to employees.	1%	X	1%
Unbundle Parking	Remove free parking at the site, and charge employees for parking. The higher the cost of parking, the higher the reduction.	1%		0%
Parking Cash-out	Provide employees a choice of forgoing current parking for a cash payment to be determined by the employer. The higher the cash payment and eligible employees, the higher the reduction.	2%		0%
PARKING STRATEGIES				
Transit Stops	Coordinate with local transit agency to provide bus stop near the site. Real time transportation information displays support on-the-go decision making to support sustainable trip making.	1%		0%
Implement Neighbor-hood Shuttle	Implement project-operated or project-sponsored neighborhood shuttle serving residents, employees, and visitors of the project site.	2%		0%
Transit Subsidies	Involves the subsidization of transit fare for residents and employees of the project site. This strategy assumes transit service is already present in the project area. Pays for employees to use local transit. This could either be a discounted ticket or a full-reimbursed transit ticket.	2%		0%
COMMUNICATION & INFORMATION STRATEGIES				
Travel Behavior Change Program	Involves the development of a travel behavior change program that targets individuals' attitudes, goals, and travel behaviors, educating participants on the impacts of their travel choices and the opportunities to alter their habits. Provide a website that allows employees to research other modes of transportation for commuting. Employee-focused travel behavior change programs target individuals' attitudes, goals, and travel behaviors, educating participants on the impacts of their travel choices and the opportunities to alter their habits.	1%	X	1%
Promotions & Marketing	Involves the use of marketing and promotional tools to educate and inform travelers about site-specific transportation options and the effects of their travel choices with passive educational and promotional materials. Marketing and public information campaign to promote awareness of TDM program with an on-site coordinator to monitor program.	1%	X	1%
COMMUTING STRATEGIES				
Employer Sponsored Vanpool or Shuttle	Implementation of employer-sponsored employee vanpool or shuttle providing new opportunities for access to connect employees to the project site.	2%		0%
Emergency Ride Home (ERH) Program	Provides an occasional subsidized ride to commuters who use alternative modes. Guaranteed ride home for people if they need to go home in the middle of the day due to an	1%	X	1%

TDM Measure	*Description*	*Max. VMT Reduction*	*Measures Determined to be Feasible by the Applicant*	*VMT Reduction Applied*
	emergency or stay late and need a ride at a time when transit service is not available.			
Tele-commuting Alternative work schedule	Four-Ten work schedule results in 20% weekly VMT reduction, 10% trip reduction equals 15% VMT reduction.	7%		0%
On-site Childcare	Provides on-site childcare to remove the need to drive a child to daycare at a separate location.	1%		0%
Shared Mobility Strategies				
Ride Share Program	Increases vehicle occupancy by providing ride-share matching services, designating preferred parking for ride-share participants, designing adequate passenger loading/unloading and waiting areas for ride-share vehicles, and providing a website or message board to connect riders and coordinate rides. Need a point person from the business on-site.	2%	X	2%
Employee/ Employer Car Share	Implement car sharing to allow people to have on-demand access to a vehicle, as-needed. This may include providing membership to an existing program located within 1/4 mile, contracting with a third-party vendor to extend membership-based service to an area, or implementing a project-specific fleet that supports the residents and employees on -site.	1%		0%
Designated Parking Spaces for Car Share Vehicles	Implement car sharing to allow people to have on-demand access to a vehicle, as-needed. This may include providing membership to an existing program located within 1/4 mile, contracting with a third-party vendor to extend membership-based service to an area, or implementing a project-specific fleet that supports the residents and employees on -site.	1%	X	1%
Bicycle Infrastructure Strategies				
Bike Share Program	Participate in a bike share program/On site bike share program.	1%		0%
Implement/ Improve On-street Bicycle Facility	Implements or provides funding for improvements to corridors and crossings for bike networks identified within a one-half mile buffer area of the project boundary, to support safe and comfortable bicycle travel.	1%		0%
Include Bike Parking Per City Code	Implements short and long-term bicycle parking to support safe and comfortable bicycle travel by providing parking facilities at destinations.	1%	X	1%
Include Secure Bike Parking and Showers	Implements additional end-of-trip bicycle facilities to support safe and comfortable bicycle travel.	1%	X	1%
Bicycle Repair Station/ Services	On-site bicycle repair tools and space to use them supports on-going use of bicycles for transportation.	1%	X	1%
Neighborhood Enhancement Strategies				
Traffic Calming	Implement traffic calming improvements on streets and intersections throughout and around the project site.	1%		0%

TDM Measure	*Description*	*Max. VMT Reduction*	*Measures Determined to be Feasible by the Applicant*	*VMT Reduction Applied*
Improve-ments				
Pedestrian Network Improve-ments	Implement pedestrian network improvements throughout and around the project site that encourages people to walk.	2%	X	2%
Miscellaneous Strategies				
Virtual Care Strategies for Hospitals	Implement options for virtual care for health services for hospitals.	2%		0%
On-Site Affordable Housing	Provide a percentage of on-site affordable housing for employees that is less than 100%.	1%		0%
Job Creation Land Use (e.g. Office)	Provide offices or other job creation land use. Applies to housing projects.	3%		0%
Provide On-Site Meals	Provide on-site meal options for employees (e.g., micro market vending machines or food trucks)	*	X	0%
			TOTAL VMT REDUCTION APPLIED	**12%**

Source: Kimley Horn, 2022.

Response N-14: This comment includes introductory statements to Exhibit B of the comment letter. No further response is warranted.

Response N-15: The Project would be conditioned to preclude cold uses, and cold storage uses are not proposed by the Project.

Response N-16: See Response N-8 regarding air-quality related mitigation measures. No further response to this comment is warranted.

Response N-17: See Response N-5 regarding stationary source emissions. No further response to this comment is warranted.

Response N-18: See Response N-6 regarding the battery energy storage system proposed by the applicant and required by Mitigation Measure 3.3-4.

Response N-19: See Response N-8 regarding air-quality related mitigation measures regarding the model year of trucks. No further response to this comment is warranted.

Response N-20: See Response N-9 and N-10 that addresses the various issues stated in this comment. The comment letter submitted to the City from Michelle Campbell, an expert Certified Industrial Hygienist at Ramboll, addresses the suggestion for sampling, which identifies the lack of reliable regulatory approved methods for sampling and work-site characterization. No further response to this comment is warranted.

Response N-21: This comment includes conclusion statements to Exhibit B of the comment letter. See Responses N-15 through N-20.

Supporting Letters

January 3, 2025

Shay Reed
AGMM Energy
Costco Wholesale

Re: Tracy CA EIR Response

Shay, per your request, the following is the formal response by Trinity's Engineers to specific comments that pertain to the Battery Storage Design and FEIR provided by Adams, Broadwell, Joseph & Cardozo via the "Comments on Agenda Item 1.D. – Tracy Costco Depot Annex Project".

As you know, Costco hired/contracted with Trinity to lead on the in development, design, construction, and operation of the solar PV and battery energy storage system ("BESS") and related structures/microgrid for the Tracy Costco Depot Annex Project. Trinity has coordinated these responses with the Engineer of Record for the Solar & Battery systems, Coffman Engineers, who prepared the engineering drawings and reviewed the proposed equipment along with their clearances and installation methods in addition to sourced material from the BESS manufacturer for this project, Tesla.

Comment: **"The FEIR Fails to Include Fundamental Information Regarding the Installation of Backup Battery Systems"** (Page 9; #B)

"In response to the comments on the RDEIR, Mitigation Measure 3.2-4 was added to the FEIR which requires the installation of a battery energy storage system ("BESS") on-site to provide electricity in the event of a 48-hour blackout. However, the FEIR fails to include information regarding the type of batteries to be used in the Project, and lacks information regarding the size of the batteries, the chemical components of each individual battery, or the proposed layout of battery units."

Response: An EIR does not typically include the information requested (size of batteries, chemical components, and proposed layout). The BESS is a system, it itself, designed to reduce the impact on the environment. Under normal operation, the BESS would have no short term or long-term impact to the ecology or hydrology at the site beyond the underlying paving and other related developments already described and analyzed within the EIR. Specific data as to the size and chemical components of each individual battery is contained within the engineering drawings Costco submitted to the city as part of its building permit application. Those plans show, that at full buildout of both proposed buildings, the Tracy Costco Depot Annex Project will use a total of 6 Tesla Megapack 2XL BESS units. Each Tesla Megapack 2XL unit provides 3,916.8 kWh of energy storage, thus, the aggregate energy storage capacity for the site at full buildout will be 23,500 kWh (6 megapacks), and the batteries within the Megapacks will be lithium iron phosphate ($LiFePO_4$=LFP) batteries.

Comment: *"According to the National Fire Protection Association, battery storage systems can create hazardous conditions from thermal runaway resulting in the release of toxic or flammable gases and other environmental impacts. The conditions leading to thermal runaway can be mitigated using explosion prevention systems or deflagration venting, fire suppression systems, battery management systems and adequate spacing between battery arrays based on the number and type of batteries used....*

The FEIR fails to provide any information regarding the design of the backup battery systems, including battery types, layout, type of cooling system they will use...A Revised DEIR must be prepared which fully discloses all components of the Project and analyzes the potential hazards of the battery system that will be installed at the Project Site."

Response: The Tesla Megapack BESS units described and depicted in the permit drawings submitted to the city, and which will be deployed at the project site, will not include any hazardous clean-agent or similarly toxic or hazardous fire suppression agents. More importantly, the Tesla Megapack 2XL BESS units will have everything the commenter says is needed to mitigate against conditions that can lead to thermal runaway, including a thermal management system containing a closed-loop liquid cooling system, a battery management system, site controls and monitoring systems, electrical fault protection devices, and a state-of-the-art explosion control system.

As detailed in those drawings, the Tesla Megapack 2XL units will be spaced at 18" or more, which is twice the recommended 9" distance between enclosures that was used during the full-scale fire certification testing; and the face-to-face distance is designed to be 8 feet or more. The main battery cells are water cooled, include deflagration, ventilation, and a constant sparking system to ignite any gases that might escape during an unlikely failure event. The monitoring system for those batteries are fed by a redundant DC UPS which ensures that battery monitoring and telemetry continues to be online at all times. Those requiring more information can review the Megapack 2XL Fire Protection Engineering and UL 9540A Interpretation Report issued on April 3rd, 2024 by Fire & Risk Alliance which is attached hereto.

Finally, the comment refers to a number of incidents at other battery storage sites, including battery fires and explosions at facilities in Arizona in 2019 and 2022, implying that similar incidents could result form the BESS proposed for the Costco Depot Annex Project and cause fires or injuries to first responders. Those references, however, are inapplicable here because the incidents at those Arizona facilities and the recent catastrophic fire at Vistra's large battery storage facility in Moss Landing, California all involved older batteries that were made by LG and utilized flawed and dated Nickel Manganese Cobalt ("NMC") chemistry, not the newer Tesla Megapack 2XL batteries which utilize much safer Lithium Iron Phosphate chemistry proposed for use here.[1]

In short, the Tesla Megapacks that will be used on site will: (1) be located far away from any other structures and separated from each other at distances that meet and exceed all applicable fire codes and manufacturer specifications; and (2) not use LG NMC batteries but instead will utilize Tesla Megapack 2XL batteries that are newer, have safer chemistry and employ all of the latest and most sophisticated fire protection equipment, systems and technologies. Accordingly, no significant fire hazards or environmental impacts will result from the project's use of the Tesla Megapack BESS units.

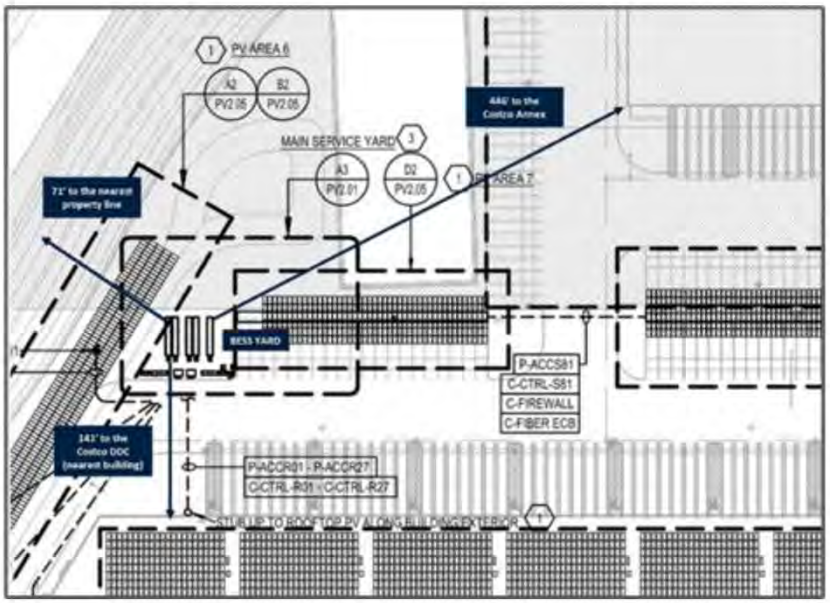
[1] *See* https://www.canarymedia.com/articles/energy-storage/moss-landing-fire-reveals-flaws-in-the-battery-industrys-early-designs?mc_cid=440664dbd7&mc_eid=e0841ae528 and https://www.aps.com/-/media/APS/APSCOM-PDFs/About/Our-Company/Newsroom/McMickenFinalTechnicalReport.ashx?la=en&hash=50335FB5098D9858BFD276C40FA54FCE.

Comment: **"The FEIR Fails to Account for The Potential Hazards from Battery Storage On Site" (**Page 44; #2)

"According to the FEIR, the Project would install a solar photovoltaic (PV) roof system, including on-site PV connection to the local electric grid. The on-site Solar PV roof system is anticipated to provide approximately 3-megawatts (MW) of building demand. In addition, a solar microgrid would be included within the Project with adequate battery storage. Sheet 4 from the RTCs indicates that the battery storage area would be adjacent to Building 2."

Response:

The location of the BESS was selected specifically to maximize the distance from buildings and operators and complies with all applicable California Building Code and California Electrical Code criteria. As noted in the following graphic from the Costco Tracy DDC Electrical Permit set, the nearest buildings are 141' and 446' feet away from the closest BESS. The location of the BESS is thus not 'adjacent' to the surrounding buildings and easily exceeds the 100' required set back from occupied structures. As designed, the location is 'remote' as defined by the California Fire Code, specifically Section 1207.8 that defines BESS systems as being 'remote' to hazards when 100 feet or more away from these hazards.



Comment:

"Mitigation Measure 3.3-4 requires that the battery storage system have enough capacity to power the Project's basic building function for 48 hours. Based on the energy consumption rate in the FEIR, the system would need to be able to store 60,494kWh in the system. As battery systems increase in size so do the potential hazards that they present. Frequently identified hazards from storage batteries include thermal runaway, off gassing, and stranded energy, along with discharges of hazardous chemicals from the batteries themselves."

Responses:

- **Contrary To the Commenter's Assertion, The System Would Not Need 60,494 kWh in Battery Storage:** Through operating analysis and expanded sizing of the PV array, specifically to maximize power production on the shortest day of the year, the aggregate battery capacity is reduced to 23,500 kWh, far less than the 60,494 projected.

- **Contrary To the Commenter's Assertion, More Batteries Do Not Equal Greater Hazard**: Current battery energy storage systems listed with UL9540 certification and having been tested to UL940A standards like the Tesla Megapacks proposed for use here are very unlikely to have a fire event spread past a single enclosure. As shown in the PG&E Moss Landing incident in 2022, a fire in a single Tesla Megapack, never spread beyond the one enclosure and responders quickly extinguished it. In conjunction with Tesla's extensive test results, this validated that a fire event is proven unlikely to spread past a single module (approx. 5% of an enclosure) per full scale testing. As such whether there is one enclosure or a thousand enclosures, the fire risk is identical.

- **Thermal Runaway Hazards Will Not Be Significant:** As discussed above, the Tesla Megapacks that will be used for this project have multiple levels of safety systems and technologies to both prevent thermal runaway from ever happening and minimize the size of any such event should it occur. Full scale UL9540A testing was completed by Tesla on the Megapack 2XL which showed a worst-case propagation of seven cells. Note that this required intentional excessive heating to the adjacent six cells before the seventh cell propagated. Specific to the Tesla Megapack 2XL designed for this project, Tesla's UL9540, section 8.4 test results, as noted in their Fire Protection Engineering and UL9540A Interpretive Report from 2024, passed the module level test. As noted in the UL's testing criteria, if all these conditions are met, further testing is not required. In Tesla's testing, thermal runaway was contained at the module level and Cell Vent Gas was proven non-flammable. In the event of a thermal runaway, the event would most likely be contained to a single enclosure as previously noted.

- **Off-Gassing Hazards Will Not Be Significant:** The Tesla Megapack LFP BESS proposed for use at this site discharges no gases during normal operation as the cells are completely sealed. Off-gassing only occurs if there is significant chemical, electrical, or physical damage to the cells and thermal runaway occurs. There are multiple levels of safety systems to prevent the batteries from ever entering thermal runaway. Furthermore, Tesla Megapack 2XL test reports show that the total volume of gas released during full scale test was only 195.3 liters (7 cells x 93.3 liters per cell), the majority of these gases are lighter than air and thus dissipate quickly and no toxic gases were released. As noted above, the Tesla Megapack 2XL includes an explosion control

system which uses sparkers designed to ignite flammable gases very early in a thermal runaway event before they accumulate within the enclosure and become an explosion hazard.

- **Stranded Energy Hazards Will Not Be Significant:** The BESS Costco proposes for this project presents little stranded energy risk as compared to higher voltage systems typically used at other sites. Manufacturers have specific procedures for handling energized batteries (i.e. stranded energy) that cannot be discharged after a thermal runaway event. For Tesla, the battery modules contain DC single-use fusible links mounted directly on the battery modules. These fuses are one-time only use safety devices that can interrupt the flow of an overcurrent in the battery module during an off-normal electrical event. As discussed above, thermal runaway events are very unlikely in the Tesla Megapack 2XL as numerous safety systems are present that prohibit such events, minimize hazards, and contain any fires to just one BESS enclosure should such an event occur.

Sincerely,

Darin Leonard

Darin Leonard
President
Trinity Structures

Enclosures: Tesla Megapack 2XL Fire Protection Engineering and UL 9540A Interpretation Report by Fire & Risk Alliance.

Tesla Megapack 2 XL

Fire Protection Engineering and
UL 9540A Interpretation Report

FIRE & RISK ALLIANCE

EXECUTIVE SUMMARY

Fire & Risk Alliance (FRA), performed a fire protection engineering (FPE) analysis of **Tesla's** Megapack 2 XL (MP2XL) battery energy storage system (BESS). The MP2XL (MP2XL) is a lithium-ion BESS with a storage capacity up to four megawatt hours (MWh). The MP2XL is a fully integrated BESS consisting of battery modules, power electronics, control systems, a battery management system, a thermal management system, and an explosion control system all pre-assembled within a single, non-occupiable cabinet. They are meant for outdoor installations, mounted to the ground, for commercial, industrial, and utility applications. This FPE analysis includes a review of the MP2XL, its construction, design, fire safety features, and an analysis of the UL 9540A cell, module, and unit level test data. Based on this review, FRA offers the following summary of our findings:

1. UL 9540A cell and module level testing demonstrated that flammable gases vent from the MP2XL cells during thermal runaway; however, the cells do not release toxic gases sometimes associated with the failure of lithium-ion batteries, such as HCN, HCL and HF.

2. UL 9540A unit level testing forced six cells into thermal runaway, which resulted in propagation to a seventh cell; however, thermal runaway did not propagate beyond the seventh cell.

3. During UL 9540A unit level testing, the MP2XL met all the performance criteria of UL 9540A, Table 9.1. Therefore, UL 9540A installation level testing is not required for a MP2XL installation.

4. The MP2XL can meet or exceed all the installation level codes and standards, such as the IFC and NFPA 855, required for outdoor, ground mounted BESS installations when it is installed in accordance with the MP2XL Design and Installation Manual.

This executive summary is an abbreviated list of findings. Refer to the main report for details of the analysis.

Fire & Risk Alliance
7640 Standish Place, Rockville, MD 20855
☎ (301) 658-3060 | ✉ info@fireriskalliance.com | 🌐 www.fireriskalliance.com

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1. INTRODUCTION

Fire & Risk Alliance (FRA), performed a fire protection engineering (FPE) analysis of Tesla's Megapack 2 XL (MP2XL) battery energy storage system (BESS). The MP2XL is a lithium-ion BESS with a storage capacity of up to four megawatt hours (MWh). The MP2XL is a fully integrated BESS consisting of battery modules, power electronics, control systems, a battery management system, a thermal management system, and an explosion control system all pre-assembled within a single, non-occupiable cabinet. They are meant for outdoor installations, mounted to the ground, for commercial, industrial, and utility applications. This FPE analysis includes a review of the MP2XL, its construction, design, and fire safety features, and an analysis of the UL 9540A cell, module, and unit-level test data. This narrative has been prepared by FRA and summarizes our analysis. It is intended to be used as a tool for a project designer, installer, fire code official (FCO), or an authority having jurisdiction (AHJ) to assist in their design, installation, or review of a MP2XL installation.

1.1 Codes, Standards, and Test Methods

The following codes, standards, and test methods have been applied to this analysis:

- 2024 International Building Code® (IBC).
- 2024 International Fire Code® (IFC).
- 2024 NFPA 1, Fire Code (NFPA 1).
- 2023 NFPA 855, Standard for the Installation of Stationary Energy Storage Systems (NFPA 855).
- 2023 NFPA 68, Standard on Explosion Protection by Deflagration Venting (NFPA 68).
- 2024 NFPA 69, Standard on Explosion Prevention Systems (NFPA 69).
- IEC 60529, Degrees of Protection Provided by Enclosures, 2.2 Edition, January 2019 (IP Code).
- IEC 62619, Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications, Edition 1.0, 2017 (IEC 62619).
- IEC 62933-5-2, Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical-based systems, April 15, 2020 (IEC 62933-5-2).
- UL 1642, Lithium Batteries, Edition 6, September 29, 2020 (UL 1642).
- UL 1973, Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications, Edition 2, February 7, 2018 (UL 1973).
- UL 9540, Standard for Safety of Energy Storage Systems and Equipment, Edition 2, February 27, 2020 (UL 9540).
- UL 9540A, Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems, Edition 4, November 12, 2019 (UL 9540A).

1.2 Reference Materials

In addition to the fire codes, standards, and test methods listed above, the following reference materials were reviewed as part of this analysis:

- MP2XL Design and Installation Manual – Rev. 2.2, dated January 30, 2024 (MP2XL DIM).
- MP2XL Operation and Maintenance Manual - Rev. 1.2, dated January 30, 2024 (MP2XL O&MM).
- Industrial Lithium-Ion Battery Emergency Response Guide – Rev. 2.7, dated February 16, 2024 (ERG).
- MP2/2XL UL 9540A Cell Level Fire Test Report, dated February 25, 2022.
- MP2/2XL UL 9540A Module Level Fire Test Report, dated July 15, 2022.
- MP2/2XL UL 9540A Unit Level Fire Test Report, dated August 5, 2022.
- Megapack 2XL Compliance Packet – Rev. 2.8, dated February 14, 2024.

1.3 Acronyms and Abbreviations

Authority Having Jurisdiction	AHJ	Light Electric Rail	LER
Battery Energy Storage System	BESS	Lithium Iron Phosphate	LFP
Battery Management System	BMS	Lower Flammability Limit	LFL
Centimeter	cm	Megapack 2	MP2
Contemporary Amperex Technology Co., LTD	CATL	Megapack 2XL	MP2XL
Controller Area Network	CAN	Megapack 2 & 2 XL	MP2/2XL
Customer Input/Output Terminals	I/O	Megawatt hour	MWh
Customer Interface Bay	CIB	Meter	m
Electrical Energy Storage	EES	Millimeter	mm
Emergency Response Plan	ERP	National Fire Protection Association	NFPA
Energy Storage System	ESS	Nationally Recognized Testing Laboratory	NRTL
Fire Code Official	FCO	Non-walk-in	NWI
Failure Modes and Effects Analysis	FMEA	Parts Per Million	ppm
Feet	ft	Pound Per Square Inch Gauge	psig
Fire Protection Engineering	FPE	Safety Data Sheet	SDS
Fire & Risk Alliance, LLC	FRA	Second	s
Gram	g	State of Charge	SOC
International Electrotechnical Commission	IEC	Supervisory Control and Data Acquisition	SCADA
International Fire Code	IFC	Tesla Site Controller	TSC
Inch	in	Thermal Management System	TMS
Kilogram	kg	TÜV SÜD	TÜV
Kilowatt hour	kWh	UL, LLC	UL

2. MP2XL DESIGN & FIRE SAFETY FEATURES

The MP2XL is a fully integrated BESS consisting of battery modules, power electronics, control systems, a battery management system, a thermal management system, and an explosion control system all pre-assembled within a single, non-occupiable cabinet. The MP2XL has a standardized, modular design that is not customizable or adjustable. MP2XL arrives at the site fully assembled needing just the alternate current (AC) connection and communications cables to be connected on the site. Meaning, every installation has the same MP2XL cabinets that are pre-assembled at the factory. It is approximately 28.9 ft in length, 5.4 ft deep, 9.2 ft in height, and can weigh up to 84,000 pounds (8.800 m by 1.650 m by 2.785 m and 38,100 kg). Below is a brief description of the MP2XL, its components, design listing, and fire safety features. For a more detailed discussion on the MP2XL components, their location, functionality, and purpose, refer to the MP2XL DIM.

2.1 Cabinet Layout

The MP2XL is intended for outdoor installations, ground-mounted to a foundation or base strong enough to support the weight of the equipment and anchor loads (including concrete pads, grade beams, etc.). The thermal roof (part of the thermal management system) is enclosed within an IP20 enclosure that sits above the battery module bays, as shown in Figure 1.

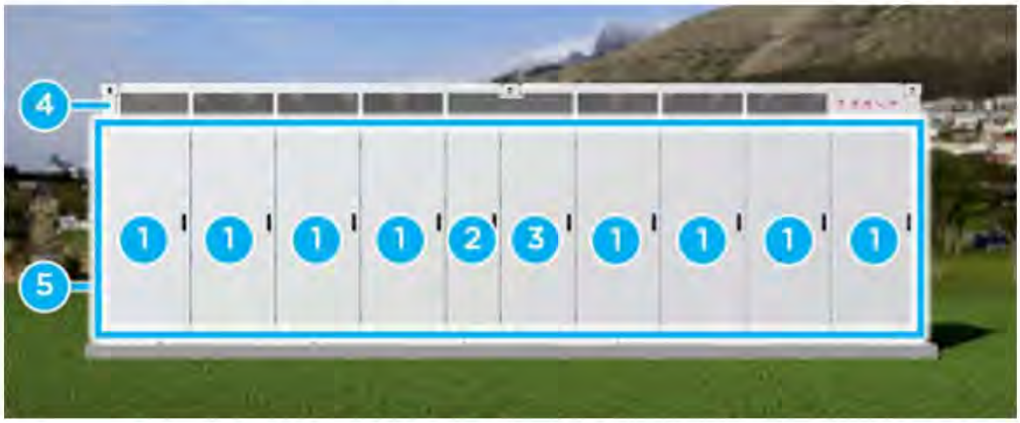

Figure 1 MP2XL internal components: (1) Battery Module Bays, (2) Thermal Cabinet, (3) Customer Interface Bay, (4) IP20 Thermal Roof Enclosure, (5) IP66 Enclosure.

The lithium-ion batteries are housed inside an IP66 steel enclosure (battery module bay) that provides protection against particle and water ingress coming into contact with the battery modules and power electronics. The IP66 enclosure is one continuous unit, meaning each of the ten bays are open to one another. However, when the MP2XL cabinet is populated with battery modules, it cannot be entered. This modular, cabinet style approach allows for the system to be easily maintained and serviced from outside the cabinets

(i.e., the battery modules, thermal management system, and power electronics are serviced through doors located on the front of the cabinets or from the top through the thermal roof), thus eliminating the need for personnel to enter an enclosure, structure, building or container to perform those activities. Since the BESS cabinets do not permit walk-in access, it is a non-walk-in style (NWI) BESS, they are not defined as occupied buildings or structures per the IBC, IFC, NFPA 1, or NFPA 855.

2.2 Cells and Battery Modules

The MP2XL can be populated with up to twenty-four battery modules with a maximum storage capacity of 3,854.4 kWh for the 2-hour duration system, 3,847.2 kWh for the 3-hour duration system, and 3,916.8 kWh for the 4-hour duration system. Each battery module contains three battery trays, as shown in Figure 2, which are arrays of prismatic, lithium phosphate (LFP) cells. The LFP cells (the cells) utilized in the MP2XL are 157.2 amp hour (Ah) with a nominal voltage of 3.22 volts (V) and are individually hermetically sealed. They are approximately 50.75 millimeters (mm) by 166.0 mm by 169.3 mm and weigh 2,991 grams (g). Each battery tray contains 112 cells; therefore, each battery module has 336 cells, and a fully populated MP2XL (twenty-four battery modules) has 8,064 cells. Note the MP2XL utilizes the same cells and battery modules found in the Megapack 2 (MP2).

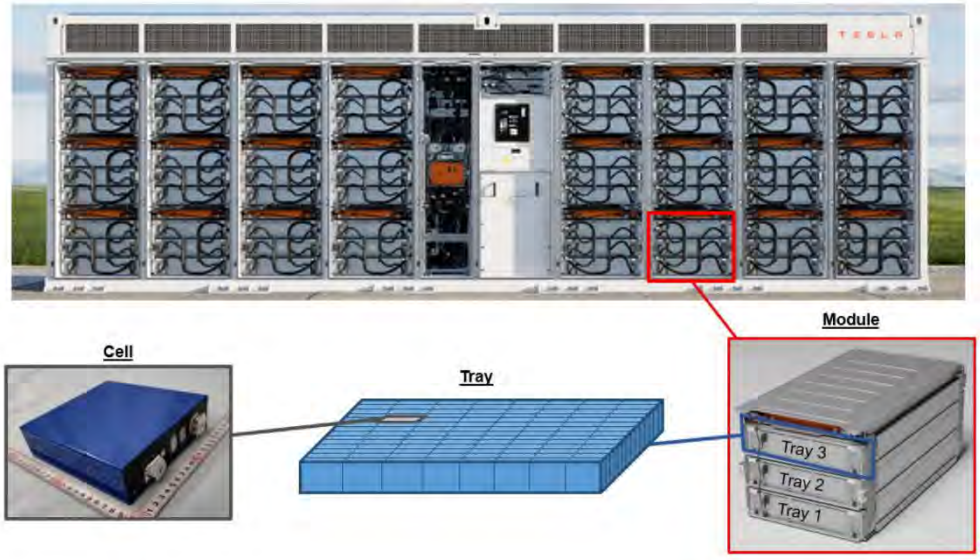

Figure 2 MP2XL, module, generalized tray, and an individual cell layout.

2.3 Customer Interface Bay

The Customer Interface Bay (CIB) is a single bay that includes all the external connections needed for initial MP2XL installation. When the fully assembled MP2XL arrives at the site, the only work necessary inside the cabinet is performed inside the CIB. Once installed, the CIB is a user-accessible area designed for operation and servicing. The CIB includes the main AC breaker, a status panel and controller area network (CAN) interface for service personnel, customer input/output (I/O) terminals, **and the keylock switch (a "Lock Out/Tag Out"** switch), which shuts down the AC bus to permit MP2XL maintenance by service personnel.

2.4 Thermal Management System

The thermal management system (TMS) provides a suitable operating temperature for MP2XL. The thermal bay and thermal roof house the components of the TMS. The TMS contains a closed-loop liquid cooling system that circulates a 50/50 mixture of ethylene glycol and water throughout the battery modules and power electronics to maintain an optimum battery operating temperature. The TMS works autonomously and does not require user feedback or controls to turn the system on when needed or to adjust temperature settings. The thermal cabinet includes pumps that circulate the liquid coolant through the MP2XL, an in-line heater that can warm the coolant and a compressor that maintains thermal control for the cabinet. The thermal roof, located above the battery bays within its own IP20 enclosure, provides a ventilation airspace for the MP2XL. It contains fans and radiators that cool the ethylene glycol-water solution. Cool air enters the thermal roof through the grates on the front of the MP2XL. The cool air then passes over the radiators, absorbing heat, and then is exhausted out of the top of the thermal roof via fans, as shown in Figure 3. The liquid cooling system utilizes approximately 400 liters (106 gallons) of the ethylene glycol-water solution, and the compressor utilizes 1.5 kilograms (3.3 pounds) of R-134a refrigerant for the 4-hour duration MP2XL and 3.0 kilograms (6.6 pounds) for the 2-hour duration MP2XL.

Figure 3 Airflow through the thermal roof.

2.5 Battery Management System

The MP2XL has an integrated battery management system (BMS) that tracks the performance, voltage, current, and state of charge of the cells (among many other datapoints). The BMS is a layered system, where each battery module has its own BMS and the MP2XL itself has a bus controller supervising the output of all the battery modules at the AC bus level. The BMS is engineered to react to fault conditions in an autonomous manner, with safeguards built into the firmware. These fault conditions include, but are not limited to, over-temperature, loss of communication, over-voltage, and isolation. For instance, to prevent a cell over-temperature the TMS is enabled by the BMS to cool the cells/module. This action by the BMS (which is just one example of many ways the BMS can respond to a fault condition) can either prevent thermal runaway from occurring in the cell or prohibit the propagation of thermal runaway to adjacent cells. Depending on the severity of the fault condition, the BMS can automatically isolate the affected battery module temporarily (less severe fault) or it can permanently disconnect the module.

2.6 Site Controller and Monitoring

Beyond the built-in safeguards of the BMS described above, the MP2XL is supported by a Tesla Local Operations Center (LOC), which is designed to support the global fleet of energy storage products. The MP2XL has 24/7 remote monitoring, diagnostics, and troubleshooting capabilities, without needing a Tesla technician on site. Customers and first responders also benefit from immediate hotline support from trained technicians via these LOCs. Additionally, the local energy provider or the facility can monitor the MP2XL through a local Supervisory Control and Data Acquisition (SCADA) system. All faults are transmitted to a Tesla LOC, alerting them to off-normal conditions that may require corrective action, either through remote means or an in-person field service visit. This communication link is accomplished via the Tesla Site Controller (TSC). The TSC provides the single **point of interface for the utility, network operator, and/or the customer's SCADA systems to control and monitor** the entire energy storage site. It dictates the charge and discharge functions of the MP2XL cabinets, aggregating real-time information and using the information to optimize the commands sent to each individual MP2XL cabinet. As such, every MP2XL has a wired Ethernet connection to the TSC, which communicates with a Tesla LOC via a built-in cellular modem. If the cellular network in the installation area is not sufficient, a hardwired internet connection can be provided. Additionally, if the BESS owner or operator wants a network connection for a control interface, the TSC becomes that point of connection to the MP2XL cabinet at the site

2.7 Electrical Fault Protection Devices

The MP2XL has several passive and active safety control mechanisms installed within the battery module circuit and distribution circuit that would be available to interrupt a fault current. At a high level, these electrical fault protection features include:

- Battery module overcurrent protection: The battery modules contain DC single-use fusible links mounted directly on the battery modules. These fuses are one-time only use safety devices that can interrupt the flow of an overcurrent in the battery module during an off-normal electrical event.

- Inverter DC protection: The inverter modules, which are installed at each of the battery modules, are equipped with a high-speed pyrotechnic fuse that can isolate the battery module passively or actively during an off-normal event.
- Inverter AC protection: In addition, each inverter module is equipped with its own AC contactor and AC fuses should an off-normal electrical event occur at the inverter module on the AC side of the circuit.
- Ground fault protection: Finally, the MP2XL is also provided with a DC ground fault detection system. It measures insulation resistance prior to operation and looks for excessive leakage current during operation. Additionally, the MP2XL also contains an AC circuit breaker, with ground-fault trip settings, which is installed within the CIB to provide distribution system protection.

2.8 Explosion Control System

The MP2XL includes an explosion control system to mitigate the risk of an uncontrolled deflagration. The system includes pressure-sensitive vents (overpressure vents) and sparkers installed throughout the battery module bay. The sparkers are designed to ignite flammable gases very early in a thermal runaway event before they accumulate within the enclosure and become an explosion hazard. They are installed at a variety of locations and heights throughout the battery module bays to ensure the flammable gases released during thermal runaway quickly meet an ignition source. Note, this explosion control system is the same approach that Tesla has utilized in previous versions of the Megapack (Megapack 1 and Megapack 2) and is not a new concept. It has been extensively validated through installation level testing for these previous Megapack versions as well as the MP2XL and its performance has been demonstrated in the field during thermal events involving Megapacks.

The overpressure vents are installed in the roof of the sealed battery bay's IP66 enclosure, as shown in Figure 4. When activated, the overpressure vents open up into the enclosed thermal roof, ensuring that the release of the overpressure vents does not create a projectile hazard. In addition, since they are installed in between the battery module bays and the thermal roof, the overpressure vents are not exposed to the environment, which means they are protected from the elements, such as falling tree limbs or snow, which could impact their functionality.

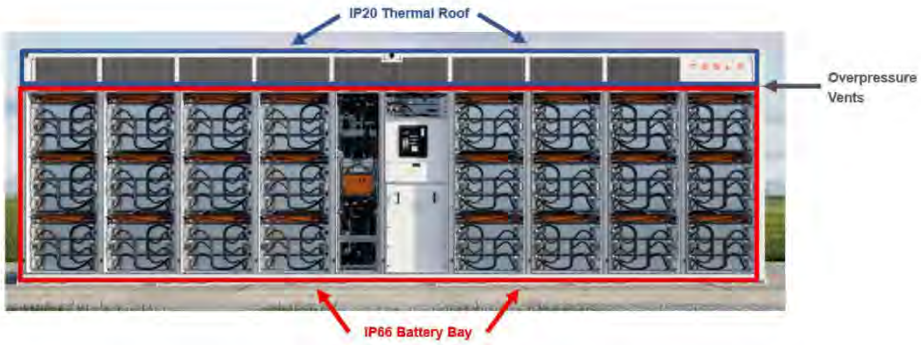

Figure 4 Location of overpressure vents in between the IP66 battery bay and the IP20 thermal roof

Once opened, the overpressure vents permit gases, products of combustion, and flames to safely exhaust through the roof of the MP2XL during a thermal event. By designing this natural ventilation flow path, flammable gases are not permitted to accumulate within the MP2XL cabinet, reducing the risk of a deflagration or explosion that could compromise the cabinet's integrity, push open the front doors, or expel projectiles from the cabinet. In addition, the ventilation path creates a controlled fire condition, should one occur, out the top of the MP2XL cabinet. By maintaining the MP2XL cabinet's integrity, keeping all the doors shut during a fire event, reducing the risk of projectiles, and creating a controlled path for flames to exit the top of the MP2XL cabinet, the likelihood of a thermal event having an impact on life safety, site personnel or first responders, is reduced. In addition, by maintaining these features, the likelihood of a fire propagating to adjacent MP2XL cabinets, electrical equipment, or other exposures is also reduced.

The overpressure vents themselves are passive and are not actuated or controlled by another device. They are designed to release during an overpressure event, such as the rapid ignition of flammable gases by a sparker. The number and total area of overpressure vents were sized following the guidance of NFPA 68 with a safety factor of two times the enclosure's strength, including the front doors. Tesla developed the overpressure vents and sparker system because the direct application of NFPA 68 or NFPA 69 is not suitable for the MP2XL cabinet, which does not have large volumes of open-air space. This engineered approach is permitted by NFPA 855 §9.6.5.6.4 provided it is validated by installation-level fire and explosion testing and an engineering evaluation, which Tesla has performed.

2.9 Fire Detection

The MP2XL does not have an internal fire detection system or one that is integral to its design/construction. If fire detection is required at the BESS site, multi-spectrum IR flame detectors can be installed external to the MP2XL to detect flames exiting the cabinets. Testing performed by Tesla has demonstrated that multi-spectrum IR flame detectors are capable of detecting a fire once flames have exited the cabinet.

2.10 Clearances

The MP2XL can be installed back-to-back and side-to-side with a clearance distance of 6 inches and can be installed 8 feet in front of adjacent MP2XL cabinets. These clearance distances are based on large-scale fire tests and fire modeling results that demonstrate a fire will not propagate from one MP2XL to adjacent MP2XL cabinets.

2.11 Emergency Response

Tesla developed a lithium-ion battery emergency response guide (ERG) to provide guidance to anyone responding to an emergency involving a MP2XL. This guide can be utilized by site owners to develop their own site-specific emergency response plans.

3. MP2XL PRODUCT LISTINGS

The MP2XL and its subcomponents are certified or listed to multiple national and international product design standards. These certifications and listings apply to the cells, battery modules, inverters, power electronics, control systems, integration between the BESS and the grid, as well as the BESS as a whole. The standards highlighted below pertain to the lithium-ion cells, the battery modules, and the MP2XL BESS at the unit level. For a full listing of all certifications and listings for all the MP2XL components, please refer to the MP2XL Compliance Packet.

3.1 Cell and Module Level

The lithium-ion batteries utilized in MP2XL are certified and listed to national and international product safety standards from entities such as UL, LLC (UL) and the International Electrotechnical Commission (IEC). These certifications include, but are not limited to:

UL 1642: This certification standard is applicable to secondary (rechargeable) lithium-ion cells and batteries used as a power source (such as BESS). The standard's requirements are intended to reduce the risk of fire or explosion when the battery is used in a product. For example, the standard subjects lithium-ion batteries to severe abuse conditions and evaluates if they can safely withstand them.

UL 1973: This certification standard is applicable to batteries and battery systems utilized for energy storage. The standard evaluates the battery system's ability to safely withstand simulated abuse conditions. For example, the standard subjects module-level stationary batteries to an internal fire exposure test to force a thermal runaway in one cell to ensure it does not explode, propagate fire to neighboring cells, or propagate to the rest of the modular battery system. UL 1973 applies to stationary BESS applications, such as photovoltaic installations and wind turbine energy storage systems, as well as other specialized energy storage systems, such as light electric rail (LER) operations.

IEC 62619: This safety standard specifies requirements and tests to ensure the safe operation of secondary (rechargeable) lithium-ion cells and batteries used in ESS and in other industrial applications. Electrical safety is covered under Clause 8 of the standard, which requires the completion of a risk analysis to determine specific electrical safety issues associated with the intended use of a given battery system or device.

3.2 Unit Level

The MP2XL, as entire cabinets, are also certified, tested, and listed to national and international product safety standards and test methods, including, but not limited to:

IEC 62933-5-2: This safety standard addresses various aspects of BESS, including the requirements for grid-integrated BESS.

UL 9540: This standard covers energy storage systems (including lithium-ion BESS) for stationary indoor and outdoor installations and establishes the system-level certification for energy storage systems and their associated equipment.

UL 9540A: The test methodology evaluates the fire characteristics and thermal runaway fire propagation of a BESS (including lithium-ion BESS). The test method provides a means to evaluate thermal runaway and fire propagation at the cell level, module level, and unit level. The data generated from the test method can be used to determine the fire and explosion protection required for a BESS installation based on fire test data. This test is specifically referenced by the IFC, NFPA 1, and NFPA 855 to demonstrate the functionality of the BESS fire protection features during large-scale fire testing.

3.3 Installation Level

The MP2XL can meet the installation level requirements in the 2024 Edition of the International Fire Code, the 2023 Edition of NFPA 855, and the 2022 California Fire Code for outdoor, ground-mounted BESS installations when they are installed in accordance with its listing and the MP2XL DIM.

4. UL 9540A TESTING

The UL 9540A test method provides a method to evaluate thermal runaway and fire propagation of a lithium-ion BESS at the cell level, module level, unit level, and installation level. The data generated from the test method can be used to determine the fire and explosion protection systems/features required for a BESS installation. This includes, but is not limited to, thermal runaway characteristics of the cell; cell thermal runaway gas composition; the fire propagation potential from cell to cell, module to module, and unit to unit; products of combustion; heat release rate; smoke release rate; and performance of fire protection systems. A summary of the cell, module, and unit-level test results for the MP2XL is provided below.

4.1 UL 9540A Cell Level Testing

Cell-level testing was conducted at UL in December 2021. UL is an OSHA-approved Nationally Recognized Testing Laboratory (NRTL) and offers the UL mark for products. Testing was performed on five model CB5T0, 3.22 V, 157.2 Ah, LFP cells manufactured by Contemporary Amperex Technology Co., Ltd. (CATL) for use in the Megapack 2 and Megapack 2 XL (MP2/2XL).[1] Each cell was charged to 100% state of charge (SOC) prior to testing. Thermal runaway was initiated via film strip heaters installed on both of the wide side surfaces of each cell, as shown in Figure 5. Meaning two heaters were installed on each cell. The heaters were programmed to **increase the temperature of the cell's surface by approximately 4.5°C per minute until the cell vented and went** into thermal runaway. The cell was placed within an enclosed enclosure and the products released during testing were collected and analyzed.

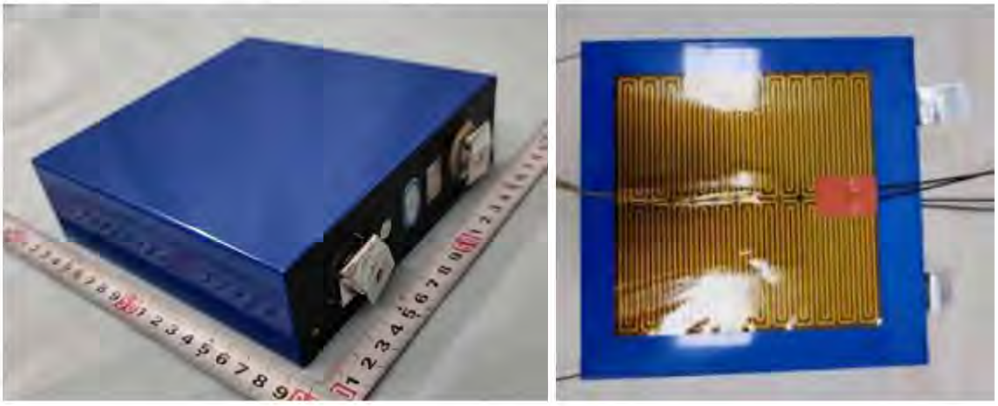

Figure 5 Individual cell tested to UL 9540A (left) and installed film strip heater (right).

[1] Note, as described in Section 2.2, the MP2 and MP2XL utilize the same cells and battery modules.

4.1.1 Test Results

The key flammability and gas composition properties from the UL 9540A cell level tests are summarized below in Table 1 and Table 2.

Table 1 UL 9540A Cell Level Testing: Key Flammability Characteristics

Flammability Property	Value
Average cell surface temperature at gas venting	174°C
Average cell surface temperature at thermal runaway	239°C
Cell vent gas volume released	93.3 L
LFL, % volume in air at the ambient temperature	7.15%
LFL, % volume in air at the venting temperature	6.05%
Burning Velocity (S_u)	90.0 cm/s
Maximum pressure (P_{max})	98.46 psig

Table 2 UL 9540A Cell Level Testing: Cell Vent Gas Composition (Excluding O_2 and N_2)

Gas Name	Chemical Structure	% Measured	Component LFL
Carbon Monoxide	CO	10.881	10.9
Carbon Dioxide	CO2	27.107	N/A
Hydrogen	H2	50.148	4.0
Methane	CH4	6.428	4.4
Acetylene	C2H2	0.264	2.3
Ethylene	C2H4	3.283	2.4
Ethane	C2H6	1.100	2.4
Propene	C3H6	0.379	1.8
Propane	C3H8	0.125	1.7
-	C4 (Total)	0.190	N/A
-	C5 (Total)	0.027	N/A
-	C6 (Total)	0.005	N/A
Benzene	C6H6	0.002	1.2
Toluene	C7H8	0.002	1.0
Dimethyl Carbonate	C3H6O3	0.055	N/A
Ethyl Methyl Carbonate	C4H8O3	0.004	N/A
Total	-	100	-

4.1.2 Key Takeaways

Key takeaways from the tests include:

- The average cell vent and thermal runaway temperature was determined to be 174°C (345°F) and 239°C (462°F), respectively.
- 93.3 liters of cell vent gases were released.
- The cell vent gas mixture is flammable and has an LFL of 7.15% at ambient temperature.
- The cell vent gases were predominantly (approximately 95%) Carbon Monoxide (CO), Carbon Dioxide (CO_2), Hydrogen (H_2), and Methane (CH_4).
- Toxic gases sometimes associated with lithium-ion batteries, such as Hydrogen Fluoride (HF), Hydrogen Chloride (HCL), and Hydrogen Cyanide (HCN) were not vented from the cell.

4.1.3 Performance Criteria

UL 9540A, Section 7.7 outlines the performance criteria for the cell level test. If all these conditions are met, further testing (such as module, unit, or installation level tests) are not required. The acceptable performance criteria during the UL 9540A cell level test are as follows:

1. Thermal runaway cannot be induced in the cell.
2. The cell vent gas does not present a flammability hazard when mixed with any volume of air, at both ambient and vent temperatures.

Given the cell went into thermal runaway and vented flammable gases, UL 9540A module level testing was required.

4.2 UL 9540A Module Level Testing

Module level testing was conducted at a TÜV SÜD (TÜV) laboratory in May 2022. TÜV is an OSHA-approved NRTL and offers the cTÜVus mark, which is equivalent to other NRTL marks such as UL, ETL or CSA. Testing was performed on a 360.64 V, 157.2 Ah, MP2/2XL tray (model MP2 Module), manufactured by CATL.[2] Each tray consists of 112, CATL model CB5T0 LFP cells that were charged to 100% SOC prior to testing. During the test, the MP2XL tray is not connected to the BMS or TMS; meaning, they are not actively operating to prevent thermal runaway in a cell or to prohibit the propagation of thermal runaway from cell to cell. Thermal runaway was initiated via film strip heaters installed on both of the wide side surfaces of two cells, similar to the cell level test (see Figure 5). This resulted in the simultaneous heating of six cells forcing multiple cells into thermal runaway at approximately the same time. The heaters were programmed to increase the temperature of the cell's surface by approximately 4.17 - 4.52°C per minute until the cells vented and went into thermal runaway. The tray was placed under an instrumented hood and the products released during combustion were collected for analysis.

[2] Note, as described in Section 2.2, the MP2 and MP2XL utilize the same cells and battery modules.

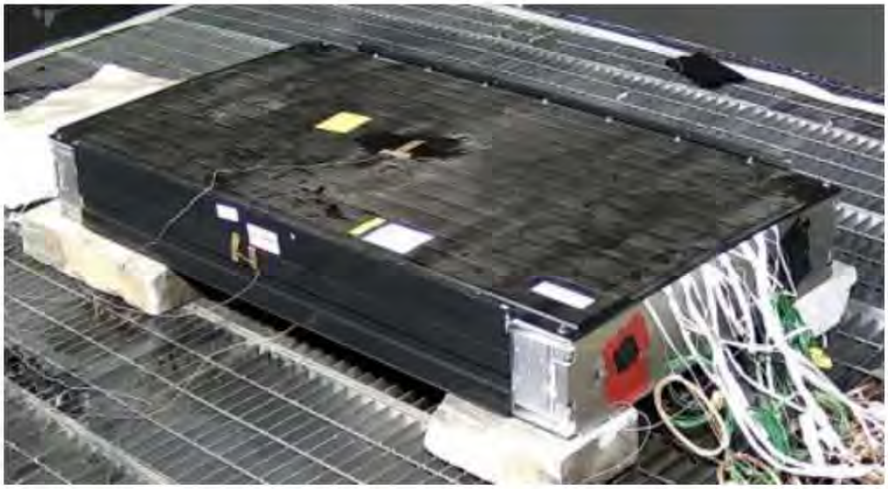

Figure 6 Tray tested to UL 9540A module level testing.

4.2.1 Test Results

This simultaneous heating of six cells forced multiple cells to go into thermal runaway that propagated from the initiating cells to all the cells in the MP2/2XL tray. Once ignited, the MP2/2XL tray fire appears to be a slow-progressing thermal event that took approximately 30-35 minutes to burn itself out. Sparks and flying debris were observed during the test; however, there were no explosive discharges of gases. Products of combustion were collected in the hood and flammable gases were identified, as listed in Table 3. However, toxic gases sometimes associated with lithium-ion batteries, such as HF, HCL, and HCN, were not detected during the combustion of the MP2/2XL tray.

4.2.2 Key Takeaways

Key takeaways from the UL 9540A module level test include:

- Thermal runaway propagated from the initiating cells to all the cells in the MP2/2XL tray.
- The MP2/2XL tray fire appears to be a slow-progressing thermal event requiring over 30 minutes to burn itself out.
- Sparks and flying debris were observed, however, there were no explosive discharges of gases.
- Products of combustion were collected and were identified as flammable.
- Toxic gases sometimes associated with lithium-ion batteries, such as HF, HCL, and HCN, were not detected during the combustion of the MP2/2XL tray.

Table 3 UL 9540A Module Level Testing: Products of Combustion

Gas Name	Chemical Structure	Measurement Peak (ppm)
Carbon Monoxide	CO	205
Carbon Dioxide	CO2	6721
Methane	CH4	68.8
Acetylene	C2H2	17.1
Ethene	C2H4	Not Detected
Ethane	C2H6	Not Detected
Propane	C3H8	Not Detected
Butane	C3H4	Not Detected
Pentane	C3H6	Not Detected
Benzene	C6H6	9.0
Hexane	C7H14	Not Detected
Hydrofluoric Acid	HF	Not Detected
Hydrogen Chloride	HCL	Not Detected
Hydrogen Cyanide	HCN	Not Detected
Hydrogen	H2	446
Total Hydrocarbons	(Propane Equivalent)	247

4.2.3 Performance Criteria

UL 9540A, Section 8.4 outlines the performance criteria for the module level test. If all these conditions are met, further testing (such as unit or installation level tests) are not required. The acceptable performance criteria during the UL 9540A module level test are as follows:

1. Thermal runaway is contained by module design.
2. Cell vent gas is nonflammable as determined by the cell level test.

Given the cell vent gases are flammable (as summarized previously) and thermal runaway was not contained by the module design, UL 9540A unit level testing was required.

4.3 UL 9540A Unit Level Testing

The unit level fire test was conducted at the Northern Nevada Research Center on March 9, 2022, and was certified by TÜV. TÜV is an OSHA-approved NRTL and offers the cTÜVus mark, which is equivalent to other NRTL marks such as UL, ETL or CSA. Note, the MP2XL design is almost identical to the MP2 other than being greater in length to accommodate the additional battery modules. It uses the exact same cells, battery modules, and power electronics (i.e., all the same internal components) that the MP2 utilizes in its design. In addition, the design of the cabinet itself, enclosure strength, and fire safety features, such as the BMS, site controller, monitoring, electrical fault protections, and explosion control system are nearly identical for the two products.

After reviewing the MP2 unit level fire test results and comparing the MP2 and MP2XL products to one another, TÜV determined the MP2 UL 9540A unit level fire test results can be applied to the MP2XL and an additional UL 9540A unit level fire test for the MP2XL was not required for its listing. As such, given all these factors, a stand-alone MP2XL unit level fire test was not performed, nor required. Therefore, the UL 9540A unit level fire test results, described below for the MP2, can be applied to the MP2XL.

4.3.1 Test Unit

The test was performed on a fully populated MP2, consisting of nineteen battery modules, with a capacity of 3,100.8 kWh, tested at 100% SOC. Of all the MP2 variations, the unit tested during UL 9540A unit level testing is the largest capacity variation Tesla manufactures. In addition, during the test, the BMS and TMS are disabled; meaning, they are not actively operating to prevent thermal runaway in a cell or to prohibit the propagation of thermal runaway from cell to cell, or module to module. As such, the UL 9540A unit level fire test can be considered a worst-case fire scenario, where: (1) the unit tested was the largest variation in terms of energy capacity; (2) the unit tested was at the highest energy density possible (100% SOC); and (3) the BMS and TMS were disabled and, therefore, unable to actively respond to the thermal runaway condition. As such, any tests performed on a smaller capacity MP2, at a lower SOC, or on an operating MP2 (one with an active BMS and TMS) would be expected to perform similarly, if not better, than this worst-case scenario. Below is a summary of the UL 9540A unit level fire test results as well as a description of the performance of key fire safety features/systems during the test.

4.3.2 Test Setup

The test setup included all the required instrumentation and data collection as required by UL 9540A as well as some additional measurements that go beyond what is required. These additional measurements were collected to provide additional information to project designers, installers, a FCO, or an AHJ to assist in their design, installation, or review of a MP2XL installation.

4.3.3 Initiation

The initiating battery module was chosen to be the bottom battery module from Bay 7, in the middle battery tray, as shown in Figure 7.

Figure 7 Initiation location: Bay 7, bottom battery module within tray 2.

This location was deemed to be the worst-case, given there are battery trays directly above it and below it. In addition, by initiating in the bottom battery module, there are two additional battery modules installed directly above the initiation location. Within the battery tray itself, six interior cells were simultaneously heated via four film heaters, as shown in Figure 8. The heaters were programmed to provide a heating rate of 5°C (9°F) per minute, as specified by UL 9540A. The number of cells and the location were selected to provide the greatest thermal exposure to adjacent cells to ensure cell-to-cell propagation during the test. The objective of this initiation method is to simulate a mass failure of multiple cells in a localized area within the same battery module.

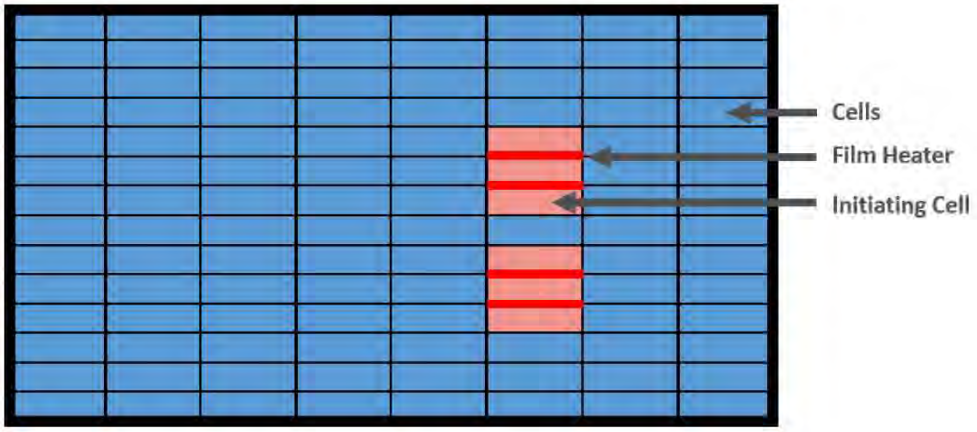

Figure 8 Film heater locations within the initiating tray (top view).

4.3.4 Instrumentation

Outside the initiating battery module and MP2 cabinet, three additional target MP2 cabinets were installed: (1) 6 inches (in) or 150 mm behind the initiating MP2; (2) 6 in (150 mm) to the side of the initiating MP2; and (3) 8 ft (2.44 m) in front the initiating MP2, as shown in Figure 9. The two target MP2 cabinets behind and to the side were populated with 100% SOC battery modules to simulate a multiple MP2 cabinet installation and to determine if thermal runaway and/or fire will propagate from one MP2 cabinet to adjacent cabinets at separation distances of 6 in (150 mm). Additionally, a combustible, instrumented wall (wood framing with plywood facing, painted black) was installed 5 ft (1.52 m) to the side of the initiating MP2 to demonstrate if fire could spread to a combustible surface (plywood wall) during the test.

Thermocouples were installed in the initiating battery module on the external surface of the initiating cells, inside the initiating MP2 cabinet, inside the target MP2 cabinets, on the instrumented wall, and on the exterior surfaces of all the MP2 target cabinets. Heat flux sensors were installed at distances of 3, 5, 8, 20, and 30 ft (0.91, 1.52, 2.44, 6.10, and 9.14 m) from the initiating MP2, as shown in Figure 9. Two external flame detectors and two thermal imagers were installed facing the initiating MP2 to demonstrate their functionality should flames exit the initiating MP2 during the test.

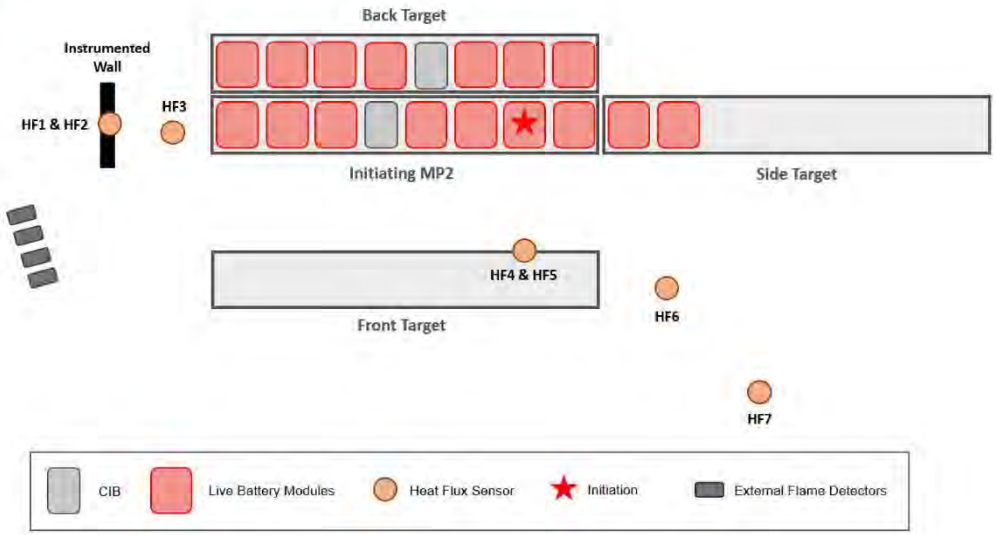

Figure 9 Instrumentation and target MP2 cabinet setup (top view).

4.3.5 Test Results

The test was performed starting around 11:30 am on March 9, 2022. The ambient temperature was between 50.5°F and 52.9°F. It was a sunny, clear day with no precipitation and a relative humidity between 14% and 19%. These outdoor environmental conditions meet the requirements of UL 9540A, Section 9.1.2. The cameras and instrumentation were turned ON at or around time 0:00:00 (hours: minutes: seconds) and the heaters within the initiating MP2 were turned ON at time 0:09:25. Six cells were heated simultaneously for over 1 hour and 18 minutes until the first initiation cell reached its thermal runaway temperature (as measured on the external surface of the cell via a thermocouple) of 239°C (462°F). Fifteen minutes later, the second group of initiating cells reached their thermal runaway temperature. Around 6 minutes later (approximately 1 hour 39 minutes into the test), light smoking/off-gassing was observed exiting the MP2 cabinet in the location where instrumentation was routed into the cabinet (i.e., where thermocouple/power wiring was in contact with the gasket that forms a **tight seal for Bay 7's front door**). Cell-to-cell propagation (thermal runaway spreading beyond the initial six cells being forcibly heated) was confirmed at approximately 1 hour 45 minutes when a seventh cell reached a temperature of 239°C (462°F). The heaters continued to run for an additional 5 minutes after this observation and then were turned off (at approximately 1 hour and 51 minutes into the test). Thermocouple temperatures inside the initiating MP2 subsided and no additional off-gassing, smoking, or cell thermal runaways were observed. By 2 hours and 30 minutes, the test ended. However, a period of observation and data collection continued for hours afterward to ensure the MP2 did not demonstrate any signs of distress. Table 4 provides a summary of key events from the UL 9540A unit level fire test of the MP2.

Table 4 UL 9540A Unit Level Testing: Timeline of Key Events

Elapsed Time hr:min:sec	Event
00:00:00	Start of Test. Cameras and Data acquisition system (DAQ) turned on.
0:09:25	Heaters ON.
1:18:18	First group of initiating cells reach thermal runaway temperature of 239°C (462°F).
1:33:38	Second group of initiating cells reach thermal runaway temperature of 239°C (462°F).
1:39:28	**Smoke observed exiting out the bottom of the initiating MP2 cabinet's bay door where** instrumentation was routed into the cabinet.
1:45:48	Confirmation of cell propagation to a 7th cell via internal thermocouple measurements.
1:51:09	Heaters turned OFF.
2:00:00	No additional smoke was observed from the initiating MP2 cabinet. Internal temperatures subside.
2:30:00	End of Test.
Post Test Overhaul	The initiating MP2 cabinet was observed for several hours afterwards and allowed to cool. No additional off-gassing, smoking, elevated temperatures, fire, thermal runaways, or signs of off-normal conditions were observed.

After 24 hours, the initiating MP2 showed no signs of abnormal conditions or distress since the test had concluded (no additional off-gassing, smoking, smells, thermal runaway, or flare-ups) and it was opened for inspection. Prior to opening the initiating MP2, handheld gas detection devices were utilized around the cabinets and did not detect the presence of flammable gases nor were flammable gases detected internally after the Bay 7 door was opened. A visual inspection of the initiating MP2 yielded the following observations:

- Seven cells had gone into thermal runaway: the six that were forcibly heated and one additional cell, as illustrated in Figure 10. This demonstrated that cell-to-cell propagation had occurred during the test, as is required by UL 9540A.

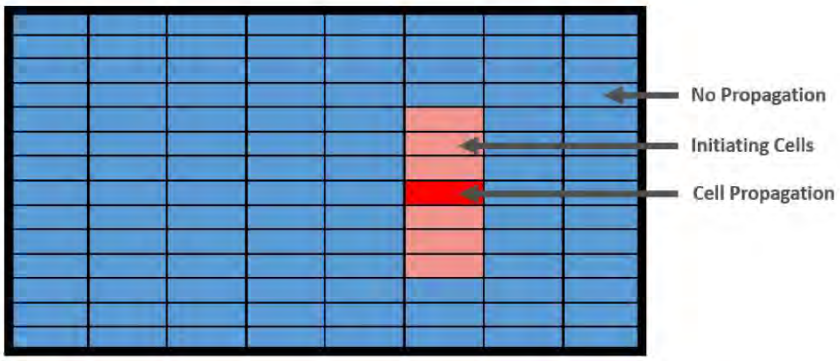

Figure 10 Cell propagation during UL 9540A unit level fire testing (top view).

- No other signs of distress were observed in the initiating battery module. Thermal runway had not propagated beyond the seven cells within Tray 2, nor had it spread to the tray above or below it within the battery module.
- Internal cell components were observed inside the initiating MP2 cabinet in the area of the initiating **battery module and around Bay 7's front door; however, no free**-flowing liquid or runoff was observed.
- The overpressure vents in Bay 7 had not opened, indicating that the internal pressure within Bay 7 did not see a significant rise during the failure of the seven cells.
- Visible clues of fire damage to surrounding components (plastics, electronics, etc.) were not observed. Based on this observation, it is likely that a sustained fire did not occur around the initiating battery module, even with the failure of seven cells occurring.
- The battery modules within the target MP2 cabinets installed 6 in (150 mm) behind and to the sides were also unaffected.

4.3.6 Fire Propagation

UL 9540A unit level fire testing of the MP2 demonstrated that an internal failure event causing thermal runaway of six cells nearly simultaneously will not propagate thermal runaway throughout the battery module. The nearly simultaneous failure resulted in thermal runaway propagating only to one additional cell and no further. The first group of initiating cells went into thermal runaway approximately 1-hour and 18 minutes into the test, as shown in Figure 11. This observation is based on internal thermocouple measurements installed on the surface of the cells within the initiating battery module.

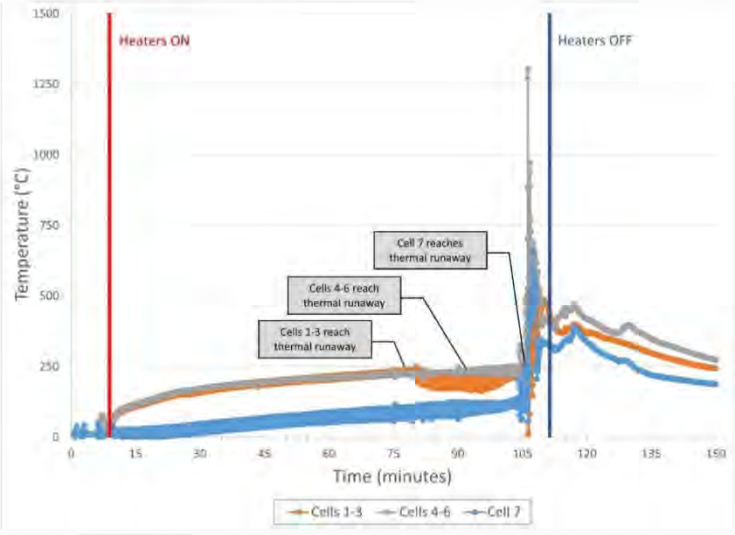

Figure 11 Cell surface temperatures recorded during UL 9540A unit level fire testing.

Fifteen minutes later the second group of initiating cells went into thermal runaway and cell-to-cell propagation was confirmed at approximately 1 hour 45 minutes when a seventh cell reached 239°C (462°F). Note, this result was with a disabled BMS and TMS (i.e., no safety protections were in place). Thermal runaway did not propagate beyond the seventh cell within Tray 2 of the initiating module, nor did it propagate to the battery modules installed above. In addition, thermal runaway did not propagate to the target MP2 cabinets installed 6 in (150 mm) behind and to the sides of the initiating MP2 cabinet. Lastly, no flaming was observed outside of the unit during the test.

4.3.7 Target Battery Module Surface Temperatures

As shown in Table 5, surface temperatures of battery modules within the target MP2 cabinets did not exceed 174°C (345°F), the temperature at which thermally initiated cell venting occurs (as determined during UL 9540A cell level testing).

Table 5 UL 9540A Unit Level Testing: Target Battery Module Surface Temperatures

Location	Maximum Battery Module Temperature Recorded	Ambient Temperature at the Start of Test	Cell Venting Temperature	Cell Thermal Runaway Temperature
Back Target Modules	13.8°C (56.4°F)	10.2°C (50.4°F)	174°C (345°F)	239°C (462°F)
Side Target Modules	13.2°C (55.8°F)	8.0°C (46.4°F)	174°C (345°F)	239°C (462°F)

These temperatures were recorded at the battery modules closest to the initiating battery module, as shown in Figure 12. As plotted in Figure 13, the internal temperature of the target battery modules gently rose throughout the 2½-hour test as the ambient, outdoor temperature also increased from 10.3°C to 11.6°C. These temperature measurements indicate the target battery modules were not affected by the thermal runaway of the seven cells within the initiating battery module.

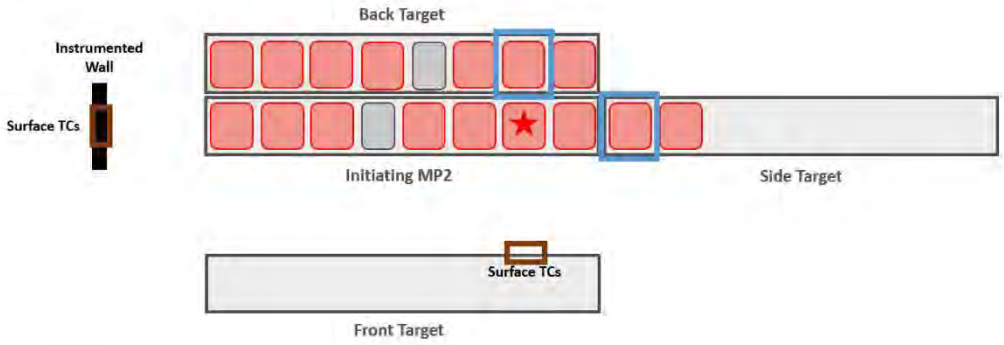

Figure 12 Temperature measurement locations: at side and back target battery modules (blue boxes) and the front target and instrumented wall surface temperatures (brown boxes).

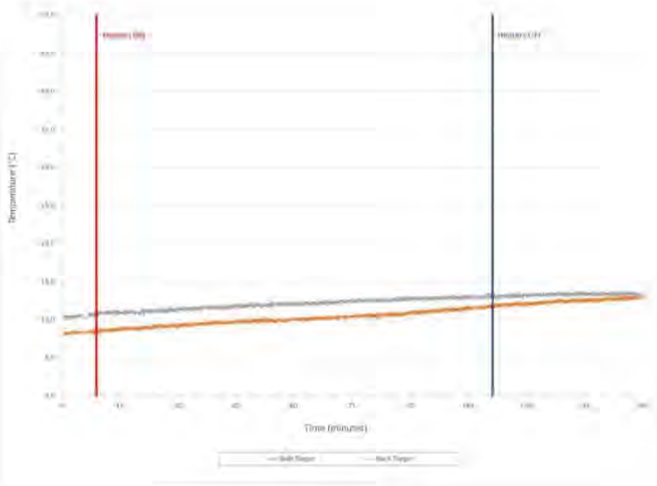

Figure 13 Side and back target battery module temperatures during UL 9540A unit level fire testing.

4.3.8 Exposure Surface Temperatures

As shown in Table 6, surface temperatures on exposures 5 ft (1.52 m) to the side (instrumented wall) and 8 ft (2.44 m) directly in front of the initiating MP2 cabinet (front target) did not exceed 97°C (175°F) above ambient.

Table 6 UL 9540A Unit Level Testing: Exposure Surface Temperatures

Location	Maximum Temperature Recorded	Ambient Temperature Recorded by the TC at the Start of Test	Temperature Rise Above Ambient
Front Target Surface	16.8°C (62.2°F)	11.3°C (52.3°F)	5.5°C (9.9°F)
Instrumented Wall Surface	25.9°C (78.6°F)	20.4°C (68.7°F)	5.5°C (9.9°F)

These temperatures were recorded directly in front of the initiating battery module and at the instrumented wall, as shown in Figure 12. The surface temperature of the front target gently rose throughout the 2½-hour test from a starting temperature of 11.3°C (52.3°F) to a maximum surface temperature of 16.8°C (62.2°F), as shown in Figure 14. Similarly, the 24 thermocouples installed on the instrumented wall also gently rose throughout the test and fluctuated slightly with the outdoor environmental conditions (i.e., wind blowing, sun exposure, increasing ambient temperatures), as shown in Figure 15. The maximum temperature measured on the instrumented wall was 25.9°C (78.6°F), which was a temperature rise of 5.5°C (9.9°F) above its ambient temperature at the start of the test. Note, the temperature rise above ambient can be attributed to the environmental conditions during the 2½-hour test and is not directly related to the thermal runaway of the seven cells within the initiating MP2. As these measurements are surface temperatures, the temperature rise within

the front target surface and the instrumented wall surface is predominantly due to the sun heating up those surfaces during the test (the test was run between 11 am and 1:30 pm on a mostly sunny day). These temperature measurements indicate an exposure surface 5 ft (1.52 m) to the side and adjacent MP2 cabinets 8 ft (2.44 m) in front, were not affected by the thermal runaway of the seven cells within the initiating battery module.

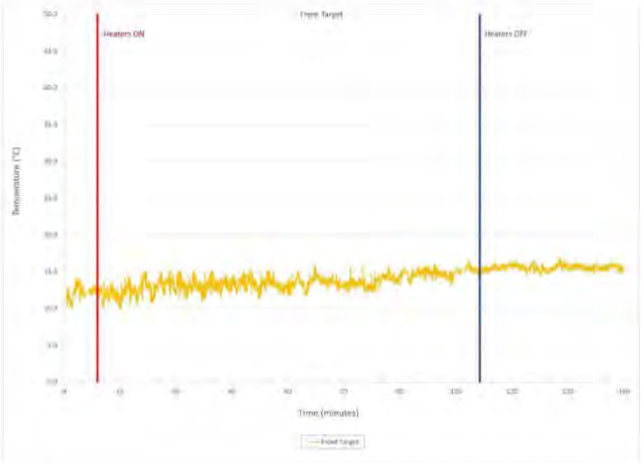

Figure 14 Front target external surface temperature 8 ft (2.44 m) directly in front of the initiating module.

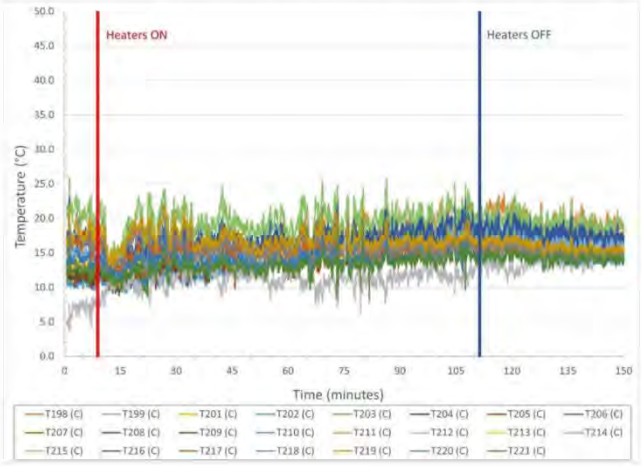

Figure 15 Instrumented wall surface temperatures during UL 9540A unit level fire testing.

Note: T200, the 24th thermocouple installed on the instrumented wall, did not work during testing, and was therefore removed from this plot as the measurements recorded were erroneous.

4.3.9 Heat Flux Measurements

Heat flux measurements were recorded throughout the UL 9540A unit level fire test at distances of 3, 5, 8, 20, and 30 ft (0.91, 1.52, 2.44, 6.10, and 9.14 m). Since flames did not occur outside the initiating MP2 cabinet, predictably, these measurements were essentially 0.00 kW/m² throughout the entire test, as summarized in Table 7 and plotted in Figure 16.

Table 7 UL 9540A Unit Level Testing: Maximum Recorded Heat Fluxes

Location	Maximum Heat Flux Recorded (W/m²)
HF1	0.0000013
HF2	0.0000013
HF3	0.0000014
HF4	0.0000016
HF5	0.0000014
HF6	0.0000016
HF7	0.0000013

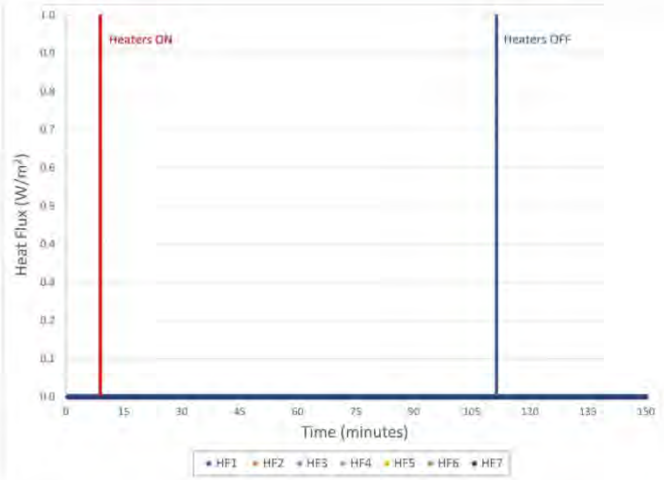

Figure 16 Heat flux measurements recorded during UL 9540A unit level fire testing.

The maximum heat flux recorded was 0.0000016 W/m², which was recorded at both the front target and at a distance of 20 ft from the initiating MP2. Note, these heat flux values, in W/m², are essentially reading no heat flux values at all, as would be expected given no flaming was observed outside the MP2 cabinet nor was the cabinet itself warmed enough to impose a heat flux on the sensors. These heat flux measurements indicate an exposure surface 3-5 ft (0.91-1.52 m) to the side, an adjacent MP2 cabinet 8 ft (2.44 m) in front, and other

exposures further away at 20-30 ft (6.10-9.14 m), were not affected by the thermal runaway of the seven cells within initiating battery module. Furthermore, the heat flux measurements in front of and to the side of the initiating MP2 cabinet did not exceed 1.3 kW/m^2 at any time during the test.

4.3.10 External Fire Detection System

The MP2 does not have an internal fire detection system or one that is integral to its design/construction. During the UL 9540A unit level fire test, two multi-spectrum IR flame detectors and two thermal imagers from differing manufacturers were installed pointing directly at the front and top of the initiating MP2 cabinet. None of the detectors were activated during the fire test. This result is expected, as no flames were observed during the test. However, previous testing by Tesla on the MP1 has demonstrated that multi-spectrum IR flame detectors can detect a fire should flames exit the cabinet through the thermal roof and can be incorporated into a site design, if required.

4.3.11 Fire Suppression System

The MP2 does not have an internal fire suppression system or one that is integral to its design/construction. The UL 9540A unit level test results demonstrate that a suppression system is not required to stop the spread of fire from cell to cell, module to module, or MP2 cabinet to cabinet when a near-simultaneous failure of up to six cells occurs within the same battery module.

The UL 9540A unit level fire test also demonstrated that manual fire suppression (hose lines) is not required to stop the spread of fire from a MP2 cabinet to adjacent MP2 cabinets installed 6 in (150 mm) behind and to the sides when a near-simultaneous failure of up to six cells occurs within the same battery module.

4.3.12 Explosion Control

UL 9540A unit level fire testing of the MP2 demonstrated that a failure event causing the near-simultaneous thermal runaway of six cells will not cause a deflagration. During the test, pressure transducers were installed within the battery module bay to monitor overpressures within the MP2 cabinet. After the test, no pressure spikes were observed in the data, indicating no sudden increases in pressure, consistent with a deflagration, occurred within the MP2 cabinet during the UL 9540A unit level test. In addition, the overpressure vents did not open, the MP2 cabinet doors were not forced open, nor did the MP2 cabinet fail to hold containment. Meaning, no visual indications of an overpressure event occurring inside the MP2 cabinet were observed. Light smoking/off-gassing (i.e., not a pressurized discharge or deflagration) did escape the initiating MP2 during the test, likely through pathways created by the required instrumentation (thermocouples, film heaters, etc.) for the test; however, explosion hazards, including but not limited to, observations of a deflagration, projectiles, flying debris, detonation, hazardous pressure waves, shrapnel, or other explosive discharge of gases, were not observed.

4.3.13 Runoff/Products of Combustion

UL 9540A unit level fire testing does not require the collection of runoff or products of combustion as part of an outdoor installation test. However, during the unit level test, and afterwards during cleanup, no liquid runoff

(such as the water-glycol solution from the TMS) was observed. Internal cell components were observed after the test on the interior of the cabinet around the Bay 7 door, as would be expected after the failure of seven cells. However, no free-flowing liquid, or runoff was observed once the MP2 doors were opened. If necessary, should a failure event occur, internal cell components/electrolytes can be disposed of in an appropriate manner **as specified by Tesla's ERG and Safety Data Sheets (SDS).**

4.3.14 Performance Criteria

UL 9540A, Table 9.1 outlines the performance criteria for outdoor, ground-mounted BESS. If all these conditions are met, further testing (such as installation-level testing) is not required. The performance criteria during the UL 9540A unit level fire test is as follows:

1. No flaming observed outside of the unit.
2. Surface temperatures of battery modules within the targets adjacent to the initiating unit cannot exceed the temperature at which thermally initiated cell venting occurs.
3. Surface temperatures on exposures 5 ft (1.52 m) to the side and 8 ft (2.44 m) in front of the initiating unit cannot exceed 97°C (175°F) above ambient.
4. No explosion hazards, including but not limited to, observations of a deflagration, projectiles, flying debris, detonation, or other explosive discharge of gases observed.
5. Heat flux in the center of the accessible means of egress cannot exceed 1.3 kW/m^2.

As described above, no flaming was observed outside the MP2 cabinet during the unit level test. In addition, surface temperatures of the battery modules within the targets were below the temperature at which cell venting occurs (174°C or 345°F), and external surface temperatures on exposures 5 and 8 ft (1.52 and 2.44 m) away did not exceed 97°C (175°F) above ambient. Lastly, no explosion hazards were observed, and all heat fluxes remained below 1.3 kW/m^2. Based on the above UL 9540A unit level fire test results, the MP2 meets all five of the above performance criteria. By meeting the unit level performance criteria, UL 9540A installation-level testing is not required for a MP2 installation.

5. CONCLUSIONS

Based on our review of the available materials, our background, experience and training, and the analysis performed to date described above, the following conclusions are submitted within a reasonable degree of scientific and engineering certainty:

1. The MP2XL is listed to all product design standards (such as UL and IEC) required of a BESS and has been tested to UL 9540A at the cell, module, and unit level.
2. Cell and module level UL 9540A testing demonstrated that the venting and combustion of the MP2XL cells release flammable gases that are commonly detected in a vented lithium-ion cell; however, they do not release toxic gases sometimes associated with the failure of lithium-ion batteries, such as HCN, HCL, and HF.
3. The largest variant of the MP2, a 3,100.8-kWh unit, was tested at a worst-case scenario (i.e., 100% SOC with the BMS and TMS disabled) to the UL 9540A unit level fire test method where six cells within the same battery module were forced into thermal runaway.
4. The MP2XL design is almost identical to the MP2 other than being greater in length to accommodate the additional battery modules. It uses the exact same cells, battery modules, and power electronics (i.e., all the same internal components) that the MP2 utilizes in its design. In addition, the design of the cabinet itself, enclosure strength, and fire safety features, such as the BMS, site controller, monitoring, electrical fault protections, and explosion control system are nearly identical for the two products. As such, TÜV determined the MP2 UL 9540A unit level fire test results summarized below can be applied to the MP2XL.
5. The performance criteria outlined in UL 9540A, Table 9.1 for outdoor, ground-mounted BESS were all met during the unit level test. Specifically, the performance criteria results were:
    a. No flaming was observed outside of the unit.
    b. Surface temperatures of battery modules within the target MP2 cabinets adjacent to the initiating MP2 cabinet did not exceed the temperature at which thermally initiated cell venting occurs. The maximum temperatures recorded at the battery modules of the adjacent MP2 cabinets were 13.8°C (56.4°F) and 13.2°C (55.8°F). These temperatures are significantly below the temperature at which cell venting occurs (174°C or 345°F).
    c. Surface temperatures on exposures 5 ft (1.52 m) to the side and 8 ft (2.44 m) in front of the initiating MP2 cabinet did not exceed 97°C (175°F) above ambient. The maximum external surface temperatures recorded at the instrumented wall 5 ft (1.52 m) to the side was 25.9°C (78.6°F) with a temperature rise above ambient of 5.5°C (9.9°F). The maximum external surface temperatures recorded at the front target 8 ft (2.44 m) directly in front of the initiating MP2 was 16.8°C (62.2°F) with a temperature rise above ambient of 5.5°C (9.9°F). These temperatures are significantly below the maximum permitted temperature rise above ambient of 97°C (175°F).
    d. Explosion hazards, including but not limited to, observations of a deflagration, projectiles, flying debris, detonation, or other explosive discharge of gases were not observed.
    e. Heat flux measurements did not exceed 1.3 kW/m^2. The maximum heat flux recorded was 0.0000016 W/m^2, which was the sensor installed on the front target MP2 cabinet and was the ambient heat flux the sensor was exposed to throughout the test.

6. Based on a review of the MP2XL, its fire safety features, and the UL 9540A unit level fire test results, the MP2XL meets or exceeds all the performance criteria of UL 9540A, Table 9.1 and UL 9540A installation level testing is not required for a MP2XL installation.
7. None of the external fire detectors activated during the UL 9540A unit level fire test (two multi-spectrum IR flame detectors and two thermal imagers). This result is expected, as no flaming was observed outside of the cabinet during the test; however, previous testing by Tesla on the MP1 has demonstrated that multi-spectrum IR flame detectors can detect a fire should flames exit the cabinet through the thermal roof.
8. An integral fire suppression system or an external fire suppression system is not required to stop the spread of fire from cell to cell, module to module, or MP2XL cabinet to cabinet when a near-simultaneous failure of up to six cells occurs within the same battery module.
9. Manual fire suppression (hose lines) is not required to stop the spread of fire from a MP2XL cabinet to adjacent MP2XL cabinets installed 6 in (150 mm) behind and to the sides when a near-simultaneous failure of up to six cells occurs within the same battery module.
10. Based on a review of the MP2XL, its fire safety features, and the UL 9540A test results, the MP2XL can meet or exceed all the installation level codes and standards, such as the IFC and NFPA 855, required for outdoor, ground mounted BESS installations when installed in accordance with the MP2XL DIM.

6. REVISION CONTROL SHEET

Date	Revision	Reason for Issue	Developed By	Reviewed By	Approved By
04/03/2024	Rev0	Initial Report	AFB	BA	NLR

Revision	Section	Changed Noted

RAMBOLL

ENVIRONMENT
& HEALTH

Ms. Christine Lasley
Real Estate Project Manager
Costco Wholesale
999 Lake Drive
Issaquah, Washington 98027
clasley@costco.com

REVIEW OF POTENTIAL VALLEY FEVER IMPACTS FROM CONSTRUCTION TASKS – PROPOSED COSTCO, TRACY, CA

February 14, 2025

Ramboll
5 Park Plaza
Suite 500
Irvine, CA 92614
USA

T +1 949 261 5151

www.ramboll.com

Dear Ms. Lasley:

Ramboll Americas Engineering Solutions, Inc. (Ramboll) was retained by Costco Wholesale Corporation (Costco) to examine and address potential impacts under the California Environmental Quality Act (CEQA) of the Costco Depot Annex project on exposure to Valley Fever. This letter summarizes the opinions of Michelle Campbell, Principal with Ramboll and a Global EHS Credentialing® (BGC) Certified Industrial Hygienist (CIH No. 10776CP) in response to the *Comments on Agenda Item 1.D. – Tracy Costco Depot Annex Project (SCH #2020080531)* prepared by Adams Broadwell Joseph & Cardozo and dated December 4, 2024 specific to Valley fever (ABJC comment letter). Specifically, that the ABJC comment letter claimed that the Final Environmental Impact Report (FEIR) for the proposed Costco project failed to address the potential health risk to construction workers and nearby sensitive receptors from exposure to *Coccidioides immitis*. Ms. Campbell's curriculum vitae (cv) is presented as Attachment 1. CIHs are responsible for anticipating, recognizing, evaluating, controlling and confirming protection from hazardous workplace conditions that may cause injury or illness to workers and/or members of the community. [1] Ms. Campbell is a practicing CIH with decades of experience assessing community and occupational exposures for the construction industry.

BACKGROUND

As explained by Dr. Clark in the response to the *Comments on Agenda Item 1.D. - Tracy Costco Depot Annex Project (SCH #2020080531)* prepared by Adams Broadwell Joseph & Cardozo and dated December 4, 2024, and as recognized by the California Occupational Safety and Health Administration (Cal/OSHA), Valley fever is caused by a microscopic fungus known as *Coccidioides immitis (Coccidioides)*, which lives in the top two to twelve inches of soil in many parts of California. *Coccidioides* are common in outdoor reservoirs such as soil and can cause infection in all previously uninfected persons who are

[1] American Industrial Hygiene Association: https://www.aiha.org/about-aiha

exposed. [2] When soil is disturbed, the fungal spores can be aerosolized, which can increase the potential for exposure to occur. Populations with more than 20 Valley fever cases annually per 100,000 people are considered highly endemic, including the San Joaquin Valley as referenced by Dr. Clark, and the California Department of Public Health (CDPH) have reported increases in Valley fever cases year over-year. Dr. Clark cites Lawrence L. Schmelzer and R. Tabershaw, Exposure Factors in Occupational Coccidioidomycosis stating "The most at-risk populations are construction and agricultural workers." along with Schmelzer and Tabershaw, 1968, p. 110; Pappagianis and Einstein, 1978 "The potentially exposed population in surrounding areas is much larger than construction workers because the nonselective raising of dust during Project construction will carry very small spores, 0.002-0.005 millimeters ("mm") into nonendemic areas, potentially exposing large non Project-related populations." Articles cited are based on exposure factors and data collected by University students from 1968 and 1978. They do not represent knowledge gained over the past several decades and it can be assumed that dust control measures for construction in 2025 are significantly enhanced from those used in 1968. While exposure to *Coccidioides* is a known hazard for construction projects in the San Joaquin Valley, there is substantial regulatory oversight and best practices provided to manage exposure risk by Cal/OSHA and as described in the subsequent sections.

HEALTH RISK FACTORS AND EXPOSURE ROUTES

Valley fever is caused when people or other mammals inhale dust particles containing *Coccidioides immitis.* Symptoms usually present within 1-3 weeks following exposure and range from mild respiratory illness to severe pneumonia, and in rare cases disseminated disease that can be fatal. The CDPH reports that 40% of persons infected with Valley fever exhibit symptoms, while 60% are asymptomatic. People with increased risk for severe disease include African American or Filipino persons, pregnant women, older age groups and those with weakened and/or compromised immune systems. There are currently no vaccines available, thus reducing exposure potential is the primary method of disease prevention.

Cal/OSHA recognizes the following job classifications to be at increased risk of becoming infected with Valley fever:

- Construction workers and other workers on construction sites, including road building and excavation crews
- Archeologists
- Geologists
- Wildland firefighters
- Military personnel
- Workers in mining, quarrying, gas and oil extraction jobs
- Agricultural workers

[2] American Conference of Governmental Industrial Hygienists: Bioaerosols Assessment and Control, First edition, 1999

ENVIRONMENTAL FACTORS

In soil, *Coccidioides* grow as a network of branching hyphae. Small rodents and other animals are thought to serve as a medium for *Coccidioides* growth. As the hyphae grow, they produce chains of asexual spores known as arthroconidia, which become airborne when the soil is disturbed.

Coccidioides prevalence in air is highly variable. More studies are needed to better understand how they are transported and dispersed in ambient conditions, once disturbed and/or under high wind events. According to the National Institutes of Health (NIH) *Coccidioides* distribution in air and soil are sporadic and uneven. The absence of commercially available air and/or soil sampling methods, and the absence of regulatory-approved laboratory analytical methods, makes worksite-specific characterization of *Coccidioides* not feasible. It is not uncommon, even in studies sampling in highly endemic areas, for the fungus to be detected in few or none of the soil samples. And as discussed below, current regulations and guidance do not recommend nor require sampling because of these factors.

WORK-RELATED EXPOSURE CASE DATA

Ramboll was informed by Cal/OSHA that work-related Valley fever case data is not available from them and that case data provided by the CDPH is used for trend analysis. CDPH case data is based on where the infected person resides and not where they work. Therefore, specific exposure source and location information pertaining to Valley fever disease incidence in construction workers are not available for review.

The CDPH Occupational Health Branch (OHB) has conducted investigations into Valley fever outbreaks at select worksites and identified ineffective dust suppression, heavy equipment windows left open and no respiratory protection available to be the major contributing factors.

The best management practices that shall be implemented by Costco Construction and their contractor(s) described in Table 1 below, both address Dr Clark's proposed feasible 'mitigation measures' and align with those provided by the regulatory agencies. They are expected to provide adequate dust suppression and be protective of worker health.

VALLEY FEVER REGULATORY REQUIREMENTS FOR WORKER PROTECTION

Cal/OSHA regulates worker protection and harmful exposures via the following California Code of Regulations (CCR), Title 8, sections:

- Section 342 - Reporting Work-Connected Fatalities and Serious Injuries
- Section 3203 - Injury and Illness Prevention Program
- Section 5141 - Control of Harmful Exposures to Employees
- Section 5144 - Respiratory Protection
- Section 14300 - Employer Records of Occupational Injury or Illness (Log 300)

These standards are applicable to the regulation of worker exposures to *Coccidioides* and define employer responsibilities for identifying and communicating occupational hazards to affected employees, implementation of site-specific written programs and controls to minimize employee's exposures, and that require immediate reporting of serious injury, illness or death from Valley fever.

Cal/OSHA also requires construction employers to train workers on prevention in counties where Valley fever is highly endemic including but not limited to, the Counties of Fresno, Kern, Kings, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, Santa Barbara, Tulare, and Ventura. Training is a

critical component of the site-specific Injury and Illness Prevention Program (IIPP) and must include a review of key definitions related to Valley fever, high-risk areas at the worksite, a review of the specific job tasks and conditions that increase potential for exposure, personal risk factors, water-based dust suppression protocols, hygiene practices, the importance of early detection, diagnosis and treatment, how to recognize signs and symptoms, reporting symptoms, treatment and prognosis.

Similarly, employers in the construction industry are also required to follow the requirements to train workers on prevention in California Labor Code 6709.

VALLEY FEVER INDUSTRY STANDARDS AND BEST MANAGEMENT PRACTICES

Costco and its contractor(s) are required to and will implement the programs to minimize and reduce health risks from Valley fever.[3] These best management practices satisfy regulatory requirements as described in the previous section, mirror the best management practices provided by Cal/OSHA, CDPH, Center for Disease Control (CDC) and National Institute for Occupational Safety and Health (NIOSH) as described below, and meet those recommended by Dr. Clark as presented in Table 1. The following highlights the guidance provided by recognized agencies to address the risks from Valley fever.

Cal/OSHA offers the following best management practices to be implemented to limit the risk of Valley fever infection[4]:

- Minimize the area of soil disturbed.
- Use water, appropriate soil stabilizers, and/or re-vegetation to reduce airborne dust.
- Stabilize all spoils piles by tarping or other methods.
- Provide enclosed air-conditioned cabs for vehicles that generate dust and make sure workers keep windows and outside air vents closed.
- Suspend work during heavy winds.
- Keep workers upwind of digging and other dust-producing activities, such as grading, driving, dumping soil, drilling, or blasting.
- Use vacuums equipped with high-efficiency particulate air (HEPA) filters, water, wet towels, or other wet methods to clean soiled equipment, tools, and surfaces. Do not use compressed air, dry sweeping, or other methods that create dust when cleaning.
- Keep break areas, eating areas, and sleeping quarters, if provided, clean and protected from sources of dust.
- When exposure to dust is unavoidable, provide NIOSH-approved respiratory protection with particulate filters rated as N95, N99, N100, P100, or HEPA. Employers must develop and implement a respiratory protection program in accordance with Cal/OSHA's Respiratory Protection standard (8 CCR 5144). Face coverings and masks do not protect against Valley fever.
- Take measures to reduce transporting spores offsite, such as:
  - Clean tools, equipment, and vehicles safely before transporting offsite.

[3] Costco indicated that construction contractors have contractual requirements for the health and safety of their workers.

[4] Cal/OSHA Protection from Valley Fever https://www.dir.ca.gov/dosh/valley-fever-home.html

  - At dusty worksites, provide coveralls and change rooms, and showers where possible. Ensure workers change into clean clothes and shoes before leaving the worksite.
- Identify a health care provider for occupational injuries and illnesses who is knowledgeable about the diagnosis and treatment of Valley fever.
- Train workers and supervisors about the risk of Valley fever, the work activities that may increase the risk, and the measures used onsite to reduce exposure. Also, train workers and supervisors on how to recognize Valley fever symptoms.
- Encourage workers to report Valley fever symptoms promptly to a supervisor. Not associating these symptoms with workplace exposures can lead to a delay in appropriate diagnosis and treatment.

CDPH recommends implementation of good industrial hygiene practices for controlling the aerosolization of the fungal spores, along with the following general practices[5]:

- Include Valley fever as a hazard in the Injury and Illness Prevention Program.
- Plan projects to minimize dirt disturbance and use water to keep dust down.
- Train workers on ways to prevent exposure to dust and about the symptoms of Valley fever.
- Provide enclosed cabs with filtered air for heavy machinery work.
- Provide and ensure the correct use of respirators.
- Refer workers with symptoms to physicians familiar with Valley fever.
- Report Valley fever illness to Cal/OSHA.

Center for Disease Control (CDC) in partnership with the NIOSH offers the following general guidance to minimize illness[6]:

- Stop work in high wind conditions.
- Minimize hand digging.
- Use heavy equipment with air-conditioned cabs.
- Wet soil.
- Train workers to position themselves upwind of soil disturbing activities.
- Use respiratory protection and implement a respiratory protection program when exposure to dusty conditions is unavoidable (e.g. manual digging, spotting for heavy equipment).
- Wash equipment before moving offsite.
- Require workers to change clothing and shoes at worksite.
- Arrange prompt medical evaluation and treatment.

[5] CDPH Preventing Work-Related Coccidioidomycosis (Valley Fever) https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/CDPH%20Document%20Library/CocciFact.pdf

[6] CDC/NIOSH: Valley Fever Prevention for Workers https://www.cdc.gov/niosh/valley-fever/about/index.html

REVIEW OF REQUESTED 'MITIGATION MEASURES'

The following section reviews the approaches suggested in the *Comments on Agenda Item 1.D. – Tracy Costco Depot Annex Project (SCH #2020080531)* prepared by Adams Broadwell Joseph & Cardozo and dated December 4, 2024. Costco Construction and their contractor(s) are required to have written programs, employee training, injury and illness reporting, work practices and controls to meet Cal/OSHA requirements for controlling workers' exposures to Valley fever. As noted below, the project will be employing the best management practices that align with those provided by the regulatory agencies and considered to be state-of-the-art to further reduce the risk of health impacts from Valley fever. These best management practices are the appropriate means to reduce workers' exposure to *Coccidioides* and are considered protective of worker and/or community health. Table 1 includes a summary of the recommendations requested by Dr. Clark to reduce potentially significant health risk impacts to construction workers and nearby sensitive receptors from exposure to *Coccidioides.* Along with a description of the best management practice that will be implemented by Costco Construction and their contractor(s) to satisfy regulatory recommendations as referenced and Dr. Clarks' requests.

Table 1 – Summary of Industrial Hygiene Risk Management Controls

Requested 'Mitigation Measure'	**Project best management practice**
1. Include specific requirements in the Project's Injury and Illness Prevention Program regarding safeguards to prevent Valley fever.	Costco and its contractor(s) will prepare an Injury and Illness Prevention Program prior to the commencement of construction in compliance with CCR Title 8, §3203, Injury and Illness Prevention Program. The IIPP will outline roles and responsibilities for implementing the program, outline specific safe and healthy work practices including recognizing workplace hazards resulting from earth-moving construction tasks, include a communication system for sharing hazard identification and reporting for all affected employees and provide resources for employees seeking medical care.
2. Control dust exposure through the following methods:	
Apply chemical stabilizers at least 24-hours prior to high wind event;	Costco and its contractor(s) will address fugitive dust control notably as related to high wind events in compliance with San Joaquin Valley Air Pollution Control District (SJVAPCD) Rule 8021. A lime treatment will be applied to the soil to reduce fugitive dust emissions during construction activities.
Apply water to all disturbed areas a minimum of three times per day. Watering frequency should be increased to a minimum of four times per day if there is any evidence of visible wind-driven fugitive dust;	Costco and its contractor(s) will apply water to disturbed areas a minimum of three times a day, watering will also be conducted continuously during excavation activities consistent with SJVAPCD fugitive dust rule requirements.

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Table 1 – Summary of Industrial Hygiene Risk Management Controls	
Requested 'Mitigation Measure'	**Project best management practice**
Provide National Institute for Occupational Safety and Health (NIOSH)-approved respirators for workers with a prior history of Valley fever.	In accordance with CCR Title 8, §5144, Respiratory Protection, NIOSH-approved respirators will be made available for workers who request additional personal protective equipment (PPE), including those who are requesting such equipment due to prior Valley fever history. The Health and Safety Plan will identify job tasks and work activities when a respirator is required.
Half-face respirators equipped with a minimum N-95 protection factor for use during worker collocation with surface disturbance activities. Half-face respirators equipped with N-100 or P-100 filters should be used during digging activities. Employees should wear respirators when working near earth-moving machinery.	in accordance with CCR Title 8, §5144, Respiratory Protection, NIOSH-approved respirators will be made available for workers who request additional PPE, including those who are requesting such equipment due to prior Valley fever history. Heavy-duty equipment will include enclosed cabs that utilize cabin HEPA-grade filters and air conditioning. Operators will be instructed to keep the windows and air vents closed. These controls will be implemented in compliance with CCR Title 8, §5141, Control of Harmful Exposures to Employees.
Prohibit eating and smoking at the worksite, and provide separate, clean eating areas with hand washing facilities.	Costco and its contractor(s) will provide hygiene facilities for hand washing and designated break and/or smoking areas in compliance with CCR Title 8, §5141, Control of Harmful Exposures to Employees. Signage will be posted throughout the site location to highlight the risks of dust exposure and reiterated to employees during weekly safety briefings.
Avoid outdoor construction operations during unusually windy conditions or in dust storms.	Costco and its contractor(s) will cease earth-moving activities during high wind events consistent with SJVAPCD fugitive dust rule requirements.
Consider limiting outdoor construction during the fall to essential jobs only, as the risk of cocci infection is higher during this season.	Costco and its contractor(s) will limit outdoor construction in the fall season as feasible. Paving and hardscaping activities will be completed as soon as possible.

RAMBOLL

Table 1 – Summary of Industrial Hygiene Risk Management Controls	
Requested 'Mitigation Measure'	**Project best management practice**
3. Prevent transport of Cocci outside endemic areas:	
Prevent spillage or loss of bulk material from holes or other openings in the cargo compartment's floor, sides, and/or tailgate.	Costco and its contractor(s) will include best management practices in their dust control plan for securing loads on trucks during transport. The perimeter of the site will comply with SJVAPCD Rule 8041, which prevents or limits fugitive dust emissions from carryout and trackout.
Provide workers with coveralls daily, lockers (or other systems for keeping work and street clothing and shoes separate), daily changing and showering facilities.	Costco and its contractor(s) will include best management practices in their dust control plan to provide a dedicated onsite changing area, hygiene facilities and posted procedures on correct methods to minimize dust carryout. The contractor(s) will also review dust control procedures during the weekly safety meetings. These controls will be implemented in accordance with CCR Title 8, §5141, Control of Harmful Exposures to Employees and CCR Title 8, §3203, Injury and Illness Prevention Program.
Clothing should be changed after work every day, preferably at the work site.	Costco and its contractor(s) will incorporate education related to dust exposure from clothing in their site-specific Health and Safety Plan (HASP) and in compliance with CCR Title 8, §3203, Injury and Illness Prevention Program.
Train workers to recognize that cocci may be transported offsite on contaminated equipment, clothing, and shoes; alternatively, consider installing boot-washing.	Costco and its contractor(s) will provide initial and annual awareness training in accordance with California Labor Code 6709 and will incorporate regular safety briefings. Costco and its contractor(s) will provide hygiene requirements and decontamination protocols related to dust exposure from clothing in their site-specific Health and Safety Plan (HASP) and in compliance with CCR Title 8, §5141, Control of Harmful Exposures to Employees and CCR Title 8, §3203, Injury and Illness Prevention Program.
Post warnings onsite and consider limiting access to visitors, especially those without adequate training and respiratory protection.	Costco and its contractor(s) will post signage to communicate dust-related hazards in compliance with CCR Title 8, §3203, Injury and Illness Prevention Program. Site access will be controlled with all visitors required to sign in and complete a safety briefing. All visitors will be escorted by a contractor(s) representative and access will be restricted to authorized personnel during high earth-moving activity.

Table 1 – Summary of Industrial Hygiene Risk Management Controls	
Requested 'Mitigation Measure'	**Project best management practice**
4. Improve medical surveillance for employees:	
Employees should have prompt access to medical care, including suspected work-related illnesses and injuries.	The site-specific Health and Safety Plan and Injury Illness Prevention Program will be used to communicate reporting, first aid and medical treatment protocols. The contractor(s) will post local clinic listings, including phone number, address, and maps onsite for worker access. Relevant health and safety information, including these resources, will be reviewed in weekly safety briefings in compliance with CCR Title 8, §3203. Injury and Illness Prevention Program. Respiratory protection will be provided in accordance with CCR Title 8, §5144, Respiratory Protection.
Work with a medical professional to develop a protocol to medically evaluate employees who have symptoms of Valley fever.	
Consider preferentially contracting with 1-2 clinics in the area and communicating with the health care providers in those clinics to ensure that providers are aware that Valley fever has been reported in the area. This will increase the likelihood that ill workers will receive prompt, proper and consistent medical care.	If a Valley fever diagnosis is identified by a medical office, a medical release will be required prior to returning to the jobsite to ensure worker safety.
Respirator clearance should include medical evaluation for all new employees, annual re-evaluation for changes in medical status, annual training, and fit-testing.	
Skin testing is not recommended for evaluation of Valley fever.	
If an employee is diagnosed with Valley fever, a physician must determine if the employee should be taken off work, when they may return to work, and what type of work activities they may perform.	

CLOSING

The variable and sporadic presence of *Coccidioides* in soil, along with the absence of commercially available soil and/or air testing methods means that there is no way of characterizing its prevalence and therefore the exposure potential for a specific worksite. As stated by Dr. Clark, San Joaquin Valley is considered an endemic area for Valley fever. Costco and its contractor(s) recognize the potential significant health risks with *Coccidioides* exposure and will employ best management practices to comply with regulatory requirements, and which go beyond awareness training required under California

Labor Code 6709. The best management practices provided by regulatory agencies and public health professionals are the standard to address potential Valley fever exposure, and they are in line with those steps suggested by Dr. Clark. As summarized in Table 1, Costco and its contractor(s) will meet these suggestions in compliance with the regulations.

Dr. Clark explains that *Coccidioides* "are five times smaller than typical PM10 dust particles, thus allowing the spores to travel significantly further, thereby impacting receptors at greater distances" Fungal spores, although small in aerodynamic diameter, are transported and dispersed the same as other airborne particles. Thus, the best management practices and fugitive regulations also address potential offsite exposure. The best management practices in Table 1 go beyond those described in the San Joaquin Valley Air Pollution Control District's Rule 8021. Potential for *Coccidioides* exposure in the San Joaquin Valley is a widely recognized hazard with ample resources provided by Cal/OSHA and CDPH to understand and establish effective exposure controls, all of which have been reviewed by Costco and its contractor(s), and will be implemented as described in Table 1. Regulatory agencies and public health professionals agree that the use of proven dust control protocols is a critical component of reducing potential exposures to *Coccidioides.* Those to be implemented by Costco and its contractor(s) are compliant with regulatory requirements, align with those suggested by Dr. Clark and would minimize fugitive dust emissions and potential for transport of soil containing *Coccidioides* beyond the worksite.

The industrial hygiene professional community recognizes engineering and administrative controls to be more effective at reducing occupational exposures, with PPE often used as a "last line of defense". Costco Construction and their contractor(s) have provided a multi-layered approach incorporating all available controls to ensure exposures to *Coccidioides* are minimized.

Please feel free to contact the undersigned if you have any further questions. Thank you for the opportunity to assist you with these matters.

Sincerely,

Michelle Campbell, CMC, CDPH, CAC, CIH
Principal, Health Sciences

D 949 381 8104
mcampbell@ramboll.com

CC. Eric Lu, Ramboll

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RAMBØLL

ATTACHMENT 1
C.V. MICHELLE CAMPBELL

Michelle L. Campbell, CMC, CAC, CIH
Principal

Michelle Campbell has over 20 years of experience in industrial hygiene with emphasis on building science, occupational safety, and industrial hygiene consulting for public and private sector clients, with a focus on high hazard industries. As a California-Sate licensed asbestos and lead professional and a Certified Industrial Hygienist, Ms. Campbell's areas of expertise include, coordination and execution of hazardous and regulated materials surveys, including asbestos and lead-containing materials, abatement specification and work plan preparation and abatement oversight. Occupational health and safety experience includes implementation and management of programs; health and safety training; moisture investigations; microbial assessments and remediation oversight; qualitative and quantitative occupational exposure assessments; facility decommissioning and verification testing; sound level mapping and noise dosimetry; industrial hygiene controls review; ventilation assessments; exposure banding and industrial hygiene program design. Her project experience covers multiple markets, delivering traditional industrial hygiene services to aerospace, energy, school districts, higher education institutions, municipalities, oil and gas, ports, sanitation districts, manufacturing and mining clients.

CONTACT INFORMATION
Michelle Campbell

MCAMPBELL@ramboll.com
+1 (949) 381-8104

Ramboll
5 Park Plaza
Suite 500
Irvine, CA 92614-8525

CAREER

2024 – Current
Principal, Ramboll Americas Engineering Solutions, Inc.
2020-2024
National Service Leader, Industrial Hygiene, TRC Companies, Inc.
2016 – 2020
California Practice Leader, TRC Companies, Inc.
2007-2016
Director, Industrial Hygiene & Occupational Safety, Citadel EHS
2001-2007
Analytical Chemist & Indoor Air Quality Manager, H. M. Pitt Labs, inc.

EDUCATION

2001 BS, Chemistry, University of Manchester, United Kingdom

CREDENTIALS

Board Certified in Comprehensive Practice of Industrial Hygiene, ABIH #10776
Certified Asbestos Consultant, California Division of Occupational Safety & Health (DOSH) Certification #09-4519
Lead-Related Construction Project Monitor, California Department of Public Health (CDPH) Certification #LRC-00000697
Certified Microbial Consultant, American Council for Accredited Certification (ACAC) Certification #0512053
Certificate of Training, Mine Safety and Health (MSHA) Certification #A3571

PROFESSIONAL AFFILIATIONS

American Conference of Governmental Industrial Hygienists (ACGIH) – Member

American Industrial Hygiene Association – Member

PROFESSIONAL EXPERIENCE

Siemen's Mobility, North America Hub, Sacramento, CA, Industrial Hygiene Program Development, Health and Safety Compliance, Qualitative and Quantitative Occupational Exposure Assessments: Provided industrial hygiene support and completed qualitative and quantitative exposure assessments for all processes and job tasks performed at the Site. Collaborated with EHS and line supervisors to build a site-specific industrial hygiene program. Performed annual occupational noise monitoring and facility sound level mapping. Conducting general health and safety compliance support as needed, including radiation safety program review, ventilation assessments and engineering controls review.

MKS Instruments, Irvine, CA, Industrial Hygiene Support, Quantitative Industrial Hygiene Exposure Assessments, Indoor Air Quality Assessments, Equipment Engineering Controls Review, Industrial Hygiene Process Safety Review:
Technical lead providing industrial hygiene support. Conducted safety procedure review(s) for new processes, including acid etching using hydrofluoric acid and sodium hydroxide. Performed occupational noise monitoring and task-based sound level mapping. Reviewed Safety Data Sheets and potential for exposure to develop industrial hygiene sampling strategies.

Collins Aerospace, Multiple Project Locations, U.S, Industrial Hygiene Support, Quantitative Industrial Hygiene Exposure Assessments, Indoor Air Quality Assessments, Ergonomic Evaluations, Facility Decommissioning and Closure, Legionella Risk Assessments:
Technical lead for all Collins Aerospace sites located on the West coast. Performing task specific industrial hygiene hazard assessments to establish exposure profiles for similar exposure groups, coordination of annual occupational exposure monitoring, legionella risk assessments, indoor air quality assessments, and general support for facility decommissioning including permit closures.

MP Materials, Multiple Project Locations, U.S and Canada, Industrial Hygiene Program Development, Health and Safety Compliance, Qualitative and Quantitative Occupational Exposure Assessments:
Provided ongoing industrial hygiene support for the rare earth mineral mining and magnetics operations located in the United States and Canada. Conducted qualitative assessments for all similar exposure groups and conducted quantitative exposure assessments for chemicals of concern, including uranium and thorium particulate at the Mountain Pass, California mine and processing facility. Developed corporate and site-specific industrial hygiene programs. Reviewed Safety Data Sheets and process information to ascertain potential exposure profiles for the newly implemented magnetics business unit.

Port of Long Beach, Industrial Hygiene Assessments, Multiple Project Locations, Long Beach, CA:
Certified Industrial Hygienist and Project Manager for industrial hygiene assessments and reporting tasks at multiple Sites throughout the Port. Developed sampling strategies for the assessments which included the use of equipment for indoor air quality parameters, particulate matter, total volatile organic compounds, asbestos, lead and polychlorinated biphenyls. Conducted and supervised multiple pre-demolition regulated materials assessments and provided hazardous materials abatement oversight.

Amtrak, Industrial Hygiene Assessments, Multiple Projects, CA:
Subject Matter Expert and lead industrial hygienist providing technical oversight and review for regulated material surveys, abatement and demolition oversight, indoor air quality investigations, gas monitoring, microbial and water intrusion assessments. Conducted peer review of Contractor Work Plans and technical specifications.

Los Angeles Department of Water and Power, Haynes Generating Station Unit 3 – 6 Decommissioning and Demolition – Regulated Material Survey, Abatement Oversight, Perimeter Air Monitoring, Community Exposure Air Monitoring, Occupational Exposure Assessments, Long Beach, CA:
Certified Industrial Hygienist of record providing support services including pre-demolition regulated materials survey, abatement oversight and air monitoring, and occupational exposure assessments in conjunction with the decommissioning and demolition of multiple boiler units and structures at the generating station. Project lead for ongoing continuous community exposure (ambient air) monitoring for dust/particulates, noise and vibration at the demolition project boundaries. Performed occupational exposure assessments and work area monitoring for metal particulate (fume) from open flame cutting, respirable crystalline silica, lead and asbestos. Utilized continuous air monitoring instrumentation coupled with Cloud-based software for real-time Client-facing data access. Project liaison for town hall and plant personnel safety meetings.

Phillips 66 Pipeline Company, Interstate I-110, Long Beach, CA, Lead Compliance Consulting:
Subject matter expert and technical lead for the preparation of a Lead Compliance Plan and the implementation of lead safe work practices in accordance with California Occupational Safety and Health Administration and California Department of Transportation requirements for the removal of aerially deposited lead (ADL)-impacted soil from an excavation to expose a portion of the Wharf Pipeline, which runs from the Phillips 66 Wilmington Refinery to the Phillips 66 Marine Terminal.

Los Angeles County Metropolitan Transportation Authority (LA Metro), Multiple Projects, CA:
Lead industrial hygienist providing technical oversight and review for regulated material surveys, abatement and demolition oversight, indoor air quality assessments, microbial contamination and homeless encampment cleanup. Provided support services for multiple construction-related projects. Conducted peer review of asbestos-related and lead-related technical specifications. Provided ongoing awareness-level training to LA Metro team for PCBs, lead, asbestos and silica hazards in construction.

Baker Hughes, Industrial Hygiene and Exposure Assessment Program Design, Hearing Conservation Program and Sound Level Mapping:
Prepared Client specific industrial hygiene and exposure assessment programs. Conducted qualitative exposure assessments, including the review of all processes, jobs and tasks performed to determine similar exposure groups and exposure profiles for Client operations. Conducted exposure assessments of Plant Operators, Support Operators, Material Handlers and Laboratory personnel for chemicals such as formaldehyde, glutaraldehyde, acid mist, organic vapors, respirable particulates, and ethylene oxide. Conducted personal noise dosimetry for development of Hearing Conservation Program, including sound level mapping of the entire facility and all noise-generating equipment.

California Department of Cannabis Control (DCC), Job Hazard Analysis and Injury Illness Prevention Program Development, Multiple Sites, CA:
Conducted job hazard analysis for key similar exposure groups at the DCC, responsible for the licensing and regulation of cannabis grow facilities, manufacturing of cannabis products, and the transportation and retail of cannabis goods. Used the hazard assessments to develop a DCC-specific injury illness prevention program (IIPP).

San Bernardino County Department of Risk Management, On Call Industrial Hygiene Consulting, Multiple Sites, CA:
Contract lead for multi-year on call industrial hygiene services, provided indoor air quality, moisture and microbial assessment, occupational exposure assessments, noise dosimetry and sound level mapping, asbestos abatement work plan development and abatement oversight, asbestos and lead bulk sampling and radiation assessments. Performed initial determination exposure assessments for lead particulate at San Bernardino County Sheriff department shooting range facilities.

California Barrel Company, Pre-Demolition Regulated Materials Assessments, Potrero Generating Station, San Francisco, CA:
Project Manager for the regulated materials assessments of the generating station, boiler unit, turbine, generator and multiple historically significant support structures. Conducted bulk sampling for asbestos, lead-containing paint and materials, PCB bulk products, in addition to preliminary waste characterization sampling of oils, sludges, water and sediments found within equipment and structures. Provided emergency response support following a mercury spill, coordinated cleanup efforts including waste disposal and performed work-in-progress and post cleanup verification monitoring for mercury vapor.

San Francisco Department of Public Works/Public Utilities Commission (SFPW/PUC), Styrene Emissions Monitoring, Multiple Sites, San Francisco, CA:
Prepared monitoring plans for styrene emissions resulting from the installation of cured-in-place-pipe (CIPP) used to rehabilitate sewer systems. Established project action levels for the immediate work area(s) and for sensitive receptors located within proximity to the project sites. Performed styrene monitoring during the CIPP installation for reporting to the SFPW/PUC.

Tracy Costco Depot Transportation Study (2017) Appendices

Appendix A Scoping Memo

KITTELSON & ASSOCIATES
610 SW ALDER STREET, SUITE 700
PORTLAND, OR 97205
503.228.5230 503.273.8169

MEMORANDUM

Date:	March 24, 2017	Project #: 20847
To:	Al Gali, Robert Armijo, Cris Mina; City of Tracy Alex Chetley, Firoz Vohra; San Joaquin County	
CC:	Peter Kahn, Costco	
From:	Kelly Laustsen and Julia Kuhn	
Project:	Tracy Costco Depot	
Subject:	Proposed Transportation Study Scope of Work	

Costco is proposing to modify the on-site uses and access to its Depot site in San Joaquin County. The existing Depot is located south of W Schulte Road and east of Mountain House Parkway. This memorandum describes the proposed site modifications, the anticipated changes in site trip generation, and a proposed scope for assessing the transportation-related impacts with the modifications to both access and on-site land uses.

EXISTING AND PROPOSED SITE USES

The Costco Tracy Depot currently includes a wet depot, a dry depot, a meat plant and variety of industrial uses in ten buildings totaling 1,382,059 square feet. The site is located on the south side of W Schulte Road, with primary access for trucks and employees via S Schulte Court and Gateway Boulevard. Employee access is also provided by two accesses on W Schulte Road that are located between S Schulte Court and Mountain House Parkway. Figure 1 shows the existing site plan and indicates the access locations.

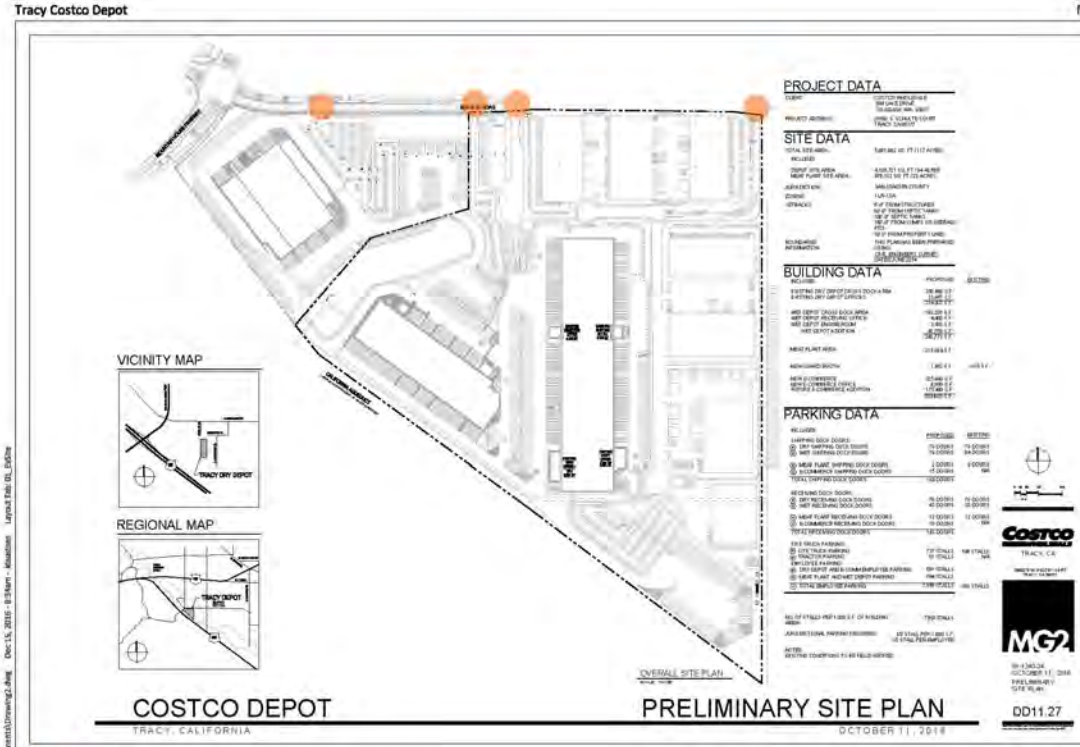
As proposed, the dry depot and meat plant will remain in-place. The wet depot will be expanded and an E-Commerce building will be constructed. The other seven buildings will be demolished as part of the site modifications. These changes result in a net *reduction* of over 220,000 square feet in building space. Figure 2 shows a conceptual site plan with the proposed changes.

SCOPE FOR TRANSPORTATION ASSESSMENT

Our proposed scope of work to assess the site plan modifications is described in the following sections.

Trip Generation

Table 1 provides the estimated trip generation of the existing site and proposed modifications based on trip rates reflected in *Trip Generation, 9th Edition* (Institute of Transportation Engineers (ITE), 2012).

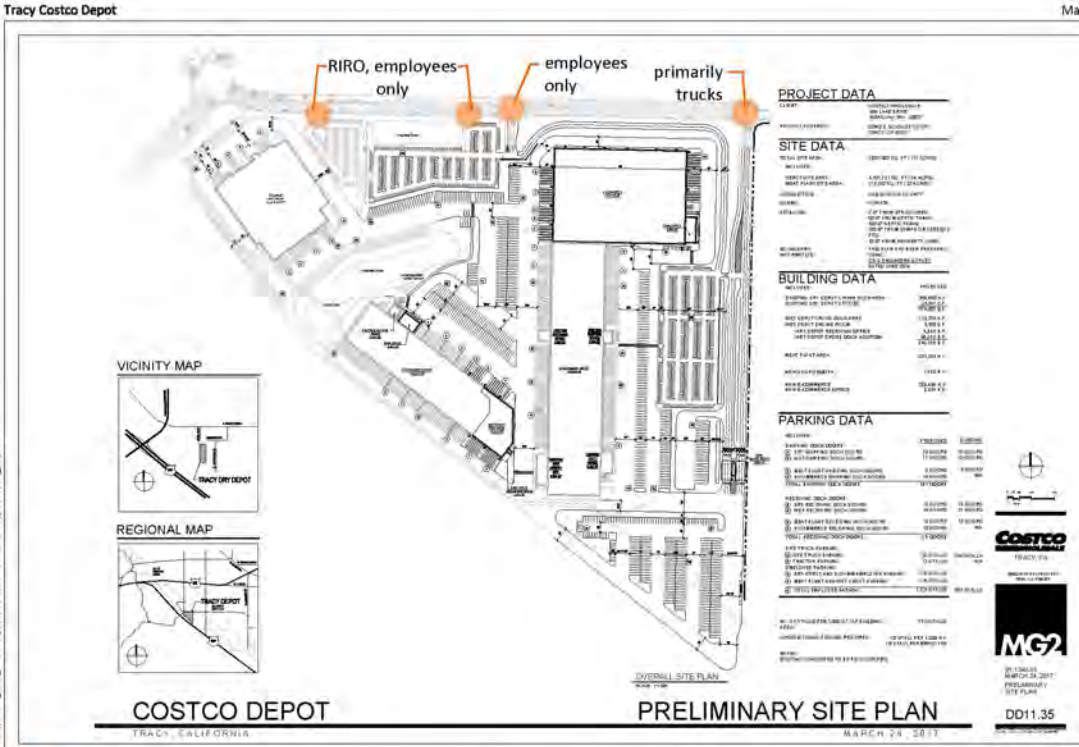


Access location

Existing Costco Tracy Depot Site Plan
San Joaquin County, California

Figure 1

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING



Access location

Proposed Costco Tracy Depot Conceptual Site Plan
San Joaquin County, California

Figure 2

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

The size shown reflects the summation of uses on site, with a breakdown by building provided in *Appendix A*.

Table 1. Trip Generation Comparison

Use	Size (SF)	ITE Code	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
Warehouse (Existing)	1,382,059	Distribution Center (152)	2,322	105	47	152	52	114	166
Warehouse (Proposed)	1,159,318	Distribution Center (152)	1,948	88	40	128	43	96	139
Difference	**-222,741**	-	**-374**	**-17**	**-7**	**-24**	**-9**	**-18**	**-27**

[1]ITE Code 152 is for high-cube warehouses/distribution centers

As shown in Table 1, the proposed changes are expected to result in a decrease of site-generated trips during all three study periods. We will update the existing trip generation estimate after we have collected traffic counts at the site driveways.

Study Area Intersections

Given the anticipated decrease in trips with the proposed changes, we propose to conduct a transportation assessment of the existing and proposed site accesses. Operations will be assessed in accordance with the procedures stated in the *2000 Highway Capacity Manual* (HCM) using Synchro 9 software. As such, the assessment will focus on:

- Two existing unsignalized employee access locations on W Schulte Road
- W Schulte Road/Schulte Court – currently serves employees and trucks, but proposed as an employee-only entrance (existing signalized access)
- W Schulte Road/Eastern site access (Gateway Boulevard) – currently serves employees and trucks, but proposed as a truck access with guard booth (existing signalized access)

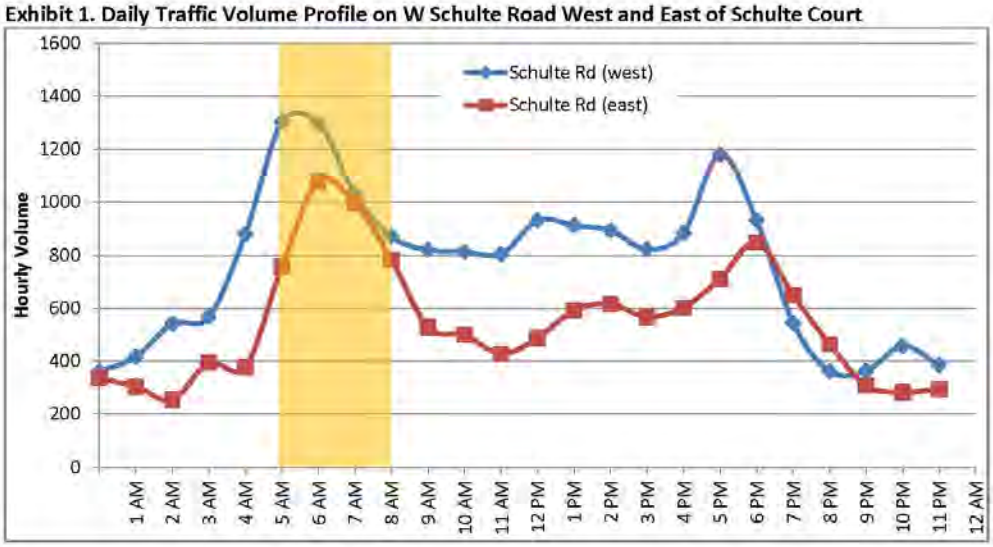
We will collect traffic counts at the existing site accesses during the weekday AM peak hour. To assess the change in access for both employees and trucks, the existing traffic counts will distinguish passenger vehicles and trucks.

Study Time Periods

The transportation impact analysis will assume the site modifications are complete in 2018 and will therefore assess existing operations and projected 2018 operations. ***Please provide information on any planned improvements within the study area, in-process developments, and an appropriate growth rate to apply to the study roadways.***

We collected twenty-four hour tube counts on Schulte Road along the site frontage to assess peaking characteristics of the existing site. Exhibit 1 provides a summary of the counts over the course of the day at both locations.

Exhibit 1. Daily Traffic Volume Profile on W Schulte Road West and East of Schulte Court



As seen in Exhibit 1, the highest hours of traffic on W Schulte Road occur in the early morning (between 5:00 and 8:00 AM). The height of the morning peak period is earlier than typical commuter traffic peaks given the plethora of warehouse and distribution facilities in the vicinity of the site and is notably higher than the evening volumes. The existing and future site uses have a variety of employee shift times and peaking characteristics, with shifts and deliveries occurring during off-peak hours. As discussed above, we will collect traffic counts at the existing site accesses during the AM peak hour, but extend the typical period to include 5:00-8:00 AM.

Proposed Street Vacations

As part of the on-site changes, Costco proposes to vacate all existing public streets within the site, including Schulte Court, Corporate Boulevard, and Gateway Boulevard. The layout of these roads and on-site circulation will be modified as shown in Figure 2 to support on-site uses and to separate employee and truck traffic. Both today and in the future, trucks use Gateway Boulevard access while employees primarily use the signal at Schulte Court and the western unsignalized locations. With the site modifications, a longer driveway throat will be provided at the Gateway Boulevard access with a guard booth situated approximately 1,500 feet south of Schulte Road.

Next Steps

We look forward to receiving your feedback and confirming the scope for our study. Please provide any comments or questions by Friday, March 31st. Thank you for your assistance with this effort.

Appendix A Existing and Proposed Uses

EXISTING AND PROPOSED USES

Existing Uses	
Use	**Size**
Dry Depot	374,507
Wet Depot	200,015
Meat Plant	201,824
Building 1	69,000
Building 2	90,000
Building 3	94,687
Building 4	86,000
Building 5	84,000
Building 6	92,400
Building 7	89,626
Total	**1,382,059**

Proposed Uses	
Use	**Size**
Dry Depot	374,507
Wet Depot	246,765
Meat Plant	201,824
Ecommerce	334,240
Guard Booth	1,982
Total	**1,159,318**

Proposed-Existing
(22,741)

Kelly Laustsen

From: frederik.venter@kimley-horn.com
Sent: Wednesday, April 26, 2017 7:13 PM
To: al.gali@cityoftracy.org; jacob.mirabella@kimley-horn.com
Cc: Criseldo.Mina@cityoftracy.org; Kelly Laustsen
Subject: RE: Tracy Depot [Costco] Traffic Study Requirements - 2nd request

Hi Al, I spoke with Robert and he said that Costco had to use City methodologies in their analysis as indicated below. Here are our comments.

Thanks for the email and updates. We appreciate Kimley Horn's review and would like to clarify a few of the comments. I've copied the comments and our responses below. As you'll see, a number of our comments are based on our confusion over the differences between the scope originally requested by Kimley-Horn versus that which they are requesting of us. Further, we are a bit uncertain about the rationale behind looking at some of the off-site locations as well as a cut-through issue (of which we are unaware and hoping the city can provide more insights) when Costco's proposal represents a decrease in the number of trips generated by the site, thereby resulting in a lower impact to the system. Any insights you or others at the city can provide would be appreciated.

1. Use HCM 2010 methodologies rather than the proposed HCM 2000. Although 2010 is the most recent version of the HCM, we have experienced several limitations with the software that is used to implement the methodologies. As a result, a number of jurisdictions have not yet made the switch from 2000. We will note any issues encountered as part of our analysis (for example, the software's inability to generate intersection volume-to-capacity ratios for signalized intersections – which is one of the measures of effectiveness used to understand operations). The City has made the switch from HCM 2000. HCM 2010 is the standard for City LOS analysis and should be used accordingly. Using HCM 2000 will yield conflicting result with existing studies.
2. Analyze AM and PM peak hour conditions, rather than the proposed AM peak only. We'd like to better understand the need for the PM peak hour analysis. The Kimley Horn scoping memo indicated counts would be collected during the AM peak hour (from 5:30-8:30 a.m.). Based on the data we collected on Schulte Road (in Exhibit 1 of the scoping memo, attached) volumes are significantly higher during the morning peak hour. In talking with Costco, several of the Depot Uses will not be open during the evening peak hours and their site peaks during the morning hours. Further, it appears from the counts in our scoping letter, several of the other distribution uses in the area also peak in the morning. The KHA scope specifies in multiple instances that AM and PM peaks would be evaluated consistent with City policies and other traffic studies conducted within the City. Street traffic in the study area is directional and to understand delays and queuing, AM and PM peaks both must be studied. Trips occur to and from the site.
3. Study Mountain House Pkwy / Schulte Rd, in addition to the 4 project driveways. We'd like to understand why this intersection is recommended for inclusion, given the significant reduction in square footage (over 220 KSF) and reduction in trips generated by the site. The proposed changes are expected to impact how the site driveways are used and internal circulation, but not add trips to adjacent intersections. As a result, Costco's impact at the off-site intersections will decrease. Further, there is a median along Schulte Road so any westbound queuing associated with the signal will not impact the right-in-right-out driveways into Costco on the south side of Schulte Road. The site plan shows and increase in 354 spaces for employees and 216 truck parking spaces and the description of square feet is not provided for the existing buildings. Thus we assume there is an increase in trips. Where does Kittelson get the SF reduction from. This is a critical intersection in the road network and the project will have potential impacts if traffic increases.
4. Evaluate onsite and offsite queueing using microsimulation (SimTraffic is typically used). We are curious about the need to use SimTraffic versus Synchro. Can you please ask for Kimley-Horn to clarify? We didn't see the use of SimTraffic in their scope and it is a more in-depth and costly procedure. Finally, if required by Kimley-Horn, can you please ask to clarify the minimum number of runs needed (e.g., 5 or 10). SimTraffic was explicitly noted in the KHA scope. City of Tracy methodologies for evaluating and reporting queue lengths incorporates microsimulations and should be used to be consistent with other studies and industry best practices. SimTraffic is included in Synchro software and very little

additional coding/calibration should be necessary beyond what will already be built for the LOS analysis. A minimum of 5 runs should be used for each period and scenario.

5. Analyze Cumulative 2035 conditions, rather than the proposed 2018 conditions. Can you clarify the need for this long-term analysis? This analysis was not included in Kimley-Horn's scope and Costco's proposal is a reduction in site-generated trips. We agree and your original scope is sufficient and only Existing plus project conditions has to be studied.
6. Address cut-through traffic on Mountain House Parkway, as well as Schulte Road. Can you clarify what this is referring to? In discussions with Costco, we are unaware of any of these concerns. Also, Mountain House and Schulte are streets that are intended to carry more regional traffic, appropriate for the distribution uses. We are unclear what is intended by this comment. We also did not see this in Kimley-Horn's proposed scope. The City is determining cut through traffic as part of another project and this task can be omitted from the scope.
7. Discuss the gate location and if/how truck traffic arriving to the site will stack on Schulte. We are planning to include this and agree. Okay.

Al, let's talk tomorrow morning. If they will decrease traffic, we do not need any analysis except for the access driveways and gate operations. But the significant increase in parking supply suggest otherwise. They need to describe parking operations.

Frederik

From: Al Gali [mailto:al.gali@cityoftracy.org]
Sent: Wednesday, April 26, 2017 9:04 AM
To: Mirabella, Jacob <jacob.mirabella@kimley-horn.com>
Cc: Criseldo Mina <Criseldo.Mina@cityoftracy.org>; Venter, Frederik <frederik.venter@kimley-horn.com>; 'Kelly Laustsen' <klaustsen@kittelson.com>
Subject: RE: Tracy Depot [Costco] Traffic Study Requirements - 2nd request
Importance: High

Jacob, please respond to Costco's questions/comments/concerns in the email sent 4-5-2017.

Do not hesitate to contact me should you have any questions.

Thank you, Al

Al Gali
Development Services Dept.
Engineering Division
Land Development Section
City of Tracy
333 Civic Center Plaza
209-831-6436 – Direct
Al.Gali@cityoftracy.org ← **NEW E-MAIL**

From: Al Gali
Sent: Thursday, April 06, 2017 10:03 AM
To: 'jacob.mirabella@kimley-horn.com'
Cc: Criseldo Mina
Subject: FW: Tracy Depot [Costco] Traffic Study Requirements

Jacob,
Costco's traffic engineer has comments regarding the following list of items:

1. Use HCM 2010 methodologies rather than the proposed HCM 2000.
2. Analyze AM and PM peak hour conditions, rather than the proposed AM peak only.
3. Study Mountain House Pkwy / Schulte Rd, in addition to the 4 project driveways.
4. Evaluate onsite and offsite queueing using microsimulation (SimTraffic is typically used).
5. Analyze Cumulative 2035 conditions, rather than the proposed 2018 conditions.
6. Address cut-through traffic on Mountain House Parkway, as well as Schulte Road.
7. Discuss the gate location and if/how truck traffic arriving to the site will stack on Schulte.

Please see the red text below. Please provide a response at KH's earliest convenience, but no later than Thursday next week, April 13, 2017.

Thanks - Al

From: Kelly Laustsen [mailto:klaustsen@kittelson.com]
Sent: Wednesday, April 05, 2017 9:54 AM
To: Al Gali
Cc: Robert Armijo; Criseldo Mina; Peter Kahn; Julia Kuhn
Subject: RE: Tracy Depot [Costco] Traffic Study Requirements

Hi Al,

Thanks for the email and updates. We appreciate Kimley Horn's review and would like to clarify a few of the comments. I've copied the comments and our responses below. As you'll see, a number of our comments are based on our confusion over the differences between the scope originally requested by Kimley-Horn versus that which they are requesting of us. Further, we are a bit uncertain about the rationale behind looking at some of the off-site locations as well as a cut-through issue (of which we are unaware and hoping the city can provide more insights) when Costco's proposal represents a decrease in the number of trips generated by the site, thereby resulting in a lower impact to the system. Any insights you or others at the city can provide would be appreciated.

1. Use HCM 2010 methodologies rather than the proposed HCM 2000. Although 2010 is the most recent version of the HCM, we have experienced several limitations with the software that is used to implement the methodologies. As a result, a number of jurisdictions have not yet made the switch from 2000. We will note any issues encountered as part of our analysis (for example, the software's inability to generate intersection volume-to-capacity ratios for signalized intersections – which is one of the measures of effectiveness used to understand operations).
2. Analyze AM and PM peak hour conditions, rather than the proposed AM peak only. We'd like to better understand the need for the PM peak hour analysis. The Kimley Horn scoping memo indicated counts would be collected during the AM peak hour (from 5:30-8:30 a.m.). Based on the data we collected on Schulte Road (in Exhibit 1 of the scoping memo, attached) volumes are significantly higher during the morning peak hour. In talking with Costco, several of the Depot Uses will not be open during the evening peak hours and their site peaks during the morning hours. Further, it appears from the counts in our scoping letter, several of the other distribution uses in the area also peak in the morning.
3. Study Mountain House Pkwy / Schulte Rd, in addition to the 4 project driveways. We'd like to understand why this intersection is recommended for inclusion, given the significant reduction in square footage (over 220 KSF) and reduction in trips generated by the site. The proposed changes are expected to impact how the site driveways are used and internal circulation, but not add trips to adjacent intersections. As a result, Costco's impact at the off-site intersections will decrease. Further, there is a median along Schulte Road so any westbound queuing associated with the signal will not impact the right-in-right-out driveways into Costco on the south side of Schulte Road.
4. Evaluate onsite and offsite queueing using microsimulation (SimTraffic is typically used). We are curious about the need to use SimTraffic versus Synchro. Can you please ask for Kimley-Horn to clarify? We didn't see the use of SimTraffic in their scope and it is a more in-depth and costly procedure. Finally, if required by Kimley-Horn, can you please ask to clarify the minimum number of runs needed (e.g., 5 or 10).
5. Analyze Cumulative 2035 conditions, rather than the proposed 2018 conditions. Can you clarify the need for this long-term analysis? This analysis was not included in Kimley-Horn's scope and Costco's proposal is a reduction in site-generated trips.
6. Address cut-through traffic on Mountain House Parkway, as well as Schulte Road. Can you clarify what this is referring to? In discussions with Costco, we are unaware of any of these concerns. Also, Mountain House and Schulte are streets

that are intended to carry more regional traffic, appropriate for the distribution uses. We are unclear what is intended by this comment. We also did not see this in Kimley-Horn's proposed scope.

7. Discuss the gate location and if/how truck traffic arriving to the site will stack on Schulte. We are planning to include this and agree.

We appreciate your continued time on this.

Best,

Kelly M Laustsen, PE
Senior Engineer

Kittelson & Associates, Inc.
Transportation Engineering / Planning
503.535.7439 (direct)
214.886.5338 (cell)

From: Al Gali [mailto:al.gali@cityoftracy.org]
Sent: Thursday, March 30, 2017 8:19 AM
To: Kelly Laustsen
Subject: FW: Tracy Depot [Costco] Traffic Study Requirements

Kelly,
Kimley Horn reviewed Kittelson's proposal and they have the following revisions/clarifications on the scope:

1. Use HCM 2010 methodologies rather than the proposed HCM 2000.
2. Analyze AM and PM peak hour conditions, rather than the proposed AM peak only.
3. Study Mountain House Pkwy / Schulte Rd, in addition to the 4 project driveways.
4. Evaluate onsite and offsite queueing using microsimulation (SimTraffic is typically used).
5. Analyze Cumulative 2035 conditions, rather than the proposed 2018 conditions.
6. Address cut-through traffic on Mountain House Parkway, as well as Schulte Road.
7. Discuss the gate location and if/how truck traffic arriving to the site will stack on Schulte.

Kimley Horn's review fee is **$3,986**. The City's fee has not been determined.
The total fee will be $3,986 + City's fee.

Do not hesitate to contact me should you have any questions.

Thank you, Al

Al Gali
Development Services Dept.
Engineering Division
Land Development Section
City of Tracy
333 Civic Center Plaza
209-831-6436 – Direct
Al.Gali@cityoftracy.org ← **NEW E-MAIL**

From: jacob.mirabella@kimley-horn.com [mailto:jacob.mirabella@kimley-horn.com]
Sent: Wednesday, March 29, 2017 7:03 PM
To: Al Gali

Cc: frederik.venter@kimley-horn.com; Criseldo Mina; Robert Armijo
Subject: RE: Tracy Depot [Costco] Traffic Study Requirements

Hi Al,

Thanks for reaching out to us to peer review the Tracy Depot (Costco) Study. Frederik and I reviewed Kittleson's scope and have a few comments. The traffic study should:

1. Use HCM 2010 methodologies rather than the proposed HCM 2000.
2. Analyze AM and PM peak hour conditions, rather than the proposed AM peak only.
3. Study Mountain House Pkwy / Schulte Rd, in addition to the 4 project driveways.
4. Evaluate onsite and offsite queueing using microsimulation (SimTraffic is typically used).
5. Analyze Cumulative 2035 conditions, rather than the proposed 2018 conditions.
6. Address cut-through traffic on Mountain House Parkway, as well as Schulte Road.
7. Discuss the gate location and if/how truck traffic arriving to the site will stack on Schulte.

We believe if the study includes the above items in addition to what was proposed, it will be consistent with City policies and will adequately address traffic concerns for the project.

We would be happy to peer review the study. We would need a budget of **$3,986** and can complete the review within a week of receiving the completed report. Let me know if you would like us to draft a new TO for this or if you would just like a letter proposal to start with.

Thanks,

Jake Mirabella
Kimley-Horn | 100 W. San Fernando Street, Suite 250, San Jose, CA 95113
Direct: 669-800-1979 | Main: 669-800-4130 | Cell: 813-382-5090 | www.kimley-horn.com
Connect with us: Twitter| LinkedIn | Facebook |

From: Venter, Frederik
Sent: Wednesday, March 29, 2017 6:12 PM
To: Mirabella, Jacob <jacob.mirabella@kimley-horn.com>
Subject: FW: Tracy Depot [Costco] Traffic Study Requirements

From: Al Gali [mailto:al.gali@cityoftracy.org]
Sent: Monday, March 27, 2017 10:42 AM
To: Venter, Frederik <frederik.venter@kimley-horn.com>
Cc: Criseldo Mina <Criseldo.Mina@cityoftracy.org>; Mirabella, Jacob <jacob.mirabella@kimley-horn.com>; Robert Armijo <Robert.Armijo@cityoftracy.org>
Subject: RE: Tracy Depot [Costco] Traffic Study Requirements

Good morning Frederik,

Costco as reviewed Kimley Horn's proposal and fee and have elected to perform the traffic study themselves.
Therefore please provide a cost to reviewing their traffic study. For your convenience, the scope of their study is attached.

Do not hesitate to contact me should you have any questions.

Thank you, Al

Al Gali
Development Services Dept.
Engineering Division
Land Development Section
City of Tracy
333 Civic Center Plaza
209-831-6436 – Direct
Al.Gali@cityoftracy.org ← **NEW E-MAIL**

From: frederik.venter@kimley-horn.com [mailto:frederik.venter@kimley-horn.com]
Sent: Monday, March 13, 2017 11:55 AM
To: Robert Armijo; Al Gali
Cc: Criseldo Mina; jacob.mirabella@kimley-horn.com
Subject: RE: Tracy Depot Traffic Study Requirements

Robert, bottom of page 2: Fee and Expenses has the cost at $9,968.

From: Robert Armijo [mailto:Robert.Armijo@cityoftracy.org]
Sent: Monday, March 13, 2017 8:39 AM
To: Al Gali <al.gali@cityoftracy.org>
Cc: Venter, Frederik <frederik.venter@kimley-horn.com>; Criseldo Mina <Criseldo.Mina@cityoftracy.org>
Subject: FW: Tracy Depot Traffic Study Requirements

Hi Al,

Can you communicate with the applicant this cost? I thought I recalled that you were working with them to set-up a CRA.

Ps – Fredrik... the costs are not easy to understand on this proposal. The tasks seem fine to me but I'm not quickly finding the costs.

Thank You,

Robert Armijo, PE
City Engineer/Assistant Director of Development
City of Tracy
333 Civic Center Plaza
Tracy, CA 95376
209.831.6424 (p)
209.831.6439 (f)

From: frederik.venter@kimley-horn.com [mailto:frederik.venter@kimley-horn.com]
Sent: Monday, March 13, 2017 8:10 AM
To: Robert Armijo; Criseldo Mina; Al Gali

Cc: jacob.mirabella@kimley-horn.com
Subject: RE: Tracy Depot Traffic Study Requirements

Hi Robert

Here is our proposal to review the proposed changes to Costco depot site buildings and driveways.

Frederik

From: Robert Armijo [mailto:Robert.Armijo@cityoftracy.org]
Sent: Monday, March 06, 2017 10:54 AM
To: 'Kelly Laustsen' <klaustsen@kittelson.com>
Cc: Criseldo Mina <Criseldo.Mina@cityoftracy.org>; Venter, Frederik <frederik.venter@kimley-horn.com>; Al Gali <al.gali@cityoftracy.org>; Julia Kuhn <jkuhn@kittelson.com>
Subject: FW: Tracy Depot Traffic Study Requirements

Hi Kelly,

We will want as least some limited traffic study to be conducted for your project (see below). Please work with Cris Mina to set up a Cost Recovery Agreement (CRA) for this study. We can have our consultant (Kimley Horn) do the work or you may be able to have your consultant do the work with Kimley Horn reviewing the work to ensure the study is satisfactory. In either event, a CRA will be required for City Staff and Consultant expenses. Please work with Cris to get this set-up.

Best Regards,

Robert Armijo, PE
City Engineer/Assistant Director of Development
City of Tracy
333 Civic Center Plaza
Tracy, CA 95376
209.831.6424 (p)
209.831.6439 (f)

From: frederik.venter@kimley-horn.com [mailto:frederik.venter@kimley-horn.com]
Sent: Monday, March 06, 2017 10:41 AM
To: Robert Armijo
Cc: Criseldo Mina; Al Gali
Subject: Tracy Depot Traffic Study Requirements

Robert, I do not have the site plan detail Kelly is referring too, but we should at least look at existing volume and then existing plus project to see if there are issues with turn pockets. The added 50 KSF is small, but if something that is not working needs to be fixed, now is the time to do it. So, maybe a limited study with trip gen, and an evaluation of the changes and queueing. If there is a problem, we may request additional analysis.

Frederik

Appendix B Traffic Counts

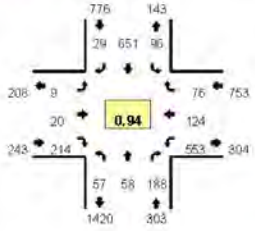
Type of peak hour being reported: System Peak

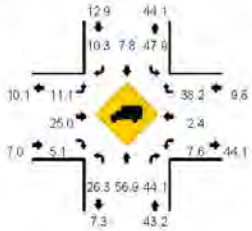
Method for determining peak hour: Total Entering Volume

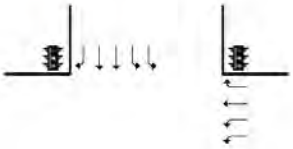
LOCATION: Mountain House Pkwy -- Schulte Rd
CITY/STATE: Tracy, CA

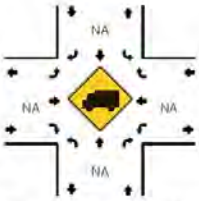
QC JOB #: 14410702
DATE: Thu, May 11 2017

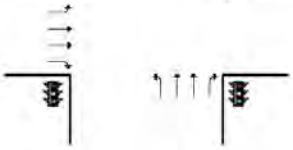
Peak-Hour: 5:20 AM -- 6:20 AM
Peak 15-Min: 5:40 AM -- 5:55 AM











5-Min Count Period Beginning At	Mountain House Pkwy (Northbound)				Mountain House Pkwy (Southbound)				Schulte Rd (Eastbound)				Schulte Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
5:00 AM	3	2	7	0	10	40	1	0	0	2	8	0	54	6	6	0	139	
5:05 AM	8	4	11	0	6	50	3	0	0	1	7	0	56	1	5	0	152	
5:10 AM	8	2	10	0	5	52	4	0	1	2	14	0	59	4	17	0	178	
5:15 AM	12	3	10	0	11	42	4	0	5	4	4	0	47	4	10	0	156	
5:20 AM	4	5	14	0	6	63	3	0	3	0	17	0	42	5	9	0	171	
5:25 AM	3	0	16	0	8	56	6	0	0	4	6	0	33	5	5	0	142	
5:30 AM	1	2	9	0	6	49	3	0	2	1	21	0	56	16	5	0	171	
5:35 AM	7	2	16	0	9	60	5	0	0	2	28	0	33	19	7	0	188	
5:40 AM	3	5	24	0	16	52	1	0	0	0	24	0	61	12	7	0	205	
5:45 AM	8	6	19	0	7	48	2	0	1	2	9	0	51	10	6	0	169	
5:50 AM	5	2	26	0	10	67	1	0	1	4	10	0	38	6	5	0	175	
5:55 AM	9	5	14	0	15	37	3	0	0	0	12	0	69	8	7	0	177	2023
6:00 AM	3	7	15	0	6	70	0	0	0	4	15	0	43	10	0	0	173	2057
6:05 AM	3	10	11	0	5	59	3	0	0	1	20	0	23	9	6	0	150	2055
6:10 AM	6	5	14	0	5	44	0	0	0	0	20	0	51	12	6	0	163	2040
6:15 AM	3	9	10	2	3	46	2	0	2	2	32	0	53	14	13	0	191	2075
6:20 AM	3	4	17	0	3	38	0	0	3	3	27	1	57	15	5	0	176	2080
6:25 AM	3	7	16	0	7	21	2	0	0	4	19	0	50	12	10	0	151	2089
6:30 AM	7	4	11	0	2	48	3	0	0	2	31	0	33	15	17	0	173	2091
6:35 AM	3	5	12	0	6	26	0	0	0	4	11	0	31	11	13	0	122	2025
6:40 AM	4	5	22	0	9	20	0	0	2	8	36	0	48	5	9	0	168	1988
6:45 AM	7	8	19	0	9	37	4	0	1	6	25	0	24	8	7	0	155	1974
6:50 AM	4	8	17	0	11	62	5	0	3	3	25	0	47	7	15	0	207	2006
6:55 AM	3	5	16	0	5	45	0	0	1	3	17	0	53	3	9	0	160	1989

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	64	52	276	0	132	668	16	0	8	24	172	0	600	112	72	0	2196
Heavy Trucks	24	24	96		56	28	0		0	4	8		28	4	24		296
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:51 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Note - through movements determined from adjacent intersections

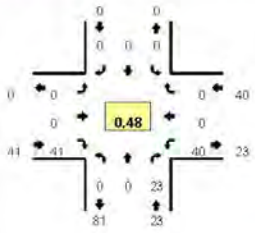
Type of peak hour being reported: System Peak

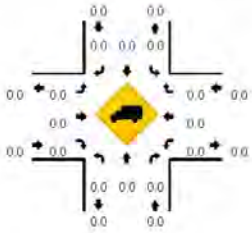
Method for determining peak hour: Total Entering Volume

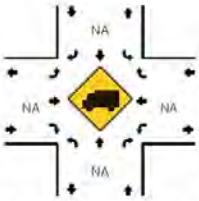
LOCATION: Dwy 1 (E of Mountain House Pkwy) -- Schulte Rd (RIRO)
CITY/STATE: Tracy, CA

QC JOB #: 14410704
DATE: Thu, May 11 2017

Peak-Hour: 5:20 AM -- 6:20 AM
Peak 15-Min: 5:40 AM -- 5:55 AM







5-Min Count Period Beginning At	Dwy 1 (E of Mountain House Pkwy) (Northbound)				Dwy 1 (E of Mountain House Pkwy) (Southbound)				Schulte Rd (RIRO) (Eastbound)				Schulte Rd (RIRO) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
5:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
5:05 AM	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	4	
5:10 AM	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	3	
5:15 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	
5:20 AM	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	3	
5:25 AM	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	3	
5:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	3	
5:35 AM	0	0	0	0	0	0	0	0	0	0	6	0	3	0	0	0	9	
5:40 AM	0	0	1	0	0	0	0	0	0	0	8	0	7	0	0	0	16	
5:45 AM	0	0	2	0	0	0	0	0	0	0	4	0	10	0	0	0	16	
5:50 AM	0	0	1	0	0	0	0	0	0	0	11	0	10	0	0	0	22	
5:55 AM	0	0	0	0	0	0	0	0	0	0	4	0	2	0	0	0	6	89
6:00 AM	0	0	1	0	0	0	0	0	0	0	2	0	2	0	0	0	5	93
6:05 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	90
6:10 AM	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	3	90
6:15 AM	0	0	15	0	0	0	0	0	0	0	1	0	1	0	0	0	17	104
6:20 AM	0	0	5	0	0	0	0	0	0	0	2	0	0	0	0	0	7	108
6:25 AM	0	0	5	0	0	0	0	0	0	0	4	0	0	0	0	0	9	114
6:30 AM	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	4	115
6:35 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	106
6:40 AM	0	0	1	0	0	0	0	0	0	0	2	0	2	0	0	0	5	95
6:45 AM	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2	81
6:50 AM	0	0	5	0	0	0	0	0	0	0	3	0	2	0	0	0	10	69
6:55 AM	0	0	2	0	0	0	0	0	0	0	2	0	2	0	0	0	6	69

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	16	0	0	0	0	0	0	0	92	0	108	0	0	0	216
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:51 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Note - through movements determined from adjacent intersections

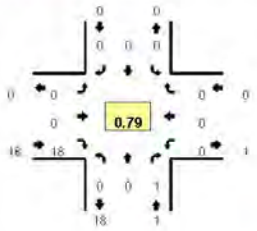
Type of peak hour being reported: System Peak

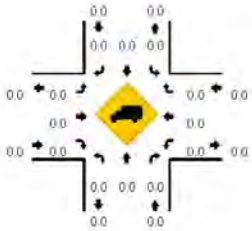
Method for determining peak hour: Total Entering Volume

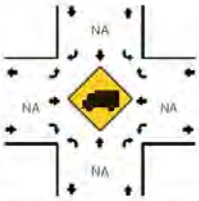
LOCATION: Dwy 2 (W of Schulte Ct) -- Schulte Rd (RIRO)
CITY/STATE: Tracy, CA

QC JOB #: 14410706
DATE: Thu, May 11 2017

Peak-Hour: 5:20 AM -- 6:20 AM
Peak 15-Min: 5:40 AM -- 5:55 AM







5-Min Count Period Beginning At	Dwy 2 (W of Schulte Ct) (Northbound)				Dwy 2 (W of Schulte Ct) (Southbound)				Schulte Rd (RIRO) (Eastbound)				Schulte Rd (RIRO) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
5:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	
5:05 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:10 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	
5:15 AM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4	
5:20 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	
5:25 AM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	
5:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	
5:35 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:40 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	
5:45 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	
5:50 AM	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	3	
5:55 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5	23
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22
6:05 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22
6:10 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	22
6:15 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	19
6:20 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	19
6:25 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	17
6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
6:35 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
6:40 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	14
6:45 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	14
6:50 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	12
6:55 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	4	0	0	0	0	0	0	0	20	0	0	0	0	0	24
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:51 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Note - NBR not captured due to data collection error. Volumes deduced from adjacent intersection

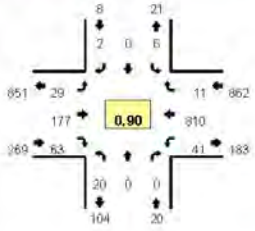
Type of peak hour being reported: System Peak

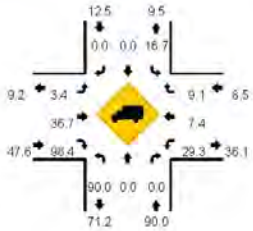
Method for determining peak hour: Total Entering Volume

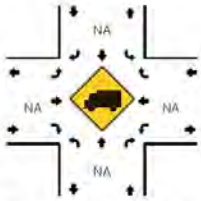
LOCATION: Schulte Ct -- Schulte Rd
CITY/STATE: Tracy, CA

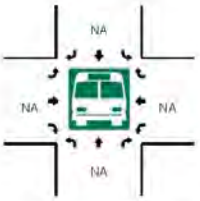
QC JOB #: 14410708
DATE: Thu, May 11 2017

Peak-Hour: 5:20 AM -- 6:20 AM
Peak 15-Min: 5:40 AM -- 5:55 AM









5-Min Count Period Beginning At	Schulte Ct (Northbound)				Schulte Ct (Southbound)				Schulte Rd (Eastbound)				Schulte Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
5:00 AM	2	0	0	0	0	0	0	0	0	13	6	0	3	54	0	0	78	
5:05 AM	1	0	0	0	2	0	1	0	1	9	1	0	3	59	0	0	77	
5:10 AM	0	0	0	0	1	0	1	0	0	15	4	0	4	73	0	0	98	
5:15 AM	2	0	0	0	2	0	1	0	1	14	3	0	4	59	0	0	86	
5:20 AM	0	0	0	0	3	0	1	0	0	11	4	0	8	71	0	0	98	
5:25 AM	0	0	0	0	0	0	1	0	0	14	7	0	3	66	0	0	91	
5:30 AM	3	0	0	0	0	0	0	0	0	12	7	1	2	65	0	0	90	
5:35 AM	2	0	0	0	0	0	0	0	0	9	6	0	4	57	3	0	81	
5:40 AM	1	0	0	0	1	0	0	0	0	29	7	2	2	68	3	0	113	
5:45 AM	0	0	0	0	1	0	0	0	2	18	4	1	5	69	0	0	100	
5:50 AM	1	0	0	0	0	0	0	0	0	17	6	0	2	82	1	0	109	
5:55 AM	1	0	0	0	0	0	0	0	1	21	3	0	4	57	0	0	87	1108
6:00 AM	7	0	0	0	1	0	0	0	1	16	8	0	2	82	1	0	118	1148
6:05 AM	3	0	0	0	0	0	0	0	0	9	7	1	2	51	0	0	73	1144
6:10 AM	0	0	0	0	0	0	0	0	3	9	4	0	5	84	1	0	106	1152
6:15 AM	2	0	0	0	0	0	0	0	3	12	0	14	2	58	2	0	93	1159
6:20 AM	3	0	0	0	0	0	0	0	1	14	7	3	0	69	3	0	100	1161
6:25 AM	3	0	0	0	0	0	0	0	1	16	6	5	2	55	2	0	90	1160
6:30 AM	2	0	0	0	0	0	1	0	0	6	3	2	1	52	2	0	69	1139
6:35 AM	5	0	0	0	1	0	0	0	1	14	6	0	1	47	2	0	77	1135
6:40 AM	3	0	0	0	0	0	0	0	6	18	9	1	0	57	2	0	96	1118
6:45 AM	6	0	0	0	0	0	0	0	6	20	4	1	1	45	5	0	88	1106
6:50 AM	6	0	0	0	0	0	0	0	4	11	10	5	1	45	2	0	84	1081
6:55 AM	5	0	0	0	1	0	0	0	4	12	9	2	3	51	6	0	93	1087

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	0	0	0	8	0	0	0	8	256	68	12	36	876	16	0	1288
Heavy Trucks	8	0	0		0	0	0		4	96	68		8	40	4		228
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:51 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

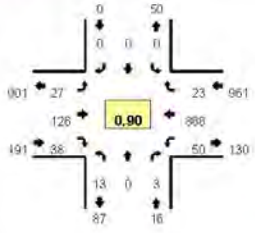
Type of peak hour being reported: System Peak

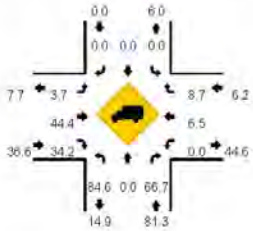
Method for determining peak hour: Total Entering Volume

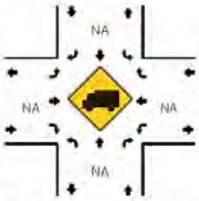
LOCATION: Gateway Blvd -- Schulte Rd
CITY/STATE: Tracy, CA

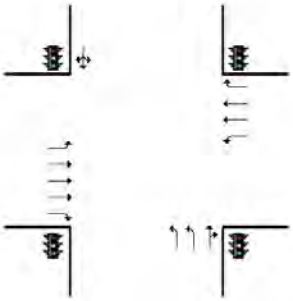
QC JOB #: 14410710
DATE: Thu, May 11 2017

Peak-Hour: 5:20 AM -- 6:20 AM
Peak 15-Min: 5:40 AM -- 5:55 AM









5-Min Count Period Beginning At	Gateway Blvd (Northbound)				Gateway Blvd (Southbound)				Schulte Rd (Eastbound)				Schulte Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
5:00 AM	0	0	1	0	0	0	0	0	1	9	3	0	4	60	0	0	78	
5:05 AM	0	0	0	0	0	0	0	0	0	11	1	0	1	63	0	0	76	
5:10 AM	1	0	0	0	0	0	0	0	0	14	3	0	1	79	0	0	98	
5:15 AM	0	0	1	0	0	0	0	0	2	8	2	0	2	61	0	0	76	
5:20 AM	2	0	0	0	0	0	0	0	2	14	1	0	1	78	1	0	99	
5:25 AM	3	0	0	0	0	0	0	0	2	9	1	0	6	75	1	0	97	
5:30 AM	1	0	0	0	0	0	0	0	1	11	1	0	1	58	1	0	74	
5:35 AM	0	0	0	0	0	0	0	0	1	7	3	0	6	66	0	0	83	
5:40 AM	0	0	1	0	0	0	0	0	3	19	5	0	7	71	1	0	107	
5:45 AM	1	0	1	0	0	0	0	0	0	16	4	0	8	71	1	0	102	
5:50 AM	0	0	0	0	0	0	0	0	4	14	4	0	6	85	3	0	116	
5:55 AM	1	0	0	0	0	0	0	0	4	9	8	0	5	66	4	0	97	1103
6:00 AM	1	0	1	0	0	0	0	0	7	8	2	0	2	82	7	0	110	1135
6:05 AM	0	0	0	0	0	0	0	0	1	7	3	0	4	60	1	1	77	1136
6:10 AM	2	0	0	0	0	0	0	0	1	4	5	0	1	91	2	0	106	1144
6:15 AM	2	0	0	0	0	0	0	0	1	8	1	0	2	85	1	0	100	1168
6:20 AM	1	0	0	0	0	0	0	0	2	11	4	0	4	58	0	0	80	1149
6:25 AM	2	0	0	0	0	0	0	0	1	15	2	0	3	35	1	0	59	1111
6:30 AM	0	0	0	0	0	0	0	0	0	6	2	0	8	56	1	0	73	1110
6:35 AM	1	0	0	0	0	0	0	0	0	12	4	0	5	60	2	0	84	1111
6:40 AM	0	0	0	0	0	0	0	0	1	16	4	0	6	47	0	0	74	1078
6:45 AM	1	0	0	0	0	0	0	0	2	13	6	0	3	49	1	0	75	1051
6:50 AM	2	0	0	0	0	0	1	0	1	11	1	0	9	47	1	0	73	1008
6:55 AM	2	0	1	0	0	0	0	0	1	10	3	0	4	59	1	0	81	992

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	0	8	0	0	0	0	0	28	196	52	0	84	908	20	0	1300
Heavy Trucks	4	0	4		0	0	0		4	84	16		0	40	0		152
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:51 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

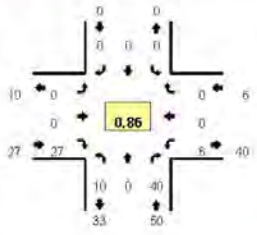
Type of peak hour being reported: System Peak

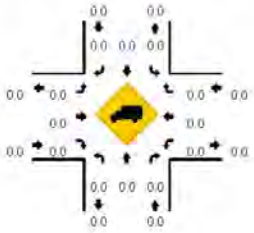
Method for determining peak hour: Total Entering Volume

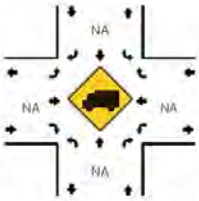
LOCATION: Dwy 1 (E of Mountain House Pkwy) -- Schulte Rd (RIRO)
CITY/STATE: Tracy, CA

QC JOB #: 14410705
DATE: Thu, May 11 2017

Peak-Hour: 5:10 PM -- 6:10 PM
Peak 15-Min: 5:30 PM -- 5:45 PM







5-Min Count Period Beginning At	Dwy 1 (E of Mountain House Pkwy) (Northbound)				Dwy 1 (E of Mountain House Pkwy) (Southbound)				Schulte Rd (RIRO) (Eastbound)				Schulte Rd (RIRO) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:40 PM	1	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	5	
4:45 PM	1	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	4	
4:50 PM	1	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	5	
4:55 PM	0	0	1	0	0	0	0	0	0	0	3	0	1	0	0	0	5	60
5:00 PM	0	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0	8	63
5:05 PM	0	0	1	0	0	0	0	0	0	0	2	0	1	0	0	0	4	59
5:10 PM	0	0	4	0	0	0	0	0	0	0	1	0	1	0	0	0	6	62
5:15 PM	1	0	2	0	0	0	0	0	0	0	3	0	1	0	0	0	7	67
5:20 PM	0	0	1	0	0	0	0	0	0	0	5	0	1	0	0	0	7	71
5:25 PM	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	71
5:30 PM	0	0	3	0	0	0	0	0	0	0	3	0	1	0	0	0	7	67
5:35 PM	0	0	7	0	0	0	0	0	0	0	3	0	0	0	0	0	10	70
5:40 PM	1	0	1	0	0	0	0	0	0	0	4	0	1	0	0	0	7	72
5:45 PM	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	3	71
5:50 PM	1	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	7	73
5:55 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	70
6:00 PM	1	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	5	67
6:05 PM	5	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	20	83
6:10 PM	2	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	8	85
6:15 PM	1	0	5	0	0	0	0	0	0	0	2	0	0	0	0	0	8	86
6:20 PM	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	81
6:25 PM	1	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	5	84
6:30 PM	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	3	80
6:35 PM	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	5	75

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	0	44	0	0	0	0	0	0	0	40	0	8	0	0	0	96
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:54 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Note - through movements determined from adjacent intersections

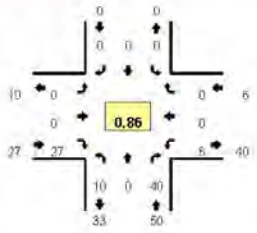
Type of peak hour being reported: System Peak

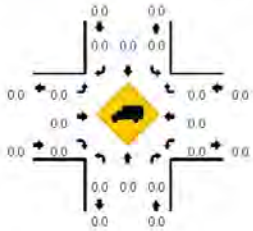
Method for determining peak hour: Total Entering Volume

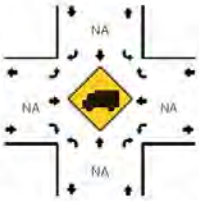
LOCATION: Dwy 1 (E of Mountain House Pkwy) -- Schulte Rd (RIRO)
CITY/STATE: Tracy, CA

QC JOB #: 14410705
DATE: Thu, May 11 2017

Peak-Hour: 5:10 PM -- 6:10 PM
Peak 15-Min: 5:30 PM -- 5:45 PM







5-Min Count Period Beginning At	Dwy 1 (E of Mountain House Pkwy) (Northbound)				Dwy 1 (E of Mountain House Pkwy) (Southbound)				Schulte Rd (RIRO) (Eastbound)				Schulte Rd (RIRO) (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:40 PM	1	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	5	
4:45 PM	1	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	4	
4:50 PM	1	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	5	
4:55 PM	0	0	1	0	0	0	0	0	0	0	3	0	1	0	0	0	5	60
5:00 PM	0	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0	8	63
5:05 PM	0	0	1	0	0	0	0	0	0	0	2	0	1	0	0	0	4	59
5:10 PM	0	0	4	0	0	0	0	0	0	0	1	0	1	0	0	0	6	62
5:15 PM	1	0	2	0	0	0	0	0	0	0	3	0	1	0	0	0	7	67
5:20 PM	0	0	1	0	0	0	0	0	0	0	5	0	1	0	0	0	7	71
5:25 PM	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	71
5:30 PM	0	0	3	0	0	0	0	0	0	0	3	0	1	0	0	0	7	67
5:35 PM	0	0	7	0	0	0	0	0	0	0	3	0	0	0	0	0	10	70
5:40 PM	1	0	1	0	0	0	0	0	0	0	4	0	1	0	0	0	7	72
5:45 PM	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	3	71
5:50 PM	1	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	7	73
5:55 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	70
6:00 PM	1	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	5	67
6:05 PM	5	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	20	83
6:10 PM	2	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	8	85
6:15 PM	1	0	5	0	0	0	0	0	0	0	2	0	0	0	0	0	8	86
6:20 PM	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	81
6:25 PM	1	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	5	84
6:30 PM	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	3	80
6:35 PM	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	5	75

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	0	44	0	0	0	0	0	0	0	40	0	8	0	0	0	96
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:54 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Note - through movements determined from adjacent intersections

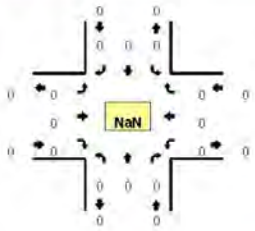
Type of peak hour being reported: System Peak

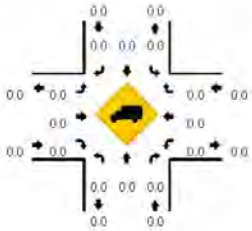
Method for determining peak hour: Total Entering Volume

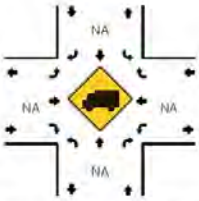
LOCATION: Dwy 2 (W of Schulte Ct) -- Schulte Rd (RIRO)
CITY/STATE: Tracy, CA

QC JOB #: 14410707
DATE: Thu, May 11 2017

Peak-Hour: 5:10 PM -- 6:10 PM
Peak 15-Min: 5:30 PM -- 5:45 PM







5-Min Count Period	Dwy 2 (W of Schulte Ct) (Northbound)				Dwy 2 (W of Schulte Ct) (Southbound)				Schulte Rd (RIRO) (Eastbound)				Schulte Rd (RIRO) (Westbound)				Total	Hourly Totals
Beginning At	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:54 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Note - NBR not captured due to data collection error. Volumes deduced from adjacent intersection

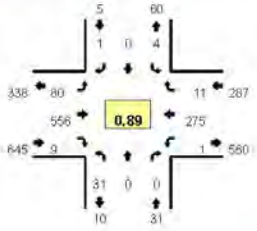
Type of peak hour being reported: System Peak

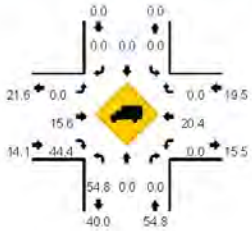
Method for determining peak hour: Total Entering Volume

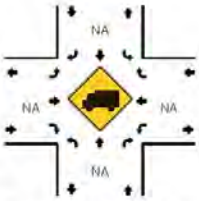
LOCATION: Schulte Ct -- Schulte Rd
CITY/STATE: Tracy, CA

QC JOB #: 14410709
DATE: Thu, May 11 2017

Peak-Hour: 5:10 PM -- 6:10 PM
Peak 15-Min: 5:30 PM -- 5:45 PM







5-Min Count Period Beginning At	Schulte Ct (Northbound)				Schulte Ct (Southbound)				Schulte Rd (Eastbound)				Schulte Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:40 PM	3	0	0	0	0	0	0	0	0	36	3	2	0	11	0	0	55	
4:45 PM	0	0	0	0	0	0	0	0	0	51	1	2	0	17	0	0	71	
4:50 PM	2	0	0	0	1	0	0	0	0	35	1	1	0	18	1	0	59	
4:55 PM	1	0	0	0	0	0	0	0	2	44	2	1	0	13	0	0	63	745
5:00 PM	6	0	0	0	0	0	0	0	1	33	2	1	0	17	0	0	60	737
5:05 PM	8	0	0	0	0	0	0	0	2	48	1	1	0	22	0	0	82	758
5:10 PM	4	0	0	0	0	0	0	0	1	50	2	4	0	20	0	0	81	779
5:15 PM	4	0	0	0	0	0	0	0	0	52	1	2	0	27	0	0	86	808
5:20 PM	2	0	0	0	0	0	0	0	1	48	2	1	0	16	0	0	70	832
5:25 PM	5	0	0	0	0	0	0	0	5	39	0	0	0	18	0	0	67	829
5:30 PM	1	0	0	0	0	0	0	0	4	56	1	3	1	41	1	0	108	881
5:35 PM	5	0	0	0	0	0	0	0	8	48	0	7	0	22	0	0	90	892
5:40 PM	1	0	0	0	0	0	0	0	1	44	0	0	0	25	3	0	74	911
5:45 PM	0	0	0	0	0	0	0	0	5	43	0	1	0	23	1	0	73	913
5:50 PM	0	0	0	0	0	0	0	0	4	41	0	2	0	15	2	0	64	918
5:55 PM	1	0	0	0	1	0	1	0	6	51	1	0	0	21	0	0	82	937
6:00 PM	3	0	0	0	1	0	0	0	5	41	2	1	0	22	1	0	76	953
6:05 PM	5	0	0	0	2	0	0	0	9	43	0	10	0	25	3	0	97	968
6:10 PM	7	0	0	0	3	0	1	0	3	32	1	5	0	12	2	0	66	953
6:15 PM	5	0	0	0	2	0	0	0	8	55	0	4	1	14	1	0	90	957
6:20 PM	2	0	0	0	0	0	1	0	2	62	1	0	0	10	1	0	79	966
6:25 PM	3	0	0	0	0	0	1	0	2	33	2	1	0	6	2	0	50	949
6:30 PM	1	0	0	0	1	0	0	0	0	33	0	0	1	16	0	0	52	893
6:35 PM	2	0	0	0	1	0	0	0	1	40	1	3	0	8	0	0	56	859

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	28	0	0	0	0	0	0	0	52	592	4	40	4	352	16	0	1088
Heavy Trucks	4	0	0		0	0	0		0	92	0		0	64	0		160
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:54 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

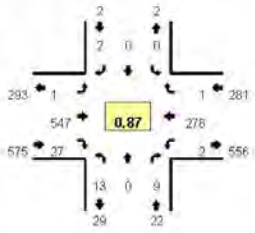
Type of peak hour being reported: System Peak

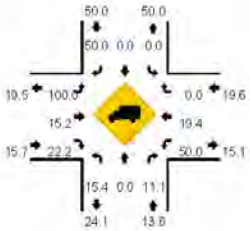
Method for determining peak hour: Total Entering Volume

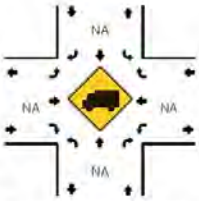
LOCATION: Gateway Blvd -- Schulte Rd
CITY/STATE: Tracy, CA

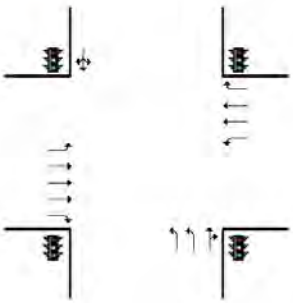
QC JOB #: 14410711
DATE: Thu, May 11 2017

Peak-Hour: 5:10 PM -- 6:10 PM
Peak 15-Min: 5:30 PM -- 5:45 PM









5-Min Count Period Beginning At	Gateway Blvd (Northbound)				Gateway Blvd (Southbound)				Schulte Rd (Eastbound)				Schulte Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:40 PM	0	0	0	0	0	0	0	0	0	40	2	0	1	10	0	0	53	
4:45 PM	3	0	1	0	0	0	0	0	0	53	3	0	2	15	0	0	77	
4:50 PM	0	0	0	0	0	0	0	0	0	32	1	0	1	17	0	0	51	
4:55 PM	1	0	0	0	0	0	0	0	1	42	2	0	0	12	0	0	58	707
5:00 PM	1	0	3	0	0	0	0	0	0	35	3	0	0	16	0	0	58	698
5:05 PM	6	0	6	0	0	0	1	0	1	45	2	0	0	16	0	0	77	714
5:10 PM	3	0	1	0	0	0	0	0	0	42	4	0	0	18	1	0	69	735
5:15 PM	2	0	0	0	0	0	0	0	0	43	3	0	1	26	0	0	75	758
5:20 PM	1	0	0	0	0	0	1	0	1	50	4	0	1	13	0	0	71	779
5:25 PM	0	0	1	0	0	0	0	0	0	43	2	0	0	18	0	0	64	773
5:30 PM	4	0	5	0	0	0	0	0	0	45	1	0	0	38	0	0	93	826
5:35 PM	0	0	1	0	0	0	0	0	0	52	3	0	0	24	0	0	80	826
5:40 PM	0	0	1	0	0	0	1	0	0	45	1	0	0	31	0	0	79	852
5:45 PM	1	0	0	0	0	0	0	0	0	47	0	0	0	23	0	0	71	846
5:50 PM	0	0	0	0	0	0	0	0	0	40	0	0	0	14	0	0	54	849
5:55 PM	0	0	0	0	0	0	0	0	0	46	5	0	0	24	0	0	75	866
6:00 PM	1	0	0	0	0	0	0	0	0	40	4	0	0	22	0	0	67	875
6:05 PM	1	0	0	0	0	0	0	0	0	54	0	0	0	27	0	0	82	880
6:10 PM	0	0	0	0	0	0	0	0	0	31	3	0	0	16	0	0	50	861
6:15 PM	2	0	1	0	0	0	0	0	0	44	5	0	2	13	0	0	67	853
6:20 PM	1	0	1	0	0	0	0	0	1	55	5	0	0	9	0	0	72	854
6:25 PM	1	0	1	0	0	0	0	0	0	34	2	0	0	7	0	0	45	835
6:30 PM	3	0	1	0	0	0	0	0	0	35	4	0	0	14	0	0	57	799
6:35 PM	2	0	1	0	0	0	0	0	0	35	1	0	0	6	0	0	45	764

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	0	28	0	0	0	4	0	0	568	20	0	0	372	0	0	1008
Heavy Trucks	0	0	4		0	0	4		0	88	8		0	60	0		164
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 8/28/2017 12:54 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix C Existing Operations Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	20	214	611	144	76	57	58	188	96	651	29
Future Volume (vph)	9	20	214	611	144	76	57	58	188	96	651	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Lane Util. Factor	1.00	0.95	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	22	233	664	157	83	62	63	204	104	708	32
RTOR Reduction (vph)	0	0	194	0	0	48	0	0	109	0	0	25
Lane Group Flow (vph)	10	22	39	664	157	35	62	63	95	104	708	7
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	11%	25%	5%	8%	2%	38%	26%	57%	44%	48%	8%	10%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	1.4	19.5	19.5	31.0	49.1	49.1	9.7	23.9	54.9	12.9	27.1	27.1
Effective Green, g (s)	1.4	19.5	19.5	31.0	49.1	49.1	9.7	23.9	54.9	12.9	27.1	27.1
Actuated g/C Ratio	0.01	0.17	0.17	0.26	0.42	0.42	0.08	0.20	0.47	0.11	0.23	0.23
Clearance Time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Vehicle Extension (s)	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	5.0	5.0	4.0	4.0
Lane Grp Cap (vph)	19	480	256	856	779	489	118	468	596	260	772	331
v/s Ratio Prot	0.01	0.01		c0.20	c0.08		0.04	0.03	0.04	c0.04	c0.21	
v/s Ratio Perm			0.03			0.03			0.04			0.01
v/c Ratio	0.53	0.05	0.15	0.78	0.20	0.07	0.53	0.13	0.16	0.40	0.92	0.02
Uniform Delay, d1	57.6	41.1	41.3	39.9	21.7	20.4	51.6	38.2	17.9	48.6	44.0	34.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	30.2	0.1	0.4	5.2	0.2	0.1	5.4	0.2	0.3	2.1	15.8	0.0
Delay (s)	87.9	41.1	42.2	45.1	21.8	20.5	57.0	38.4	18.2	50.7	59.8	34.9
Level of Service	F	D	D	D	C	C	E	D	B	D	E	C
Approach Delay (s)		43.8			38.8			29.4			57.8	
Approach LOS		D			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	44.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	117.3	Sum of lost time (s)	30.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	263	41	40	831	0	23
Future Volume (Veh/h)	263	41	40	831	0	23
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Hourly flow rate (vph)	548	85	83	1731	0	48
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	538			983		
pX, platoon unblocked					0.86	
vC, conflicting volume			633		1622	180
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			633		1393	180
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		100	94
cM capacity (veh/h)			960		106	839

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1
Volume Total	157	157	157	163	83	866	866	48
Volume Left	0	0	0	0	83	0	0	0
Volume Right	0	0	0	85	0	0	0	48
cSH	1700	1700	1700	1700	960	1700	1700	839
Volume to Capacity	0.09	0.09	0.09	0.10	0.09	0.51	0.51	0.06
Queue Length 95th (ft)	0	0	0	0	7	0	0	5
Control Delay (s)	0.0	0.0	0.0	0.0	9.1	0.0	0.0	9.6
Lane LOS					A			A
Approach Delay (s)	0.0				0.4			9.6
Approach LOS								A

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱		↑↑		↱
Traffic Vol, veh/h	268	18	0	871	0	1
Future Vol, veh/h	268	18	0	871	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	53	53	53	53	53	53
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	506	34	0	1643	0	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	253
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.9
Pot Cap-1 Maneuver	-	-	0	-	0	641
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	641
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	641	-	-	-
HCM Lane V/C Ratio	0.003	-	-	-
HCM Control Delay (s)	10.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	177	63	41	849	11	20	0	8	6	0	2
Future Volume (veh/h)	29	177	63	41	849	11	20	0	8	6	0	2
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1387	960	1473	1776	1743	1000	1000	1900	1624	1900	1900
Adj Flow Rate, veh/h	32	197	70	46	943	12	22	0	9	7	0	2
Adj No. of Lanes	1	3	1	1	2	1	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	37	98	29	7	9	90	0	0	17	0	0
Cap, veh/h	122	1516	327	127	1422	624	49	0	65	28	0	70
Arrive On Green	0.07	0.40	0.40	0.09	0.42	0.42	0.05	0.00	0.08	0.02	0.00	0.04
Sat Flow, veh/h	1757	3786	816	1403	3374	1482	952	0	850	1547	0	1615
Grp Volume(v), veh/h	32	197	70	46	943	12	22	0	9	7	0	2
Grp Sat Flow(s),veh/h/ln	1757	1262	816	1403	1687	1482	952	0	850	1547	0	1615
Q Serve(g_s), s	1.0	1.9	3.3	1.8	13.0	0.3	1.3	0.0	0.6	0.3	0.0	0.1
Cycle Q Clear(g_c), s	1.0	1.9	3.3	1.8	13.0	0.3	1.3	0.0	0.6	0.3	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	122	1516	327	127	1422	624	49	0	65	28	0	70
V/C Ratio(X)	0.26	0.13	0.21	0.36	0.66	0.02	0.45	0.00	0.14	0.25	0.00	0.03
Avail Cap(c_a), veh/h	1516	3268	704	1211	2912	1279	822	0	734	1335	0	1394
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.5	11.0	11.4	24.8	13.5	9.8	26.7	0.0	25.0	28.0	0.0	26.5
Incr Delay (d2), s/veh	0.4	0.0	0.3	0.6	0.5	0.0	8.9	0.0	0.4	1.6	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.7	0.8	0.7	6.1	0.1	0.5	0.0	0.1	0.1	0.0	0.0
LnGrp Delay(d),s/veh	26.0	11.0	11.7	25.4	14.0	9.8	35.6	0.0	25.3	29.7	0.0	26.6
LnGrp LOS	C	B	B	C	B	A	D		C	C		C
Approach Vol, veh/h		299			1001			31			9	
Approach Delay, s/veh		12.8			14.5			32.6			29.0	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	29.2	9.0	8.5	10.0	30.4	7.1	10.4
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	3.8	5.3	3.3	2.1	3.0	15.0	2.3	2.6
Green Ext Time (p_c), s	0.1	9.8	0.1	0.0	0.0	9.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.6
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	126	38	50	888	23	13	0	3	0	0	0
Future Volume (veh/h)	27	126	38	50	888	23	13	0	3	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1319	1418	1900	1776	1743	1027	1138	1900	1900	1900	1900
Adj Flow Rate, veh/h	30	140	42	56	987	26	14	0	3	0	0	0
Adj No. of Lanes	1	3	1	1	2	1	2	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	44	34	0	7	9	85	0	0	0	0	0
Cap, veh/h	98	1623	543	165	1638	719	54	0	28	4	5	0
Arrive On Green	0.06	0.45	0.45	0.09	0.49	0.49	0.03	0.00	0.03	0.00	0.00	0.00
Sat Flow, veh/h	1740	3602	1205	1810	3374	1482	1898	0	967	1810	1900	0
Grp Volume(v), veh/h	30	140	42	56	987	26	14	0	3	0	0	0
Grp Sat Flow(s),veh/h/ln	1740	1201	1205	1810	1687	1482	949	0	967	1810	1900	0
Q Serve(g_s), s	0.7	0.9	0.8	1.2	8.9	0.4	0.3	0.0	0.1	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.7	0.9	0.8	1.2	8.9	0.4	0.3	0.0	0.1	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	98	1623	543	165	1638	719	54	0	28	4	5	0
V/C Ratio(X)	0.31	0.09	0.08	0.34	0.60	0.04	0.26	0.00	0.11	0.00	0.00	0.00
Avail Cap(c_a), veh/h	2075	4297	1438	2159	4025	1767	2264	0	1154	2159	2266	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	19.0	6.6	6.6	17.9	7.8	5.6	19.9	0.0	19.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.1	0.4	0.4	0.0	0.9	0.0	0.6	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.3	0.3	0.6	4.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0
LnGrp Delay(d),s/veh	19.6	6.6	6.6	18.3	8.2	5.7	20.8	0.0	20.5	0.0	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	C		C			
Approach Vol, veh/h		212			1069			17			0	
Approach Delay, s/veh		8.5			8.7			20.8			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.8	24.9	7.2	0.0	8.4	26.4	0.0	7.2
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	3.8	2.9	2.3	0.0	2.7	10.9	0.0	2.1
Green Ext Time (p_c), s	0.1	9.7	0.0	0.0	0.0	9.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	8.8
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
101: Mountain House Pkwy & Schulte Rd 5/11/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	66	78	166	66	155	58	353	406	177	106	14
Future Volume (vph)	63	66	78	166	66	155	58	353	406	177	106	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Lane Util. Factor	1.00	0.95	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	72	85	180	72	168	63	384	441	192	115	15
RTOR Reduction (vph)	0	0	73	0	0	132	0	0	254	0	0	11
Lane Group Flow (vph)	68	72	12	180	72	36	63	384	187	192	115	4
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	11%	25%	5%	8%	2%	38%	26%	57%	44%	48%	8%	10%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	8.9	13.6	13.6	15.7	20.4	20.4	9.1	21.6	37.3	14.6	27.1	27.1
Effective Green, g (s)	8.9	13.6	13.6	15.7	20.4	20.4	9.1	21.6	37.3	14.6	27.1	27.1
Actuated g/C Ratio	0.09	0.14	0.14	0.16	0.21	0.21	0.10	0.23	0.39	0.15	0.28	0.28
Clearance Time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Vehicle Extension (s)	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	5.0	5.0	4.0	4.0
Lane Grp Cap (vph)	151	411	219	532	397	249	136	519	526	361	948	407
v/s Ratio Prot	0.04	0.02		0.06	c0.04		0.04	c0.17	c0.06	c0.08	c0.03	
v/s Ratio Perm			0.01			0.03			0.11			0.00
v/c Ratio	0.45	0.18	0.06	0.34	0.18	0.14	0.46	0.74	0.36	0.53	0.12	0.01
Uniform Delay, d1	41.0	36.0	35.4	35.3	30.7	30.5	40.9	34.3	20.6	37.3	25.4	24.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.9	0.3	0.1	0.8	0.3	0.4	3.4	5.8	0.9	2.7	0.1	0.0
Delay (s)	43.9	36.3	35.5	36.1	31.0	30.8	44.3	40.2	21.5	40.0	25.4	24.6
Level of Service	D	D	D	D	C	C	D	D	C	D	C	C
Approach Delay (s)		38.3			33.1			31.2			34.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	95.5	Sum of lost time (s)	30.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	622	27	6	377	0	40
Future Volume (Veh/h)	622	27	6	377	0	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Hourly flow rate (vph)	1296	56	13	785	0	83
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	538			983		
pX, platoon unblocked					0.99	
vC, conflicting volume			1352		1742	352
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1352		1736	352
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		100	87
cM capacity (veh/h)			516		78	650

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1
Volume Total	370	370	370	241	13	392	392	83
Volume Left	0	0	0	0	13	0	0	0
Volume Right	0	0	0	56	0	0	0	83
cSH	1700	1700	1700	1700	516	1700	1700	650
Volume to Capacity	0.22	0.22	0.22	0.14	0.03	0.23	0.23	0.13
Queue Length 95th (ft)	0	0	0	0	2	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	12.2	0.0	0.0	11.3
Lane LOS					B			B
Approach Delay (s)	0.0				0.2			11.3
Approach LOS								B

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱		↑↑		↱
Traffic Vol, veh/h	644	18	0	383	0	1
Future Vol, veh/h	644	18	0	383	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	53	53	53	53	53	53
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1215	34	0	723	0	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	608
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.9
Pot Cap-1 Maneuver	-	-	0	-	0	380
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	380
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	380	-	-	-
HCM Lane V/C Ratio	0.005	-	-	-
HCM Control Delay (s)	14.5	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	556	9	1	351	11	31	0	15	4	0	1
Future Volume (veh/h)	80	556	9	1	351	11	31	0	15	4	0	1
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1638	1319	1900	1583	1900	1226	1138	1900	1900	1900	1900
Adj Flow Rate, veh/h	90	625	10	1	394	12	35	0	17	4	0	1
Adj No. of Lanes	1	3	1	1	2	1	1	1	0	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	0	16	44	0	20	0	55	0	0	0	0	0
Cap, veh/h	249	1896	475	5	870	467	88	0	113	20	0	84
Arrive On Green	0.14	0.42	0.42	0.00	0.29	0.29	0.08	0.00	0.12	0.01	0.00	0.05
Sat Flow, veh/h	1810	4472	1122	1810	3008	1615	1167	0	967	1810	0	1615
Grp Volume(v), veh/h	90	625	10	1	394	12	35	0	17	4	0	1
Grp Sat Flow(s),veh/h/ln	1810	1491	1122	1810	1504	1615	1167	0	967	1810	0	1615
Q Serve(g_s), s	2.4	5.0	0.3	0.0	5.8	0.3	1.5	0.0	0.9	0.1	0.0	0.0
Cycle Q Clear(g_c), s	2.4	5.0	0.3	0.0	5.8	0.3	1.5	0.0	0.9	0.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	1896	475	5	870	467	88	0	113	20	0	84
V/C Ratio(X)	0.36	0.33	0.02	0.20	0.45	0.03	0.40	0.00	0.15	0.20	0.00	0.01
Avail Cap(c_a), veh/h	1680	4151	1041	1680	2792	1499	1084	0	898	1680	0	1499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.1	10.4	9.0	26.8	15.7	13.7	23.7	0.0	21.4	26.4	0.0	24.2
Incr Delay (d2), s/veh	0.3	0.1	0.0	7.1	0.4	0.0	4.1	0.0	0.2	1.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	2.0	0.1	0.0	2.4	0.1	0.6	0.0	0.2	0.1	0.0	0.0
LnGrp Delay(d),s/veh	21.4	10.5	9.0	33.9	16.0	13.7	27.8	0.0	21.6	28.3	0.0	24.2
LnGrp LOS	C	B	A	C	B	B	C		C	C		C
Approach Vol, veh/h		725			407			52			5	
Approach Delay, s/veh		11.8			16.0			25.8			27.5	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.1	28.8	10.1	8.8	13.4	21.6	6.6	12.3
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	2.0	7.0	3.5	2.0	4.4	7.8	2.1	2.9
Green Ext Time (p_c), s	0.0	7.8	0.1	0.1	0.1	7.8	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.9
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	547	27	2	348	1	13	0	9	0	0	2
Future Volume (veh/h)	1	547	27	2	348	1	13	0	9	0	0	2
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1652	1557	1267	1597	1900	1652	1712	1900	1900	1267	1900
Adj Flow Rate, veh/h	1	629	31	2	400	1	15	0	10	0	0	2
Adj No. of Lanes	1	3	1	1	2	1	2	1	0	1	1	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	100	15	22	50	19	0	15	0	0	0	0	0
Cap, veh/h	2	1566	460	5	1060	564	93	0	310	4	0	40
Arrive On Green	0.00	0.35	0.35	0.00	0.35	0.35	0.03	0.00	0.21	0.00	0.00	0.04
Sat Flow, veh/h	905	4510	1324	1206	3034	1615	3053	0	1455	1810	0	1077
Grp Volume(v), veh/h	1	629	31	2	400	1	15	0	10	0	0	2
Grp Sat Flow(s),veh/h/ln	905	1503	1324	1206	1517	1615	1526	0	1455	1810	0	1077
Q Serve(g_s), s	0.0	4.4	0.6	0.1	4.1	0.0	0.2	0.0	0.2	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.0	4.4	0.6	0.1	4.1	0.0	0.2	0.0	0.2	0.0	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	2	1566	460	5	1060	564	93	0	310	4	0	40
V/C Ratio(X)	0.46	0.40	0.07	0.38	0.38	0.00	0.16	0.00	0.03	0.00	0.00	0.05
Avail Cap(c_a), veh/h	1094	5454	1601	1459	3669	1953	3692	0	1759	2188	0	1302
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	20.6	10.2	9.0	20.5	10.1	8.8	19.5	0.0	12.9	0.0	0.0	19.2
Incr Delay (d2), s/veh	46.6	0.2	0.1	15.6	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	0.2	0.0	1.7	0.0	0.1	0.0	0.1	0.0	0.0	0.0
LnGrp Delay(d),s/veh	67.2	10.4	9.1	36.2	10.3	8.8	19.8	0.0	12.9	0.0	0.0	19.4
LnGrp LOS	E	B	A	D	B	A	B		B			B
Approach Vol, veh/h		661			403			25			2	
Approach Delay, s/veh		10.4			10.4			17.1			19.4	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.2	20.4	7.3	7.5	6.1	20.4	0.0	14.8
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	6.4	2.2	2.1	2.0	6.1	0.0	2.2	
Green Ext Time (p_c), s	0.0	8.0	0.0	0.0	0.0	8.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	10.6
HCM 2010 LOS	B

Appendix D In-Process Information

APPENDIX D. IN-PROCESS INFORMATION

The table below summarizes the in-process developments provided by the City of Tracy. Figures D-1 and D-2shows the added weekday AM and PM peak hour trips, respectively.

Project Name	Status	Size	General Location
Building 12 warehouse	In-process, tenant identified	664,000 SF	Part of EIR
Building 22 warehouse	In-process	225,000 SF	Part of EIR
Building 23 warehouse	In-process	271,572 SF	Part of EIR
Building 25 warehouse	In process	708,080 SF	Part of EIR
LBA warehouse	In-process		Part of EIR
Gateway commercial	Restart of development		Part of EIR
Building 3	Under Construction	323,987 SF	Part of EIR
Building 4	Under Construction	210,945 SF	Part of EIR
Rocking Horse - residential	Seeking funding	226 single-family detached homes	NE of the intersection of Lammers Road and Redbridge Road
Tracy Hills - mix	Seeking funding		Part of EIR

Appendix E Year 2018 Background Operations Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	99	170	461	88	369	99	370	468	422	328	34
Future Volume (vph)	114	99	170	461	88	369	99	370	468	422	328	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Lane Util. Factor	1.00	0.95	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	124	108	185	501	96	401	108	402	509	459	357	37
RTOR Reduction (vph)	0	0	166	0	0	302	0	0	110	0	0	27
Lane Group Flow (vph)	124	108	19	501	96	99	108	402	399	459	357	10
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	11%	25%	5%	8%	2%	38%	26%	57%	44%	48%	8%	10%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.8	12.8	12.8	32.7	30.7	30.7	14.7	20.2	52.9	28.7	34.2	34.2
Effective Green, g (s)	14.8	12.8	12.8	32.7	30.7	30.7	14.7	20.2	52.9	28.7	34.2	34.2
Actuated g/C Ratio	0.12	0.10	0.10	0.26	0.25	0.25	0.12	0.16	0.43	0.23	0.27	0.27
Clearance Time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Vehicle Extension (s)	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	5.0	5.0	4.0	4.0
Lane Grp Cap (vph)	193	297	158	852	459	288	169	373	544	545	919	396
v/s Ratio Prot	0.08	0.04		0.15	0.05		0.08	c0.17	c0.19	c0.19	0.11	
v/s Ratio Perm			0.01			c0.08			0.16			0.01
v/c Ratio	0.64	0.36	0.12	0.59	0.21	0.34	0.64	1.08	0.73	0.84	0.39	0.03
Uniform Delay, d1	52.3	52.0	50.7	40.0	37.2	38.6	52.3	52.1	29.8	45.7	36.6	32.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.9	1.0	0.5	1.6	0.3	1.0	8.6	68.9	6.1	12.4	0.4	0.0
Delay (s)	60.2	53.0	51.2	41.6	37.5	39.5	61.0	121.0	36.0	58.1	37.0	33.0
Level of Service	E	D	D	D	D	D	E	F	D	E	D	C
Approach Delay (s)		54.3			40.4			72.2			48.2	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	54.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	124.4	Sum of lost time (s)	30.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	961	27	6	908	0	40
Future Volume (Veh/h)	961	27	6	908	0	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Hourly flow rate (vph)	2002	56	13	1892	0	83
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	538			983		
pX, platoon unblocked					0.82	
vC, conflicting volume			2058		3002	528
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2058		3002	528
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		100	83
cM capacity (veh/h)			276		8	500

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1
Volume Total	572	572	572	342	13	946	946	83
Volume Left	0	0	0	0	13	0	0	0
Volume Right	0	0	0	56	0	0	0	83
cSH	1700	1700	1700	1700	276	1700	1700	500
Volume to Capacity	0.34	0.34	0.34	0.20	0.05	0.56	0.56	0.17
Queue Length 95th (ft)	0	0	0	0	4	0	0	15
Control Delay (s)	0.0	0.0	0.0	0.0	18.7	0.0	0.0	13.6
Lane LOS					C			B
Approach Delay (s)	0.0				0.1			13.6
Approach LOS								B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱		↑↑		↱
Traffic Vol, veh/h	983	18	0	914	0	1
Future Vol, veh/h	983	18	0	914	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	53	53	53	53	53	53
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1855	34	0	1725	0	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	927
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.9
Pot Cap-1 Maneuver	-	-	0	-	0	235
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	235
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	20.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	235	-	-	-
HCM Lane V/C Ratio	0.008	-	-	-
HCM Control Delay (s)	20.4	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	82	893	9	1	882	11	31	0	15	4	0	1
Future Volume (veh/h)	82	893	9	1	882	11	31	0	15	4	0	1
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1638	1319	1900	1583	1900	1226	1138	1900	1900	1900	1900
Adj Flow Rate, veh/h	92	1003	10	1	991	12	35	0	17	4	0	1
Adj No. of Lanes	1	3	1	1	2	1	1	1	0	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	0	16	44	0	20	0	55	0	0	0	0	0
Cap, veh/h	195	2616	656	5	1443	775	79	0	101	19	0	78
Arrive On Green	0.11	0.59	0.59	0.00	0.48	0.48	0.07	0.00	0.10	0.01	0.00	0.05
Sat Flow, veh/h	1810	4472	1122	1810	3008	1615	1167	0	967	1810	0	1615
Grp Volume(v), veh/h	92	1003	10	1	991	12	35	0	17	4	0	1
Grp Sat Flow(s),veh/h/ln	1810	1491	1122	1810	1504	1615	1167	0	967	1810	0	1615
Q Serve(g_s), s	3.9	9.7	0.3	0.0	20.7	0.3	2.3	0.0	1.3	0.2	0.0	0.0
Cycle Q Clear(g_c), s	3.9	9.7	0.3	0.0	20.7	0.3	2.3	0.0	1.3	0.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	195	2616	656	5	1443	775	79	0	101	19	0	78
V/C Ratio(X)	0.47	0.38	0.02	0.20	0.69	0.02	0.45	0.00	0.17	0.21	0.00	0.01
Avail Cap(c_a), veh/h	1119	2764	693	1119	1860	998	722	0	598	1119	0	998
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.9	9.0	7.0	40.2	16.3	11.0	36.3	0.0	33.0	39.7	0.0	36.7
Incr Delay (d2), s/veh	0.7	0.1	0.0	7.2	0.7	0.0	5.5	0.0	0.3	2.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	4.0	0.1	0.0	8.7	0.1	0.9	0.0	0.4	0.1	0.0	0.0
LnGrp Delay(d),s/veh	34.6	9.1	7.0	47.4	17.1	11.0	41.8	0.0	33.3	41.6	0.0	36.7
LnGrp LOS	C	A	A	D	B	B	D		C	D		D
Approach Vol, veh/h		1105			1004			52			5	
Approach Delay, s/veh		11.2			17.0			39.0			40.6	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.2	53.3	11.4	9.9	14.7	44.8	6.9	14.5
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	2.0	11.7	4.3	2.0	5.9	22.7	2.2	3.3
Green Ext Time (p_c), s	0.0	19.4	0.1	0.1	0.1	16.1	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	14.6
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	884	27	2	879	1	13	0	9	0	0	2
Future Volume (veh/h)	1	884	27	2	879	1	13	0	9	0	0	2
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1652	1557	1267	1597	1900	1652	1712	1900	1900	1267	1900
Adj Flow Rate, veh/h	1	1016	31	2	1010	1	15	0	10	0	0	2
Adj No. of Lanes	1	3	1	1	2	1	2	1	0	1	1	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	100	15	22	50	19	0	15	0	0	0	0	0
Cap, veh/h	2	2477	727	5	1673	891	89	0	234	3	0	39
Arrive On Green	0.00	0.55	0.55	0.00	0.55	0.55	0.03	0.00	0.16	0.00	0.00	0.04
Sat Flow, veh/h	905	4510	1324	1206	3034	1615	3053	0	1455	1810	0	1077
Grp Volume(v), veh/h	1	1016	31	2	1010	1	15	0	10	0	0	2
Grp Sat Flow(s),veh/h/ln	905	1503	1324	1206	1517	1615	1526	0	1455	1810	0	1077
Q Serve(g_s), s	0.1	8.3	0.7	0.1	14.1	0.0	0.3	0.0	0.4	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.1	8.3	0.7	0.1	14.1	0.0	0.3	0.0	0.4	0.0	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	2	2477	727	5	1673	891	89	0	234	3	0	39
V/C Ratio(X)	0.50	0.41	0.04	0.38	0.60	0.00	0.17	0.00	0.04	0.00	0.00	0.05
Avail Cap(c_a), veh/h	718	3580	1051	957	2408	1282	2423	0	1155	1436	0	855
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	31.4	8.3	6.6	31.3	9.5	6.3	29.8	0.0	22.3	0.0	0.0	29.3
Incr Delay (d2), s/veh	58.0	0.1	0.0	15.9	0.4	0.0	0.3	0.0	0.0	0.0	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.4	0.2	0.1	5.8	0.0	0.1	0.0	0.1	0.0	0.0	0.0
LnGrp Delay(d),s/veh	89.4	8.4	6.6	47.1	9.9	6.3	30.2	0.0	22.4	0.0	0.0	29.5
LnGrp LOS	F	A	A	D	A	A	C		C			C
Approach Vol, veh/h		1048			1013			25			2	
Approach Delay, s/veh		8.4			9.9			27.0			29.5	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.3	40.6	7.8	8.3	6.1	40.7	0.0	16.1
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	4.1	10.3	2.3	2.1	2.1	16.1	0.0	2.4
Green Ext Time (p_c), s	0.0	20.2	0.0	0.0	0.0	18.6	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	9.4
HCM 2010 LOS	A

HCM Signalized Intersection Capacity Analysis
101: Mountain House Pkwy & Schulte Rd

5/11/2017

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	30	258	676	168	298	78	69	321	217	714	50
Future Volume (vph)	19	30	258	676	168	298	78	69	321	217	714	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Lane Util. Factor	1.00	0.95	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	33	280	735	183	324	85	75	349	236	776	54
RTOR Reduction (vph)	0	0	230	0	0	191	0	0	192	0	0	42
Lane Group Flow (vph)	21	33	50	735	183	133	85	75	157	236	776	12
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	11%	25%	5%	8%	2%	38%	26%	57%	44%	48%	8%	10%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	3.6	18.4	18.4	35.9	50.7	50.7	11.0	19.4	55.3	19.4	27.8	27.8
Effective Green, g (s)	3.6	18.4	18.4	35.9	50.7	50.7	11.0	19.4	55.3	19.4	27.8	27.8
Actuated g/C Ratio	0.03	0.15	0.15	0.29	0.41	0.41	0.09	0.16	0.45	0.16	0.23	0.23
Clearance Time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Vehicle Extension (s)	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	5.0	5.0	4.0	4.0
Lane Grp Cap (vph)	47	431	229	945	767	481	128	362	572	372	754	324
v/s Ratio Prot	0.01	0.01		c0.23	0.10		0.06	0.03	0.08	c0.10	c0.23	
v/s Ratio Perm			0.03			c0.11			0.06			0.01
v/c Ratio	0.45	0.08	0.22	0.78	0.24	0.28	0.66	0.21	0.27	0.63	1.03	0.04
Uniform Delay, d1	58.8	45.0	46.0	39.9	23.6	24.0	54.3	45.2	21.3	48.5	47.6	37.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.0	0.1	0.7	4.8	0.2	0.4	13.4	0.4	0.5	4.9	40.5	0.1
Delay (s)	67.7	45.1	46.7	44.7	23.8	24.5	67.6	45.5	21.8	53.4	88.1	37.3
Level of Service	E	D	D	D	C	C	E	D	C	D	F	D
Approach Delay (s)		47.9			36.4			33.0			77.8	
Approach LOS		D			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	51.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	123.1	Sum of lost time (s)	30.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	527	41	40	1142	0	23
Future Volume (Veh/h)	527	41	40	1142	0	23
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Hourly flow rate (vph)	1098	85	83	2379	0	48
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	538			983		
pX, platoon unblocked					0.77	
vC, conflicting volume			1183		2496	317
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1183		2343	317
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			86		100	93
cM capacity (veh/h)			597		21	685

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1
Volume Total	314	314	314	242	83	1190	1190	48
Volume Left	0	0	0	0	83	0	0	0
Volume Right	0	0	0	85	0	0	0	48
cSH	1700	1700	1700	1700	597	1700	1700	685
Volume to Capacity	0.18	0.18	0.18	0.14	0.14	0.70	0.70	0.07
Queue Length 95th (ft)	0	0	0	0	12	0	0	6
Control Delay (s)	0.0	0.0	0.0	0.0	12.0	0.0	0.0	10.7
Lane LOS					B			B
Approach Delay (s)	0.0				0.4			10.7
Approach LOS								B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱		↑↑		↱
Traffic Vol, veh/h	532	18	0	1182	0	1
Future Vol, veh/h	532	18	0	1182	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	53	53	53	53	53	53
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1004	34	0	2230	0	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	502
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.9
Pot Cap-1 Maneuver	-	-	0	-	0	445
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	445
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	445	-	-	-
HCM Lane V/C Ratio	0.004	-	-	-
HCM Control Delay (s)	13.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	441	63	41	1160	11	20	0	8	6	0	2
Future Volume (veh/h)	30	441	63	41	1160	11	20	0	8	6	0	2
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1387	960	1473	1776	1743	1000	1000	1900	1624	1900	1900
Adj Flow Rate, veh/h	33	490	70	46	1289	12	22	0	9	7	0	2
Adj No. of Lanes	1	3	1	1	2	1	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	37	98	29	7	9	90	0	0	17	0	0
Cap, veh/h	117	1906	411	116	1752	770	47	0	62	28	0	67
Arrive On Green	0.07	0.50	0.50	0.08	0.52	0.52	0.05	0.00	0.07	0.02	0.00	0.04
Sat Flow, veh/h	1757	3786	816	1403	3374	1482	952	0	850	1547	0	1615
Grp Volume(v), veh/h	33	490	70	46	1289	12	22	0	9	7	0	2
Grp Sat Flow(s),veh/h/ln	1757	1262	816	1403	1687	1482	952	0	850	1547	0	1615
Q Serve(g_s), s	1.3	5.5	3.5	2.3	22.1	0.3	1.7	0.0	0.7	0.3	0.0	0.1
Cycle Q Clear(g_c), s	1.3	5.5	3.5	2.3	22.1	0.3	1.7	0.0	0.7	0.3	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	117	1906	411	116	1752	770	47	0	62	28	0	67
V/C Ratio(X)	0.28	0.26	0.17	0.40	0.74	0.02	0.47	0.00	0.15	0.25	0.00	0.03
Avail Cap(c_a), veh/h	1183	2550	549	945	2272	998	641	0	572	1041	0	1088
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.0	10.5	10.0	32.3	13.9	8.6	34.4	0.0	32.3	36.0	0.0	34.1
Incr Delay (d2), s/veh	0.5	0.1	0.2	0.8	0.9	0.0	10.1	0.0	0.4	1.7	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	1.9	0.8	0.9	10.4	0.1	0.6	0.0	0.2	0.2	0.0	0.0
LnGrp Delay(d),s/veh	33.5	10.6	10.2	33.1	14.8	8.7	44.4	0.0	32.7	37.7	0.0	34.2
LnGrp LOS	C	B	B	C	B	A	D		C	D		C
Approach Vol, veh/h		593			1347			31			9	
Approach Delay, s/veh		11.8			15.4			41.0			36.9	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.1	43.4	9.6	9.1	10.9	44.6	7.3	11.4
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	4.3	7.5	3.7	2.1	3.3	24.1	2.3	2.7
Green Ext Time (p_c), s	0.1	18.4	0.1	0.0	0.0	14.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	389	38	50	1199	23	13	0	3	0	0	0
Future Volume (veh/h)	28	389	38	50	1199	23	13	0	3	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1319	1418	1900	1776	1743	1027	1138	1900	1900	1900	1900
Adj Flow Rate, veh/h	31	432	42	56	1332	26	14	0	3	0	0	0
Adj No. of Lanes	1	3	1	1	2	1	2	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	44	34	0	7	9	85	0	0	0	0	0
Cap, veh/h	95	2038	682	151	2005	881	53	0	27	3	3	0
Arrive On Green	0.05	0.57	0.57	0.08	0.59	0.59	0.03	0.00	0.03	0.00	0.00	0.00
Sat Flow, veh/h	1740	3602	1205	1810	3374	1482	1898	0	967	1810	1900	0
Grp Volume(v), veh/h	31	432	42	56	1332	26	14	0	3	0	0	0
Grp Sat Flow(s),veh/h/ln	1740	1201	1205	1810	1687	1482	949	0	967	1810	1900	0
Q Serve(g_s), s	1.0	3.3	0.9	1.6	14.7	0.4	0.4	0.0	0.2	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.0	3.3	0.9	1.6	14.7	0.4	0.4	0.0	0.2	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	95	2038	682	151	2005	881	53	0	27	3	3	0
V/C Ratio(X)	0.33	0.21	0.06	0.37	0.66	0.03	0.26	0.00	0.11	0.00	0.00	0.00
Avail Cap(c_a), veh/h	1561	3231	1081	1623	3026	1329	1702	0	867	1623	1704	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	25.4	6.0	5.4	24.2	7.6	4.7	26.5	0.0	26.4	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.1	0.0	0.6	0.4	0.0	1.0	0.0	0.7	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.1	0.3	0.8	6.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0
LnGrp Delay(d),s/veh	26.1	6.0	5.5	24.7	8.0	4.7	27.5	0.0	27.1	0.0	0.0	0.0
LnGrp LOS	C	A	A	C	A	A	C		C			
Approach Vol, veh/h		505			1414			17			0	
Approach Delay, s/veh		7.2			8.6			27.4			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.6	37.5	7.6	0.0	9.0	39.1	0.0	7.6
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	5.0	5.3	2.4	0.0	3.0	16.7	0.0	2.2
Green Ext Time (p_c), s	0.1	18.6	0.0	0.0	0.0	16.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	8.4
HCM 2010 LOS	A

Appendix F Trip Generation Supporting Data

APPENDIX F. TRIP GENERATION SUPPORTING DATA

Existing and Proposed Uses

Existing Uses	
Use	**Size**
Dry Depot	374,507
Wet Depot	200,015
Meat Plant	201,824
Building 1	69,000
Building 2	90,000
Building 3	94,687
Building 4	86,000
Building 5	84,000
Building 6	92,400
Building 7	89,626
Guard Booth	802
Total	**1,382,861**

Proposed Uses	
Use	**Size**
Dry Depot	374,507
Wet Depot	246,765
Meat Plant	201,824
E-Commerce	334,240
Guard Booth	1,982
Total	**1,159,318**

Proposed-Existing
(22,741)

Trip Generation

Existing

Use	Size (SF)	Source	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
Warehouse (Existing Occupied Space)	1,266,206	Count Data	291	68	359	90	119	209
		Rate	*0.23*	*0.05*	*0.28*	*0.07*	*0.09*	*0.17*
E-Commerce (Existing)	204,300	Count Data	44	3	47	2	7	9
		Rate	*0.22*	*0.01*	*0.23*	*0.01*	*0.03*	*0.04*

Proposed

Use	Size (SF)	Source	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
Warehouse	825,078	Rate from existing data	190	44	234	59	78	136
E-Commerce (Existing)	334,240	Rate from existing data	72	5	77	3	11	15
		Total	**262**	**49**	**311**	**62**	**89**	**151**

Employee Shift Times and Typical Truck Hours

Use	Employee Shift Times	Typical Truck Hours
Dry Depot	4:30 am – 4:30 pm Overlap of employee start at 5:00 am, 5:30 am, 6:00 am and 6:30 am	4:00 am – 4:30 pm Peak Receiving: 8:30 am-2:30 pm Peak Shipping: 9:00 am-3:00 pm
Wet Depot	4:30 am – 3:00 pm Overlap of employee start at 5:00 am, 5:30 am, 6:00 am and 6:30 am	4:00 am – 4:00 pm Peak Receiving: 5:00 am and 11:00 am Peak Shipping: 5:30 am and Noon
E-Commerce	4:00 am – 8:30 pm 2 equal shifts at 4:00 am and Noon	Peak Receiving: 7:00 am – 4:00 pm Peak Shipping: Noon – 5:00 pm

Appendix G Year 2018 Total Traffic Operations Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	30	258	671	167	294	78	69	310	203	714	50
Future Volume (vph)	19	30	258	671	167	294	78	69	310	203	714	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Lane Util. Factor	1.00	0.95	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	33	280	729	182	320	85	75	337	221	776	54
RTOR Reduction (vph)	0	0	230	0	0	188	0	0	184	0	0	42
Lane Group Flow (vph)	21	33	50	729	182	132	85	75	153	221	776	12
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	11%	25%	5%	8%	2%	38%	26%	57%	44%	48%	8%	10%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	3.6	18.4	18.4	35.7	50.5	50.5	10.9	19.9	55.6	18.7	27.7	27.7
Effective Green, g (s)	3.6	18.4	18.4	35.7	50.5	50.5	10.9	19.9	55.6	18.7	27.7	27.7
Actuated g/C Ratio	0.03	0.15	0.15	0.29	0.41	0.41	0.09	0.16	0.45	0.15	0.23	0.23
Clearance Time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Vehicle Extension (s)	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	5.0	5.0	4.0	4.0
Lane Grp Cap (vph)	47	433	230	943	766	481	127	372	577	360	754	324
v/s Ratio Prot	0.01	0.01		c0.22	0.10		0.06	0.03	0.08	c0.09	c0.23	
v/s Ratio Perm			0.03			c0.11			0.06			0.01
v/c Ratio	0.45	0.08	0.22	0.77	0.24	0.27	0.67	0.20	0.26	0.61	1.03	0.04
Uniform Delay, d1	58.6	44.8	45.8	39.8	23.5	23.9	54.2	44.5	20.8	48.6	47.5	37.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.0	0.1	0.6	4.7	0.2	0.4	13.8	0.4	0.5	4.4	40.5	0.1
Delay (s)	67.5	44.9	46.5	44.5	23.8	24.4	67.9	44.9	21.4	53.1	88.0	37.2
Level of Service	E	D	D	D	C	C	E	D	C	D	F	D
Approach Delay (s)		47.6			36.2			32.9			78.0	
Approach LOS		D			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	51.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	122.7	Sum of lost time (s)	30.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	500	43	60	1131	0	6
Future Volume (Veh/h)	500	43	60	1131	0	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Hourly flow rate (vph)	1042	90	125	2356	0	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	538			983		
pX, platoon unblocked					0.78	
vC, conflicting volume			1132		2515	306
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1132		2379	306
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			80		100	98
cM capacity (veh/h)			625		18	696

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1
Volume Total	298	298	298	239	125	1178	1178	13
Volume Left	0	0	0	0	125	0	0	0
Volume Right	0	0	0	90	0	0	0	13
cSH	1700	1700	1700	1700	625	1700	1700	696
Volume to Capacity	0.18	0.18	0.18	0.14	0.20	0.69	0.69	0.02
Queue Length 95th (ft)	0	0	0	0	19	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	12.2	0.0	0.0	10.3
Lane LOS					B			B
Approach Delay (s)	0.0				0.6			10.3
Approach LOS								B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱		↑↑		↱
Traffic Vol, veh/h	485	21	0	1191	0	2
Future Vol, veh/h	485	21	0	1191	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	53	53	53	53	53	53
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	915	40	0	2247	0	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	458
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.9
Pot Cap-1 Maneuver	-	-	0	-	0	475
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	475
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	475	-	-	-
HCM Lane V/C Ratio	0.008	-	-	-
HCM Control Delay (s)	12.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	436	21	60	1186	11	3	0	12	6	0	2
Future Volume (veh/h)	30	436	21	60	1186	11	3	0	12	6	0	2
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1387	1900	1900	1776	1743	1900	1900	1900	1624	1900	1900
Adj Flow Rate, veh/h	33	484	23	67	1318	12	3	0	13	7	0	2
Adj No. of Lanes	1	3	1	1	2	1	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	37	0	0	7	9	0	0	0	17	0	0
Cap, veh/h	118	1888	805	187	1803	792	15	0	68	28	0	84
Arrive On Green	0.07	0.50	0.50	0.10	0.53	0.53	0.01	0.00	0.04	0.02	0.00	0.05
Sat Flow, veh/h	1757	3786	1615	1810	3374	1482	1810	0	1615	1547	0	1615
Grp Volume(v), veh/h	33	484	23	67	1318	12	3	0	13	7	0	2
Grp Sat Flow(s),veh/h/ln	1757	1262	1615	1810	1687	1482	1810	0	1615	1547	0	1615
Q Serve(g_s), s	1.3	5.2	0.5	2.4	21.2	0.3	0.1	0.0	0.6	0.3	0.0	0.1
Cycle Q Clear(g_c), s	1.3	5.2	0.5	2.4	21.2	0.3	0.1	0.0	0.6	0.3	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	118	1888	805	187	1803	792	15	0	68	28	0	84
V/C Ratio(X)	0.28	0.26	0.03	0.36	0.73	0.02	0.20	0.00	0.19	0.25	0.00	0.02
Avail Cap(c_a), veh/h	1237	2666	1137	1274	2375	1043	1274	0	1137	1089	0	1137
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.5	10.2	9.1	29.7	12.6	7.8	35.0	0.0	32.8	34.4	0.0	31.9
Incr Delay (d2), s/veh	0.5	0.1	0.0	0.4	0.8	0.0	9.5	0.0	0.5	1.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.8	0.2	1.3	9.9	0.1	0.1	0.0	0.3	0.1	0.0	0.0
LnGrp Delay(d),s/veh	31.9	10.3	9.1	30.1	13.4	7.8	44.5	0.0	33.3	36.1	0.0	32.0
LnGrp LOS	C	B	A	C	B	A	D		C	D		C
Approach Vol, veh/h		540			1397			16			9	
Approach Delay, s/veh		11.6			14.2			35.4			35.2	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.3	41.4	6.6	9.7	10.8	44.0	7.3	9.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	4.4	7.2	2.1	2.1	3.3	23.2	2.3	2.6
Green Ext Time (p_c), s	0.1	18.4	0.0	0.0	0.0	14.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	13.7
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	377	49	8	1237	23	20	0	6	0	0	0
Future Volume (veh/h)	28	377	49	8	1237	23	20	0	6	0	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1319	950	950	1776	1743	950	950	1900	1900	1900	1900
Adj Flow Rate, veh/h	31	419	54	9	1374	26	22	0	7	0	0	0
Adj No. of Lanes	1	3	1	1	2	1	2	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	44	100	100	7	9	100	100	100	0	0	0
Cap, veh/h	94	2274	510	17	2010	883	72	0	33	3	3	0
Arrive On Green	0.05	0.63	0.63	0.02	0.60	0.60	0.04	0.00	0.04	0.00	0.00	0.00
Sat Flow, veh/h	1740	3602	807	905	3374	1482	1755	0	807	1810	1900	0
Grp Volume(v), veh/h	31	419	54	9	1374	26	22	0	7	0	0	0
Grp Sat Flow(s),veh/h/ln	1740	1201	807	905	1687	1482	878	0	807	1810	1900	0
Q Serve(g_s), s	1.0	2.8	1.5	0.6	16.2	0.4	0.7	0.0	0.5	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.0	2.8	1.5	0.6	16.2	0.4	0.7	0.0	0.5	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	94	2274	510	17	2010	883	72	0	33	3	3	0
V/C Ratio(X)	0.33	0.18	0.11	0.53	0.68	0.03	0.30	0.00	0.21	0.00	0.00	0.00
Avail Cap(c_a), veh/h	1493	3091	693	776	2896	1272	1506	0	693	1553	1631	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	26.5	4.5	4.2	28.3	8.0	4.8	27.1	0.0	27.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.1	9.4	0.4	0.0	0.9	0.0	1.2	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.9	0.4	0.2	7.6	0.2	0.2	0.0	0.1	0.0	0.0	0.0
LnGrp Delay(d),s/veh	27.3	4.5	4.3	37.8	8.4	4.9	28.0	0.0	28.2	0.0	0.0	0.0
LnGrp LOS	C	A	A	D	A	A	C		C			
Approach Vol, veh/h		504			1409			29			0	
Approach Delay, s/veh		5.9			8.6			28.0			0.0	
Approach LOS		A			A			C				

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	42.8	8.4	0.0	9.2	40.7	0.0	8.4
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	3.0	4.8	2.7	0.0	3.0	18.2	0.0	2.5
Green Ext Time (p_c), s	0.0	19.3	0.0	0.0	0.0	16.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	8.2
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	96	170	455	86	362	99	370	453	414	328	34
Future Volume (vph)	114	96	170	455	86	362	99	370	453	414	328	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Lane Util. Factor	1.00	0.95	1.00	0.97	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1626	2888	1538	3242	1863	1170	1433	2299	1122	2366	3343	1437
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	124	104	185	495	93	393	108	402	492	450	357	37
RTOR Reduction (vph)	0	0	166	0	0	300	0	0	117	0	0	27
Lane Group Flow (vph)	124	104	19	495	93	93	108	402	375	450	357	10
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	11%	25%	5%	8%	2%	38%	26%	57%	44%	48%	8%	10%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.7	12.6	12.6	31.1	29.0	29.0	14.6	20.2	51.3	28.2	33.8	33.8
Effective Green, g (s)	14.7	12.6	12.6	31.1	29.0	29.0	14.6	20.2	51.3	28.2	33.8	33.8
Actuated g/C Ratio	0.12	0.10	0.10	0.25	0.24	0.24	0.12	0.17	0.42	0.23	0.28	0.28
Clearance Time (s)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Vehicle Extension (s)	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	5.0	5.0	4.0	4.0
Lane Grp Cap (vph)	195	298	158	825	442	277	171	380	540	546	925	397
v/s Ratio Prot	0.08	0.04		0.15	0.05		0.08	c0.17	c0.18	c0.19	0.11	
v/s Ratio Perm			0.01			c0.08			0.16			0.01
v/c Ratio	0.64	0.35	0.12	0.60	0.21	0.34	0.63	1.06	0.70	0.82	0.39	0.03
Uniform Delay, d1	51.2	50.9	49.7	40.0	37.4	38.6	51.2	50.9	29.0	44.6	35.7	32.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.4	1.0	0.5	1.8	0.3	1.0	8.3	62.3	4.9	10.9	0.4	0.0
Delay (s)	58.6	51.9	50.2	41.8	37.7	39.6	59.5	113.2	33.9	55.5	36.1	32.2
Level of Service	E	D	D	D	D	D	E	F	C	E	D	C
Approach Delay (s)		53.1			40.5			68.5			46.3	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	52.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	122.1	Sum of lost time (s)	30.0
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	938	25	3	904	0	6
Future Volume (Veh/h)	938	25	3	904	0	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.48	0.48	0.48	0.48	0.48	0.48
Hourly flow rate (vph)	1954	52	6	1883	0	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	538			983		
pX, platoon unblocked					0.82	
vC, conflicting volume			2006		2934	514
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2006		2919	514
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	97
cM capacity (veh/h)			289		10	510

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	NB 1
Volume Total	558	558	558	331	6	942	942	13
Volume Left	0	0	0	0	6	0	0	0
Volume Right	0	0	0	52	0	0	0	13
cSH	1700	1700	1700	1700	289	1700	1700	510
Volume to Capacity	0.33	0.33	0.33	0.19	0.02	0.55	0.55	0.03
Queue Length 95th (ft)	0	0	0	0	2	0	0	2
Control Delay (s)	0.0	0.0	0.0	0.0	17.7	0.0	0.0	12.2
Lane LOS					C			B
Approach Delay (s)	0.0				0.1			12.2
Approach LOS								B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	28.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↱		↑↑		↱
Traffic Vol, veh/h	932	12	0	907	0	2
Future Vol, veh/h	932	12	0	907	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	53	53	53	53	53	53
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1758	23	0	1711	0	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	879
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.9
Pot Cap-1 Maneuver	-	-	0	-	0	253
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	253
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	19.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	253	-	-	-
HCM Lane V/C Ratio	0.015	-	-	-
HCM Control Delay (s)	19.4	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	82	840	12	3	885	11	20	0	13	4	0	1
Future Volume (veh/h)	82	840	12	3	885	11	20	0	13	4	0	1
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1638	1900	1900	1583	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	92	944	13	3	994	12	22	0	15	4	0	1
Adj No. of Lanes	1	3	1	1	2	1	1	1	0	1	1	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	0	16	0	0	20	0	0	0	0	0	0	0
Cap, veh/h	201	2632	951	15	1461	784	88	0	134	19	0	73
Arrive On Green	0.11	0.59	0.59	0.01	0.49	0.49	0.05	0.00	0.08	0.01	0.00	0.05
Sat Flow, veh/h	1810	4472	1615	1810	3008	1615	1810	0	1615	1810	0	1615
Grp Volume(v), veh/h	92	944	13	3	994	12	22	0	15	4	0	1
Grp Sat Flow(s),veh/h/ln	1810	1491	1615	1810	1504	1615	1810	0	1615	1810	0	1615
Q Serve(g_s), s	3.7	8.5	0.3	0.1	19.7	0.3	0.9	0.0	0.7	0.2	0.0	0.0
Cycle Q Clear(g_c), s	3.7	8.5	0.3	0.1	19.7	0.3	0.9	0.0	0.7	0.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	201	2632	951	15	1461	784	88	0	134	19	0	73
V/C Ratio(X)	0.46	0.36	0.01	0.21	0.68	0.02	0.25	0.00	0.11	0.21	0.00	0.01
Avail Cap(c_a), veh/h	1166	2882	1041	1166	1939	1041	1166	0	1041	1166	0	1041
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.3	8.3	6.6	38.2	15.3	10.3	35.5	0.0	32.9	38.0	0.0	35.4
Incr Delay (d2), s/veh	0.6	0.1	0.0	2.5	0.6	0.0	2.1	0.0	0.1	2.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	3.5	0.1	0.1	8.3	0.1	0.5	0.0	0.3	0.1	0.0	0.0
LnGrp Delay(d),s/veh	32.9	8.4	6.6	40.8	15.9	10.3	37.6	0.0	33.0	40.0	0.0	35.4
LnGrp LOS	C	A	A	D	B	B	D		C	D		D
Approach Vol, veh/h		1049			1009			37			5	
Approach Delay, s/veh		10.5			15.9			35.8			39.1	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.6	51.7	9.8	9.5	14.6	43.7	6.8	12.5
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	2.1	10.5	2.9	2.0	5.7	21.7	2.2	2.7
Green Ext Time (p_c), s	0.0	18.9	0.1	0.0	0.1	16.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	13.6
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	849	6	1	878	1	19	0	28	0	0	2
Future Volume (veh/h)	1	849	6	1	878	1	19	0	28	0	0	2
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1652	950	950	1597	1900	1152	1508	1900	1900	1267	1900
Adj Flow Rate, veh/h	1	976	7	1	1009	1	22	0	32	0	0	2
Adj No. of Lanes	1	3	1	1	2	1	2	1	0	1	1	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	100	15	100	100	19	0	65	0	0	0	0	0
Cap, veh/h	2	2357	422	2	1585	844	85	0	271	3	0	90
Arrive On Green	0.00	0.52	0.52	0.00	0.52	0.52	0.04	0.00	0.21	0.00	0.00	0.08
Sat Flow, veh/h	905	4510	807	905	3034	1615	2128	0	1282	1810	0	1077
Grp Volume(v), veh/h	1	976	7	1	1009	1	22	0	32	0	0	2
Grp Sat Flow(s),veh/h/ln	905	1503	807	905	1517	1615	1064	0	1282	1810	0	1077
Q Serve(g_s), s	0.1	9.0	0.3	0.1	16.2	0.0	0.7	0.0	1.4	0.0	0.0	0.1
Cycle Q Clear(g_c), s	0.1	9.0	0.3	0.1	16.2	0.0	0.7	0.0	1.4	0.0	0.0	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	2	2357	422	2	1585	844	85	0	271	3	0	90
V/C Ratio(X)	0.50	0.41	0.02	0.50	0.64	0.00	0.26	0.00	0.12	0.00	0.00	0.02
Avail Cap(c_a), veh/h	663	3305	592	663	2223	1183	1559	0	939	1326	0	789
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	34.0	9.9	7.8	34.0	11.7	7.8	31.8	0.0	21.8	0.0	0.0	28.7
Incr Delay (d2), s/veh	58.1	0.1	0.0	58.1	0.4	0.0	0.6	0.0	0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	3.7	0.1	0.1	6.8	0.0	0.2	0.0	0.5	0.0	0.0	0.0
LnGrp Delay(d),s/veh	92.1	10.0	7.9	92.1	12.1	7.8	32.4	0.0	21.8	0.0	0.0	28.7
LnGrp LOS	F	B	A	F	B	A	C		C			C
Approach Vol, veh/h		984			1011			54			2	
Approach Delay, s/veh		10.1			12.2			26.1			28.7	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.2	41.7	8.7	11.7	6.2	41.7	0.0	20.4
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Max Q Clear Time (g_c+I1), s	11.0	2.7	2.1	2.1	18.2	0.0	3.4	
Green Ext Time (p_c), s	0.0	19.3	0.0	0.1	0.0	17.4	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	11.6
HCM 2010 LOS	B