APPENDIX D

Climate Change Documentation

Appendix D.1: Revised Draft EIR Section 3.13 Climate Change

3.13 CLIMATE CHANGE

Introduction

This section addresses the effects of the proposed project on global greenhouse gas emissions and the potential for these emissions to contribute to global climate change. There is international scientific consensus that anthropogenic emissions of greenhouse gases[1] have and will continue to contribute to changes in the global climate. Although there is uncertainty concerning the magnitude, rate, and ultimate effects of this change, it is generally accepted that climate change will result in a number of substantial adverse environmental impacts.

Climate change is a cumulative effect of all natural and anthropogenic sources of greenhouse gases on a global scale. The greenhouse gas emissions from an individual project, even a very large development project, would not individually generate sufficient greenhouse gas emissions to measurably influence global climate change.[2] Consideration of a project's climate change impact, therefore, is essentially an analysis of a project's contribution to a cumulatively significant global impact through its emission of greenhouse gases. While it is possible to examine the quantity of greenhouse gases that would be emitted from project sources, it is not currently possible to link particular changes to the environment of California to greenhouse gases emitted from a particular source or location.

Although environmental impacts associated with climate change cannot be directly linked to individual development projects, the State of California recognizes the link between development activities and greenhouse gas emissions and is in the process of developing standards for assessment and, ultimately, regulation of the greenhouse gas emissions associated with land use. The State of California, through Assembly Bill (AB) 32 and Executive Order S-3-05, has set statewide targets for the reduction of greenhouse gas emissions. The goal of AB 32 and S-3-05 is to reduce future California greenhouse gas emissions in a state that is expected to experience rapid growth in population and economic output. While CEQA focuses on emissions associated with new development, other regulatory means will need to be implemented to address reductions in existing emissions.

Greenhouse gases would be emitted as the result of project construction activities, direct and indirect operational sources, and mobile emissions associated with the trips generated by the proposed project. Emissions from sources such as construction equipment, vehicles, energy consumption, and solid waste generation are inventoried and discussed quantitatively and qualitatively. Emissions associated with the water supply and wastewater treatment are also discussed, although these sources could not be

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1 For the purposes of this analysis, the term "greenhouse gases" refers to CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6, those gases regulated under California Assembly Bill 32 and the Kyoto Protocol of the United Nations Framework Convention on Climate Change.

2 Association of Environmental Professionals (AEP). 2007. Alternative Approaches to Analyzing Greenhouse Gas Emissions and Global Climate Change in CEQA Documents. Accessed at: www.califaep.org/ userdocuments/File/AEP_Global_Climate_Change_June_29_Final.pdf; and OPR, 2008. Technical Advisory, CEQA and Climate Change: Addressing Climate Change Through CEQA Review, p. 6.

quantified due to data limitations. All emissions inventories are presented in metric tons unless otherwise indicated.

This analysis was prepared based upon a literature review that included advice for preparing CEQA climate change analyses released by the California Office of Planning and Research (OPR)[3] and OPR's Draft CEQA Guideline Amendments for Greenhouse Gas Emissions,[4] as well as approaches prepared by a number of professional associations and agencies that have published suggested approaches and strategies for complying with CEQA's environmental disclosure requirements. Such organizations include the California Attorney General's Office (AGO), the California Air Resources Board (CARB), the California Air Pollution Control Officers Association (CAPCOA), the United Nations and World Meteorological Organization's Intergovernmental Panel on Climate Change (IPCC), the Association of Environmental Professionals (AEP), and the Bay Area Air Quality Management District (BAAQMD).

Sources used for this section include energy forecasts and consumption reports produced by the California Energy Commission (CEC); energy consumption data provided by the proposed project and proposed project sponsors; data from the 2007 URBEMIS air quality modeling software; the Menlo Gateway Traffic Impact Analysis (see Appendix G); and information from the CARB and the California Climate Action Team (CAT).

No comments pertaining to climate change were identified in the scoping meetings held for the proposed project or were received in response to the Notice of Preparation (see Appendix C).

Setting

Overview of Climate Change

Global climate change refers to changes in the normal[5] weather of the earth measured by alterations in wind patterns, storms, precipitation, and temperature relative to historical averages. Such changes vary considerably by geographic location. Over time, the earth's climate has undergone periodic ice ages and warming periods, as observed in fossil isotopes, ice core samples, and through other measurement techniques. Recent climate change studies use the historical record to predict future climate variations and the level of fluctuation that might be considered statistically normal given historical trends.

Temperature records from the Industrial Age (ranging from the late 18th century to the present) deviate from normal predictions in both rate and magnitude. Most modern climatologists predict an unprecedented warming period during the next century and beyond, a trend that is increasingly attributed to human-generated greenhouse gas emissions resulting from the industrial processes, transportation, solid waste generation, and land use patterns of the twentieth and twenty-first centuries.

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3 OPR, 2008. Technical Advisory, CEQA and Climate Change: Addressing Climate Change through CEQA Review.

4 OPR, 2009. Preliminary Draft CEQA Guideline Amendments for Greenhouse Gas Emissions.

5 "Normal" weather patterns include statistically normal variations within a specified range.

According to the IPCC, greenhouse gas emissions associated with human activities have grown since pre-industrial times, increasing by 70 percent between 1970 and 2004.[6] Increased greenhouse gas emissions are largely the result of increasing fuel consumption, particularly the incineration of fossil fuels.

The IPCC modeled several possible emissions trajectories to determine what level of reductions would be needed worldwide to stabilize global temperatures and minimize climate change impacts. Regardless of the analytic methodology used, global average temperature and sea level were predicted to rise under all scenarios.[7] In other words, there is evidence that emissions reductions can minimize climate change effects but cannot reverse them entirely. On the other hand, emissions reductions can reduce the severity of impacts, resulting in lesser environmental impacts. For example, the IPCC predicted that the range of global mean temperature change from year 1990 to 2100, given different emissions reduction scenarios, could range from 1.1°C to 6.4°C.

Greenhouse Gases

Gases that trap heat in the atmosphere are called greenhouse gases because they transform the light of the sun into heat, similar to the glass walls of a greenhouse. Common greenhouse gases include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), ozone, and aerosols. Without the natural heat trapping effect of greenhouse gas, the earth's surface would be about 34°C cooler.[8] However, it is believed that emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations. Global atmospheric concentrations of CO_2, CH_4, and N_2O have increased markedly since the late 18th century as a result of human activities and now far exceed pre-industrial values.

Climate change results from radiative forcings and feedbacks. Radiative forcing is defined as the difference between the radiation energy entering the earth's atmosphere and the radiation energy leaving the atmosphere. Greenhouse gases allow solar radiation to penetrate the earth's atmosphere but slow the release of atmospheric heat. A feedback is an internal process that amplifies or dampens the climate's response to a specific forcing. For example, the heat trapped by the atmosphere may cause temperatures to rise or may alter wind and weather patterns. A gas or aerosol's global warming potential is defined as its ability to trap heat in the atmosphere; it is the "cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas".[9]

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6 IPCC, 2007. R.B. Alley et al. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policymakers.

7 Ibid.

8 CARB, 2006. CARB Proposed Early Actions to Mitigate Climate Change in California.

9 U.S. Environmental Protection Agency (EPA). 2006. The U.S. Greenhouse Gas Emissions and Sinks: Fast Facts. Office of Atmospheric Programs.

Individual greenhouse gases have varying global warming potentials and atmospheric lifetimes (see Table 3.13-1). The carbon dioxide equivalent (CO_2e) is a consistent methodology for comparing greenhouse gas emissions since it normalizes various greenhouse gas emissions to a consistent metric. The reference gas for global warming potential is CO_2; CO_2 has a global warming potential of one. By comparison, CH_4's global warming potential is 21, as CH_4 has a greater global warming effect than CO_2 on a molecule to molecule basis.[10] One teragram ([Tg] equal to one million metric tons) of CO_2e is the mass of a project's emissions of an individual greenhouse gas multiplied by the gas's global warming potential.

Table 3.13-1
Global Warming Potentials and Atmospheric Lifetimes of Select Greenhouse Gases

Gas	Atmospheric Lifetime (years)	Global Warming Potential (100 year time horizon)
Carbon Dioxide (CO_2)	50–200	1
Methane (CH_4)	12 $\pm$3	21
Nitrous Oxide (N_2O)	120	310
HFC-23	264	11,700
HFC-134a	14.6	1,300
HFC-152a	1.5	140
PFC: Tetrafluoromethane (CF_4)	50,000	6,500
PFC: Hexafluoroethane (C_2F_6)	10,000	9,200
Sulfur Hexafluoride (SF_6)	3,200	23,900

Source: CCAR, 2009.

Of all greenhouse gases in the atmosphere, water vapor is the most abundant, important, and variable. It is not considered a pollutant; in the atmosphere, it maintains a climate necessary for life. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from ice and snow, and transpiration from plant leaves.

Carbon dioxide (CO_2) is an odorless, colorless gas, which has both natural and anthropogenic sources. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources of CO_2 are from burning coal, oil, natural gas, and wood. Concentrations of CO_2 were 379 parts per million (ppm) in 2005, which equates to an increase of 1.4 ppm per year since 1960.[11] CO_2 is the most common greenhouse gas generated by California activities, constituting approximately 84 percent of all

[10] EPA, 2006. Non CO_2 Gases Economic Analysis and Inventory. Global Warming Potentials and Atmospheric Lifetimes. Accessed at: www.epa.gov/nonco2/econ-inv/table.html.

[11] IPCC, 2007. R.B. Alley et al. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policymakers.

greenhouse gas emissions.[12] CO_2 emissions attributed to California activities are mainly associated with in-state fossil fuel combustion and fossil fuel combustion in out-of-state power plants supplying electricity to California. Other activities that produce CO_2 emissions include mineral production, waste combustion and reductions in vegetation.

Methane (CH_4) is a flammable gas and is the main component of natural gas. When one molecule of CH_4 is burned in the presence of oxygen, one molecule of CO_2 and two molecules of water are released. A natural source of CH_4 is from the anaerobic decay of organic matter. Geological deposits, known as natural gas fields, also contain CH_4, which is extracted for fuel. Other sources are landfills, fermentation of manure, and cattle by-products.

Nitrous oxide (N_2O), also known as laughing gas, is produced naturally by microbial processes in soil and water. Anthropogenic sources of N_2O include agricultural sources, industrial processing, fossil fuel-fired power plants, and vehicle emissions. N_2O also is used as an aerosol spray propellant and in medical applications.

Other gases that contribute to the greenhouse effect include ozone,[13] CFCs, HFCs, PFCs, SF_6, and aerosols. Generally, this analysis focuses on the major sources of greenhouse gases, including CO_2, N_2O, and CH_4, because these are the gases currently regulated in the State of California.

Greenhouse Gas Emissions Inventories

A greenhouse gas inventory is an accounting of the amount of greenhouse gases emitted to or removed from the atmosphere over a specified period of time attributed to activities by a particular entity (e.g., annual emissions and reductions attributed to the State of California). A greenhouse gas inventory also provides information on the activities that cause emissions and removals, as well as the methods used to make the calculations. This section summarizes the latest information on global, state, regional, and local greenhouse gas emissions.

Worldwide and United States Inventories. In 2004, total worldwide greenhouse gas emissions were estimated to be 49,000 Tg CO_2e.[14] In 2006, greenhouse gas emissions in the U.S. were 7,054 Tg CO_2e, a 14.7 percent increase over 1990 emissions.[15]

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[12] CEC, 2007. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004.

[13] Ozone is a greenhouse gas; however, unlike other greenhouse gases, ozone in the troposphere is relatively short-lived. It is difficult to make an accurate determination of the contribution of ozone precursors (nitrogen oxides and volatile organic compounds) to global climate change. California Environmental Protection Agency, 2004. Technical Support Document for Staff Proposal Regarding Reduction of Greenhouse Gas Emissions from Motor Vehicles Climate Change Overview.

[14] Intergovernmental Panel on Climate Change, 2007. R.B. Alley et al. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policymakers.

[15] EPA, 2008. The U.S. Greenhouse Gas Emissions and Sinks: Fast Facts. Office of Atmospheric Programs.

California Inventory. California is the second largest contributor of greenhouse gas emissions in the U.S. and the sixteenth largest in the world.[16] In 2004, California produced 479.7 Tg CO_2e,[17] which is approximately six percent of 2004 U.S. emissions and 0.9 percent of global emissions. In California, the most common greenhouse gas is CO_2 from fossil fuel combustion, which constitutes approximately 81 percent of all greenhouse gas emissions.[18] The remainder of greenhouse gases only makes up a small percentage of the total: N_2O constitutes 6.8 percent, CH_4 6.4 percent, high GWP gases 3.5 percent, and non-fossil fuel CO_2 emissions constitute 2.3 percent.[19] CO_2 emissions in California are mainly associated with fossil fuel consumption in the transportation sector (41.2 percent) with the industrial sector as the second-largest source (22.8 percent).[20] Electricity production, from both in-state and out-of-state sources, agriculture, forestry, commercial, and residential activities comprise the balance of California's greenhouse gas emissions.

As part of the California Global Warming Solutions Act of 2006 (AB 32), discussed below, the CARB is required to establish a statewide greenhouse gas emissions limit for 2020 equivalent to 1990 emissions. In addition, Executive Order S-3-05 sets the following statewide emissions targets: a reduction of greenhouse gas emissions to 2000 levels by 2010, a reduction of greenhouse gas emissions to 1990 levels by 2020, and a reduction of greenhouse gas emissions to 80 percent below 1990 levels by 2050. CARB estimates that California's annual emissions were equivalent to 427 Tg CO_2e in 1990 and 452 Tg CO_2e in 2000.[21]

Table 3.13-2 quantifies California statewide emissions targets (AB 32 and Executive Order S-3-05 targets) by year based on the CEC's 2007 Inventory of Greenhouse Gases and Sinks.

Bay Area Emissions. The Bay Area Air Quality Management District (BAAQMD) prepared an inventory of greenhouse gases emissions in the Bay Area in November 2006.[22] Total greenhouse gases emissions within the San Francisco Bay Air Basin in 2002 were estimated as 94.2 million metric tons of CO_2e.

City of Menlo Park Inventory. The City of Menlo Park Climate Action Plan, adopted in 2009, states that approximately 493,237 metric tons of CO_2e were emitted by the City in 2005. According to this estimate, 99 percent of this total constitutes "community" emissions, emissions attributed to vehicles on Menlo Park's roads and highways (45.8 percent), commercial and industrial buildings (30.1 percent), residences (11.4 percent), and the closed Marsh Road Landfill (8.5 percent). The remaining emissions are municipal emissions, emissions generated by City buildings and vehicles, and waste, streetlights, and electricity for pumping water and stormwater.

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16 CEC, 2007. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004.

17 Ibid.

18 Ibid.

19 Ibid.

20 Ibid.

21 CARB, 2007. Greenhouse Gas Emissions Inventory Database [1990 - 2004]. Accessed August 5, 2008 at: www.arb.ca.gov/app/ghg/ghg_sector_data.php.

22 BAAQMD, 2006. Source Inventory of Bay Area Greenhouse Gas Emissions: Base Year 2002.

Table 3.13-2 California Greenhouse Gas Reductions Targets			
Year[1]	**Estimated California Population**	**Reduction Goal**	**Greenhouse Gas Target (Tg CO_2e)[2]**
1990	29,828,000	N/A	427.0
2000	34,105,437	N/A	452.3
2010	39,135,676	greenhouse gases emissions at or below 2000 levels[3]	452.3
2020	44,135,923	greenhouse gases emissions at or below 1990 levels	427.0
2050	59,507,876	greenhouse gases emissions 80% below 1990 levels[4]	85.4

Source: Population data are from California Department of Finance, 2007; greenhouse gas targets are derived from CARB, 2007. Greenhouse Gas Emissions Inventory Summary [1990 - 2004].

Notes:

1. Target years specified in Executive Order S-3-05 and/or AB 32. 1990 and 2000 data are provided as a baseline.
2. Calculated by dividing the statewide greenhouse gas target by the projected population for each target year. 1 teragram (Tg) = 1 million metric tons = 1.1023 million short tons CO_2e.
3. Based on 2004 estimate.
4. Calculated by multiplying 427.0 x 20 percent, which equals 80 percent below 1990 emissions.

Gasoline use accounts for 41.6 percent of the total emissions, electricity use accounts for 21.2 percent, and natural gas accounts for 20.7 percent. The remaining emissions are from a number of combustion sources, including CH_4, diesel, paper products, food waste, wood/textiles, and plant debris.

The City's 2005 Community Emissions Inventory includes a forecast for 2020. This forecast assumes that community emissions will increase by 107,227 metric tons CO_2e by 2020, for a total of 600,464 metric tons CO_2e. The majority of the increase would be in the transportation and commercial sectors, for a total of 62,596 metric tons CO_2e and 38,618 metric tons CO_2e, respectively. Direct access and emissions from the Marsh Road Landfill are expected to decrease.

Project Area Inventory. The project area currently supports office and research and development (R&D) uses, although a small portion of the project area is undeveloped. Existing development on the Independence site includes one-and two-story structures housing approximately 85,000 square feet (s.f.) of office/R&D uses. Existing development on the Constitution site includes one- and two-story buildings which contain approximately 134,000 s.f. of office/R&D uses.

An inventory of the greenhouse gas emissions generated by existing uses is provided in Table 3.13-3, below. To estimate total existing emissions, the emissions of the individual gases were estimated based on energy consumption data, then converted to their CO2e using the individually determined global warming potential of each gas. Thus, total greenhouse gas emissions equals total CO2 emissions plus total CO_2e emissions from CH_4 and N_2O. The inventory includes the following emissions:

- *Direct Emissions.*[23] Direct, existing emissions sources include on-site natural gas consumption (generally used for space and water heating and food preparation) and emissions from

[23] Also known as "areawide" emissions.

landscaping equipment. These emissions were estimated using CARB's URBEMIS 2007 model.

- *Indirect Emissions*. The generation of electricity through the combustion of fossil fuels typically yields CO_2 and, to a much smaller extent, CH_4 and N_2O. By consuming electricity, existing facilities generated indirect greenhouse gas emissions. Existing electricity usage, which was used to estimate greenhouse gas emissions from existing facilities, is based upon average statewide energy consumption factors, by use, from the CEC *Commercial End-Use Study*.[24]
- *Vehicular Emissions*. Employee and visitor vehicle trips associated with existing land uses represent the largest portion of the existing emissions inventory. Existing trips and corresponding greenhouse gas emissions were estimated using the default trip length and trip generation factors for San Mateo County in the URBEMIS 2007 model.
- *Fugitive Solid Waste Emissions*. According to the EPA's emissions reporting protocol, emissions of CO_2 from solid waste interment are considered to be biogenic greenhouse gases and part of the carbon cycle, and as such, are typically not included in greenhouse gas emission inventories.[25] Nevertheless, fugitive CH_4 emissions associated with solid waste management have been estimated for use in this EIR based on the EPA State Workbook method.[26]
- *Emissions Associated with Water Supply*. Greenhouse gas emissions are also generated by the infrastructure used to distribute and treat the domestic water supply and by infrastructure used to collect and treat wastewater. By consuming water and generating wastewater, development in the project area contributes to these emissions. Emissions associated with the water supply were estimated based on per gallon electricity consumption rates reported in the CEC report *Refining Estimates of Water Related Energy Use in California*. The CCAR greenhouse gas emissions factors for electricity were applied to this total.

It is believed that the above sources represent the vast majority of the greenhouse gas emissions associated with existing development within the project area. Existing facilities may emit a small amount of HFC emissions from leakage and service of refrigeration and air conditioning equipment and from disposal at the end of the life of the equipment;[27] however, the contributions of these emissions to the total inventory are likely quite small. PFCs and SF_6 are typically used in industrial activities that are not conducted at the project area. Ozone has characteristics of a greenhouse gas; however, unlike regulated greenhouse gases, ozone in the troposphere is relatively short-lived, and therefore, has localized rather than global effects. According to CARB, it is difficult to make an accurate determination of the contribution of ozone precursors (NO_X and ROGs) to global warming.[28] Facilities

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[24] CEC, 2006. California Commercial End-Use Survey.

[25] EPA, 1995. AP 42, Fifth Edition: Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources.

[26] EPA, 1998. State Workbook: Methodologies for Estimating Greenhouse Gas Emissions, pp. 5-1 to 5-3.

[27] Godwin, David S., Marian Martin Van Pelt and Katrin Peterson, no date. Modeling Emissions of High Global Warming Potential Gases. Environmental Protection Agency.

[28] CARB, 2004. Fact Sheet, Climate Change Emission Control Regulations.

in the project area do not emit CFCs, another gas with greenhouse gas characteristics, because CFCs are banned under federal regulations. Therefore, the inventory presented in Table 3.13-3, represents a good-faith estimate of all emissions directly and indirectly associated with current on-site operations.

The total greenhouse gas emissions currently generated by existing development in the project area on an annual basis is 4,783 metric tons of CO_2e.

Table 3.13-3
Existing Annual Operational Greenhouse Gas Emissions Within the Project Area

Source of Emissions	Emissions (metric tons CO_2e) Total
Direct	290
Indirect	936
Vehicular	3,159
Solid Waste	375
Water and Wastewater	23
Total	**4,783**

Source: PBS&J, 2009.

Predicted Effects of Climate Change

Although the adverse effects of climate change will have global consequences, in most cases they would not be expected to disproportionately affect any one site or activity. In other words, many of the effects of climate change are not site-specific. Emission of greenhouse gases would contribute to the changes in the global climate, which would, in turn, have a number of physical and environmental effects. A number of general effects, some of which may not occur in the project area, are discussed below.

Sea Level Rise and Flooding. Because the project area is at a low elevation (about 5 feet above mean sea level) and in close proximity to the San Francisco Bay, natural and climate change-accelerated sea level rise could result in increased flood risks within the next 50 to 100 years. Additionally, alterations in the flow regime, and subsequent flood potential, could also occur from effects of climate change on local and regional precipitation patterns. These issues are addressed in Section 3.5, Hydrology and Water Quality, under Impact Criterion #8.

In the future, precipitation events are predicted to vary in terms of timing, intensity and volume according to many climate change models.[29] Extreme storm events may occur with greater

[29] EPA, 2008. Climate Change Science: Precipitation and Storm Changes. Accessed January 16, 2009 at: www.epa.gov/climatechange/science/recentpsc.html.

frequency.[30] The effect on peak runoff is not known because most climate change models have not used a temporal (or spatial) scale necessary to identify effects on peak flows, and existing precipitation/runoff models for assessing the effects of climate change do not yet adequately predict rainfall/runoff scenarios.[31] Changes in rainfall and runoff could affect flows in surface water bodies, causing increased flooding and runoff to the storm drain system. Refer to Section 3.5, Hydrology and Water Quality.

Water Supply. California Health and Safety Code Section 38501(a) recognizes that "[climate change] poses a serious threat to the economic well-being, public health, natural resources, and the environment of California," and notes, "the potential adverse impacts of [climate change] include…reduction in the quality and supply of water to the state from the Sierra snowpack." As most of the state, including the San Francisco Peninsula, depends on surface water supplies originating in the Sierra Nevada, this water supply reduction is a concern. The San Francisco Public Utilities Commission (SFPUC), the water wholesaler that supplies the Menlo Park Municipal Water District, recognizes that climate change may cause increased uncertainty concerning the Sierra snowpack, and a higher chance of water shortages in the Bay Area. SFPUC's initial steps to address climate change include "engaging national climate change experts to study the potential effects of reduced snowpack, rising seas and hotter temperatures on the SFPUC's water supplies, wastewater collection and energy generation."[32]

Most of the scientific models addressing climate change show that the primary effect on California's climate would be a reduced snow pack and a shift in stream-flow seasonality. A higher percentage of the winter precipitation in the mountains would likely fall as rain rather than as snow in some locations, reducing the overall snowpack. Further, as temperatures rise, snowmelt is expected to occur earlier in the year resulting in peak runoff that would likely come a month or so earlier. The end result of this would be that the state may not have sufficient surface storage to capture the resulting early runoff, and so, absent construction of additional water storage projects, a portion of the current supplies would be lost to the oceans, rather than be available for use in the state's water delivery systems.

The SFPUC predicts a decrease in snowpack volume from the current 87 percent of historic averages to 83 percent in 2025 and 76 percent in 2050.[33] Changing climatic conditions could also shift the timing of snowmelt, so that peak runoff would occur earlier in the spring. This shift could affect the availability of the seasonal water supply, particularly during the hot summer months. However, the

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30 Ibid.

31 Anderson. M. 2006. Chapter 6: Climate Change Impacts on Flood Management p. 6-22 and 6-27. In Medelin, J., J. Harou, M. Olivares, J. Lund, R. Howitt, S. Tanaka, M. Jenkins, K. Madani, and T. Zhu (Eds), Climate Warming and Water Supply Management In California: White Paper. A Report From Climate Change Center CEC-500-2005-195-SF.

32 San Francisco Public Utilities Commission. http://sfwater.org/detail.cfm/MC_ID/18/MSC_ID/114/MTO_ID/342/C_ID/3124/Keyword/climate%20change, accessed July 2007.

33 San Francisco Public Utilities Commission, 2008. Modeling, Coalition Building, and Adaptation Response: San Francisco's Approach to Climate Change. Presentation made by Michael Carlin, Assistant General Manager, Water Enterprise, April 10, 2008.

SFPUC states that the effect of climate change in 2025 would likely be within range of current annual variation (with a slight shift in runoff timing).[34]

Water Quality.[35] Climate change could have adverse effects on water quality, which would, in turn, affect the beneficial uses (habitat, water supply, etc.) of surface water bodies and groundwater. The changes in precipitation discussed above could result in increased sedimentation, higher concentration of pollutants, higher dissolved oxygen levels, increased temperatures, and an increase in the amount of runoff constituents reaching surface water bodies. Sea level rise, discussed above, could result in the encroachment of saline water into freshwater bodies.

Ecosystems and Biodiversity.[36] Climate change is expected to have effects on diverse types of ecosystems, from alpine to deep sea habitat. As temperatures and precipitation change, seasonal shifts in vegetation will occur; this could affect the distribution of associated flora and fauna species. As the range of species shifts, habitat fragmentation could occur, with acute impacts on the distribution of certain sensitive species. The IPCC states that "20 percent to 30 percent of species assessed may be at risk of extinction from climate change impacts within this century if global mean temperatures exceed 2 to 3°C (3.6 to 5.4°F) relative to pre-industrial levels."[37] Shifts in existing biomes could also make ecosystems vulnerable to invasive species encroachment. Wildfires, which are an important control mechanism in many ecosystems, may become more severe and more frequent, making it difficult for native plant species to repeatedly re-germinate. In general terms, climate change is expected to put a number of stressors on ecosystems, with potentially catastrophic effects on biodiversity.

Human Health Impacts.[38] Climate change may also increase the risk of vector-borne infectious diseases, particularly those found in tropical areas and spread by insects—malaria, dengue fever, yellow fever, and encephalitis. Cholera, which is associated with algal blooms, could also increase. While these health impacts would largely affect tropical areas in other parts of the world, effects would also be felt in California. Warming of the atmosphere would be expected to increase smog and particulate pollution, which could adversely affect individuals with heart and respiratory problems, such as asthma. Extreme heat events would also be expected to occur with more frequency, and could adversely affect the elderly, children, and the homeless. Finally, the water supply impacts and

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34 Ibid.

35 IPCC, 2007: Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)]. Cambridge University Press, Cambridge, United Kingdom, 1000 pp.

36 EPA, 2008. Climate Change – Ecosystems and Biodiversity. Accessed January 3, 2009 at: www.epa.gov/climatechange/effects/eco.html

37 IPCC, 2007: Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change [Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)]. Cambridge University Press, Cambridge, United Kingdom, 1000 pp.

38 EPA, 2008. Climate Change – Health and Environmental Effects. Accessed January 3, 2009 at: www.epa.gov/climatechange/effects/health.html#climate

seasonal temperature variations expected as a result of climate change could affect the viability of existing agricultural operations, making the food supply more vulnerable.

Regulatory Setting

Executive Order S-3-05. On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05, setting statewide targets for the reduction of California's greenhouse gas emissions. The Executive Order S-3-05 states that greenhouse gases should be reduced to:

- 2000 levels by the year 2010,
- 1990 levels by the year 2020, and
- 80 percent below 1990 levels by the year 2050.

The text of Executive Order S-3-05 does not explain how the targets should be applied to individual development projects.

Executive Order S-3-05 also established the CAT for state agencies. After numerous public meetings and review of thousands of submitted comments, the CAT released its first report, *Climate Action Team Report to the Governor and the Legislature*, in March 2006, identifying key carbon reduction recommendations. A second iteration of this report was released in draft version in March 2009. This report will be released on a biennial basis from this point forward.

In April 2007, the CAT released a second report, *Proposed Early Actions to Mitigate Climate Change in California*, which identifies numerous strategies for initiation of other climate action regulations and efforts prior to the 2012 deadline established by AB 32 (discussed below). State agencies are moving ahead on many of these Early Actions.

Assembly Bill 32. Shortly after the issuance of Executive Order S-3-05, the California State Legislature adopted AB 32, the Global Warming Solutions Act of 2006. AB 32 recognizes that California is the source of substantial amounts of greenhouse gas emissions. In the Findings and Declarations for AB 32, the Legislature found that:

> The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to the marine ecosystems and that natural environment, and an increase in the incidences of infectious diseases, asthma and other health-related problems.

To avert these consequences, AB 32 requires CARB to create a plan and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." AB 32 requires CARB to design and implement emissions limits, regulations, and other measures, such that statewide greenhouse gas emissions would be reduced to 1990 levels by 2020, the same 2020 threshold indicated in Executive Order S-3-05. AB 32 directs CARB to develop early actions to reduce greenhouse gas emissions while

also preparing a Scoping Plan to identify how best to reach the 2020 limit. The measures and regulations to meet the 2020 target are to be in effect by 2012.

California Air Resources Board Climate Change Scoping Plan.[39] CARB's *Climate Change Scoping Plan*, adopted on December 11, 2008, reports that CARB has met the first milestones set by AB 32. As discussed above, CARB was required to prepare a historical emissions inventory and set emissions targets for 2020. In December 2007, CARB approved a 1990 emissions inventory of 427 million metric tons of CO_2e of greenhouse gases. As AB 32 requires that emissions be reduced to 1990 levels by 2020, approval of this inventory effectively determined emissions targets for 2020. As required, CARB has also identified 44 early action measures that could be enforceable on or before 2010. These measures include potential regulations affecting landfills, motor vehicle fuels, refrigerant in cars, port operations and many other sources. Regulatory development for these measures is ongoing.

The Scoping Plan also proposes a comprehensive set of actions designed to reduce overall greenhouse gas emissions in California, including:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewable energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California, and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

The Scoping Plan notes that local governments are "essential partners" in the effort to reduce greenhouse gas emissions, and that they have "broad influence and, in some cases, exclusive jurisdiction" over activities that contribute to greenhouse gas emissions. The Scoping Plan encourages local governments to adopt goals for reducing municipal greenhouse gas emissions and move towards adoption of a goal for reducing community emissions. These targets should parallel the State's commitment to reduce greenhouse gas emissions by approximately 15 percent of current levels by 2020. The Scoping Plan also observes that "[l]ocal governments have the ability to directly influence both the siting and design of new residential and commercial developments in a way that reduces greenhouse gases associated with vehicle travel, as well as energy, water, and waste"[40] and that

[39] CARB, December, 2008, Climate Change Scoping Plan, pp. ES-3 to ES-4.

[40] Ibid, p. 26.

"[i]ncreasing low-carbon travel choices (public transit, carpooling, walking and biking) combined with land use patterns and infrastructure that support these low-carbon modes of travel, can decrease average vehicle trip lengths by bringing more people closer to more destinations."[41] It also notes that regional targets will be set and achieved on a regional basis through the Senate Bill (SB) 375 implementation process, which "maintains regions' flexibility." SB 375 is discussed below.

Senate Bill 375. SB 375, which establishes mechanisms for the development of regional targets for reducing passenger vehicle greenhouse gas emissions, was adopted by the State on September 30, 2008. SB 375 requires CARB to develop vehicular greenhouse gas emission regional reduction targets for 2020 and 2035 by September 30, 2010, in consultation with metropolitan planning organizations. SB 375 recognizes the importance of achieving significant greenhouse gas reductions by changing land use patterns and improving transportation alternatives. Through the SB 375 process, metropolitan planning organizations will develop sustainable community strategies designed to integrate development patterns and the transportation network in a way that reduces greenhouse gas emissions while meeting housing needs and other regional planning objectives. However, the planning processes to implement SB 375 are only in the beginning stages and no sustainable community strategies have been adopted to date.

Senate Bill 97. The provisions of SB 97, enacted in August 2007, direct OPR to propose CEQA Guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions." SB 97 directs OPR to develop such guidelines by July 2009, and directs the Resources Agency, the agency charged with adopting the CEQA Guidelines, to certify and adopt such guidelines by January 2010. In addition, an OPR technical advisory memorandum, titled *CEQA and Climate Change*, was released in July 2008. OPR released the Draft CEQA Guideline Amendments for formal adoption into law by the Resources Agency on April 13, 2009. On December 31, 2009, the Natural Resources Agency delivered the amendments to the CEQA Guidelines to the Office of Administrative Law, which then submitted them to the Secretary of State for inclusion in the California Code of Regulations. These new CEQA Guidelines became effective on March 18, 2010. All of these documents inform the analysis in this EIR.

Assembly Bill 1493. California Assembly Bill 1493 (Pavley) enacted on July 22, 2002, required CARB to develop and adopt regulations that reduce GHG emitted by passenger vehicles and light duty trucks. Regulations adopted by CARB will apply to 2009 and later model year vehicles. CARB estimates that the regulation will reduce climate change emissions from the light duty passenger vehicle fleet by an estimated 20 percent in 2020[42] and by 27 percent in 2030.[43]

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[41] Ibid, p. 48.

[42] California Air Resources Board. 2008. Comparison of Greenhouse Gas Reductions for the United States and Canada Under United States CAFÉ Standards and California Air Resources Board Greenhouse Gas Regulations. Table 11. Available at: http://www.climatechange.ca.gob/publications.

[43] California Air Resources Board, December 10, 2004, Fact Sheet, Climate Change Emission Control Regulations.

Senate Bills 1078 and 107. Established in 2002 under Senate Bill (SB) 1078 and accelerated in 2006 under SB 107, California's Renewables Portfolio Standard (RPS) requires retail suppliers of electric services to increase procurement from eligible renewable energy resources by at least 1% of their retail sales annually, until they reach 20% by 2010. Executive Order S-14-08 (November 11, 2008) mandates retail suppliers of electric services to increase procurement from eligible renewable energy sources to 33% by 2020. Although the retail suppliers currently have not met the 2010 requirement, efforts to develop renewable energy continue to increase. The U.S. Department of Energy Loan Guarantee Program paves the way for federal support of clean energy projects that use innovative technologies, and spurs further investment in these advanced technologies. The program includes a specific solicitation aimed at developing renewable energy and projects that must commence construction by September 30, 2011. Pacific Gas & Electric, the energy provider for Menlo Park, is working towards meeting the 2010 RPS by rapidly improving its energy distribution as stated on their website, "We are aggressively adding more renewables to our power mix under California's Renewable Portfolio Standard and now have contractual commitments to have more than 20 percent of our future deliveries come from renewable."[44]

CEQA Guideline Amendments for Greenhouse Gas Emissions. The CEQA Guideline Amendments add new text to the existing CEQA Guidelines (Title 14, Chapter 3 of the California Code of Regulations) pertaining to greenhouse gas emissions. A summary of key text revisions is provided below.

Section 15064.4. Determining the Significance of Impacts from Greenhouse Gas Emissions. This section clarifies that a lead agency must employ careful judgment and discretion in determining the significance of greenhouse gas emissions. A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project. The text identifies general considerations that should be weighed when determining the significance of an effect:

- The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;
- Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and
- The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such regulations or requirements must be adopted by the relevant public agency through a public review process and must include specific requirements that reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

[44] Memorandum to Justin Murphy, City of Menlo Park, from Environ, March 3, 2010, page 3. See Appendix D for the complete memorandum.

Section 15126.4. Consideration and Discussion of Mitigation Measures Proposed to Minimize Significant Effects. The text in this section states that lead agencies "shall consider feasible means, supported by substantial evidence and subject to monitoring or reporting, of mitigating greenhouse gas emissions." Measures to mitigate the significant effects of greenhouse gas emissions may include, among others:

- Measures in an existing plan or mitigation program for the reduction of emission that are required as part of the lead agency's decision;
- Reductions in emissions resulting from a project through implementation of project features, project design, or other measures;
- Off-site measures, including offsets, that are not otherwise required, to mitigate a project's emissions;
- Measures that sequester greenhouse gases; and
- In the case of the adoption of a plan, such as a general plan, long range development plan, or plans for the reduction of greenhouse gas emissions, mitigation may include the identification of specific measures that may be implemented on a project-by-project basis. Mitigation may also include the incorporation of specific measures or policies found in an adopted ordinance or regulation that reduces the cumulative effect of emissions.
- *Section 15130. Discussion of Cumulative Impacts*. The text in this section states that greenhouse gas emissions associated with a project should be considered when the incremental contribution of the emissions may be cumulatively considerable.

Revisions to CEQA Checklist Questions. Appendix G of the CEQA Guidelines contains a sample checklist that may be used by lead agencies when considering environmental impacts. The checklist includes two new questions for greenhouse gas emissions:

- Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?
- Would the project conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

CARB Preliminary Draft Staff Proposal, Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act. On October 24, 2008, CARB staff published its preliminary draft proposal to establish a statewide threshold of significance for emissions of greenhouse gases from industrial, commercial and residential projects. The CARB preliminary draft proposal states that non-zero thresholds can be supported by substantial evidence, and that zero thresholds are not mandated in light of the facts that (1) some level of emissions in the near term and at mid-century is still consistent with climate stabilization and (2) current and anticipated regulations and programs apart from CEQA will proliferate and increasingly will reduce the greenhouse gas contributions of past, present, and future projects.

The preliminary draft also states that different standards should apply to different sectors because some sectors contribute more substantially to statewide emissions, and differing levels of reductions will be expected from different sectors. The preliminary draft includes the following potential thresholds for residential and commercial projects:

> Greenhouse gas emissions would be less than significant if the project is exempt from CEQA, or the project complies with a previously approved plan that addressed greenhouse gas emissions and has all of the following attributes:
>
> - Meets a community level greenhouse gas target consistent with AB 32;
> - Is consistent with a transportation related greenhouse gas reduction target adopted by CARB pursuant to SB 375;
> - Includes greenhouse gas inventory and mechanisms to monitor and evaluate emissions;
> - Incorporates mechanisms that allow the plan to be revised to meet targets; and
> - Has a certified final CEQA document; or
> - The project meets the following standards:
> - Construction sources meet interim CARB performance standards;
> - Operational sources meet an energy performance standard defined as CEC's Tier II Energy Efficiency Goal, and CARB performance standards (not yet specified) for water use, waste, and transportation; and
> - The project, with performance standards, will emit no more than an amount to be specified of CO_2e emissions per year.

Bay Area Regional Agency Climate Protection Program. The Joint Policy Committee (composed of the Association of Bay Area Governments [ABAG], BAAQMD, BCDC, and Metropolitan Transportation Commission [MTC]) approved the Bay Area Regional Agency Climate Protection Program on May 4, 2007 (amended July 20, 2007) to reduce potential effects of climate change. This program includes strategies to:

- Establish management priorities based on impacts, benefits, ease of implementation, and cost-effectiveness;
- Increase public awareness and motivate action through workshops and grass-roots outreach;
- Provide assistance, such as standardization of procedures for determining impacts, maintaining and distributing data, model codes and other tools, funding for demonstration projects, and others;
- Reduce driving and promote alternative modes of transportation through mechanisms such as road pricing, mode competitiveness, and regional development planning;
- Prepare to adapt, because regardless of regional reductions in potential causes contributing to global climate change, the region will be affected by changing environmental conditions; and

- Increase the importance of CEQA review of CO_2 emissions, conduct life-cycle costing of all capital projects, encourage energy-efficient development with sliding-scale permit fees, rebates and expedited permit review processes, and return the region's freeways to a maximum of 55 miles per hour.

Bay Area Air Quality Management District. The Bay Area Air Quality Management District (BAAQMD) is the primary agency responsible for comprehensive action or response to air pollution in the San Francisco Bay Area Air Basin. Currently, BAAQMD does not have an adopted or recommended threshold of significance for greenhouse gas emissions. However, BAAQMD is in the process of updating its CEQA Guidelines, which include the development of recommended significance thresholds, assessment methodologies and mitigation strategies for greenhouse gas emissions. The most recent draft approach that the BAAQMD has provided for consideration is a document entitled *CEQA Draft Air Quality Guidelines*, dated December 2009. BAAQMD is currently scheduled to consider adopting the proposed thresholds in June 2010.

The BAAQMD proposed thresholds consist of a three-pronged approach presenting three different criteria that could be used for determining the significance of a mixed-use development's operational greenhouse gas emissions. The first option is compliance with a qualified Climate Action Plan that includes enforceable measures to reduce greenhouse gas emissions consistent with AB 32 goals or Executive Order S-03-05 targets. As the City of Menlo Park's Climate Action Plan applies to the City's activities and not private projects, this first tier is not applicable. The second option is a numeric "bright line" threshold of 1,100 metric tonnes of CO_2e per year for operational emission sources including residential and non-residential building energy use, mobile source emissions, area source emissions, and indirect emissions associated with water usage. This screening level is intended to evaluate small or modest projects. Since the proposed project is larger than a small or modest proposal, this second tier is also not applicable. The third option is a metric based on a project's "service population" (the residential population plus the number of jobs associated with the land uses). This "efficiency-based" threshold is 4.6 tonnes CO_2e per service population per year for operational emissions. Because this efficiency threshold is designed for larger projects, such as the proposed project, this is the appropriate metric utilized to augment the analysis in the Draft EIR.

Menlo Park Climate Action Plan. The City of Menlo Park's Climate Action Plan (CAP - adopted in May 2009) proposes local emissions reduction strategies designed to help meet AB 32 targets. The emissions reduction strategies are generally focused on City actions, although the City would be expected to create programs directed towards reducing community emissions. As shown in Table 3.13-4, two options for emissions reduction targets are proposed in the CAP. Option 1 would set the target for 2020 community emissions at a level that would be 14 percent higher than 2005 emissions.[45] This option weighs growth projections and quantifies the projected emissions reductions from the strategies presented in the Climate Action Plan. It also assumes that a significant portion of the emissions reductions specified by AB 32 targets would be met through state emissions reduction

[45] The 2020 target is 3 percent below business-as-usual 2020 emissions. This is equivalent to 14 percent above 2005 emissions.

programs. Option 2 would set an emissions reduction target at 15 percent below 2005 levels by 2020 for both municipal and community emissions. The option assumes that additional strategies, beyond those presented in the CAP, will have to be developed at the local level. The City Council will consider these options along with others that may be developed during the 2009-10 CAP revision, one of which may be adopted in the future.

The state currently has a goal to reduce emissions to 1990 levels by 2020, if state reduction strategies are also taken into account. State strategies, such as fuel efficiency standards, statewide green building standards, transportation system improvements, and other strategies, would be expected to reduce emissions in Menlo Park by 123,000 metric tons CO_2e annually.

The City's 2020 emissions forecast predicts that the City would produce up to 600,464 metric tons CO_2e under a "worst-case" baseline scenario. Existing and planned emissions reduction strategies in the CAP are expected to result in reductions of approximately 157,997 metric tons CO_2e (including reductions from State strategies), for a reduced 2020 total of 442,467 metric tons CO_2e.

Table 3.13-4
Menlo Park Climate Action Plan Emissions Targets

Year	Community Reductions		Municipal Reductions	
	Target	**Annual Emissions Target (metric tons CO_2e)**	**Target**	**Annual Emissions Target (metric tons CO2e)**
Option 1				
2012	Limit community emissions to 4% over 2005 emissions	510,696	Reduce municipal emissions by 10% of 2005 emissions	1,965
2020	Limit community emissions to 14% over 2005 emissions	505,786	Reduce municipal emissions by 26% of 2005 emissions	1,615
Option 2				
2020	Reduce community emissions by 15% below 2005 emissions	417,396	Reduce municipal emissions by 15% of 2005 emissions	1,856

Source: City of Menlo Park, 2009. Climate Action Plan.

Menlo Park General Plan. Although the General Plan does not include policies explicitly designed to address greenhouse gas emissions and climate change, a number of goals and policies in the General Plan would be expected to contribute to this end. These policies include the following:

> **Policy I-B-4:** Uses and activities shall be encouraged which will strengthen and complement the relationship between the Transportation Center and the Downtown area and the nearby El Camino Real corridor.

Goal I-G: To promote the preservation of open-space lands for recreation, protection of natural resources, the production of managed resources, protection of health and safety, and/or the enhancement of scenic qualities.

Policy I-G-11: Well-designed pedestrian facilities should be included in areas of intensive pedestrian activity.

Policy I-H-1: The community design should help conserve resources and minimize waste.

Policy I-H-2: The use of water-conserving plumbing fixtures in all new public and private development shall be required.

Policy I-H-3: Plant material selection and landscape and irrigation design for City parks and other public facilities and in private developments shall adhere to the City's Water Efficient Landscape Ordinance.

Policy I-H-12: Street orientation, placement of buildings, and use of shading should contribute to the energy efficiency of the community.

Policy I-I-2: The regional land use planning structure should be integrated within a larger transportation network built around transit rather than freeways and the City shall influence transit development so that it coordinates with Menlo Park's land use planning structure.

Policy II-A-12: The City shall endeavor to provide for the safe, efficient, and equitable use of streets by pedestrians and bicyclists through good roadway design, maintenance, and effective traffic law enforcement.

Goal II-B: To promote the use of public transportation.

Policy II-B-1: The City shall consider transit modes in the design of transportation improvements and the review and approval of development projects.

Policy II-B-2: As many activities as possible should be located within easy walking distance of transit stops, and transit stops should be convenient and close to as many activities as possible.

Policy II-B-3: The City shall promote improved public transit service and increased transit ridership, especially to office and industrial areas and schools.

Goal II-C: To promote the use of alternatives to the single occupant automobile.

Policy II-C-1: The City shall work with all Menlo Park employers to encourage employees to use alternatives to the single occupancy automobile in their commute to work.

Goal II-D: To promote the safe use of bicycles as a commute alternative and for recreation.

Policy II-D-3: The design of streets within Menlo Park shall consider the impact of street cross section, intersection geometrics and traffic control devices on bicyclists.

Policy II-D-4: The City shall require new commercial and industrial development to provide secure bicycle storage facilities on-site.

Goal II-E: To promote walking as a commute alternative and for short trips.

Policy II-E-1: The City shall endeavor to maintain safe sidewalks and walkways where existing within the public right of way.

Impacts and Mitigation Measures

Climate Change Analysis Methodology

As described in Chapter 2, Project Description, the maximum amount of development assumed under the proposed M-3 zoning would include 173,667 s.f. of hotel uses, 694,669 s.f. of R&D/office uses, 69,467 s.f. of health club uses, 6,947 s.f. of restaurant uses, and 10,420 s.f. of commercial/retail uses. Inventory methods similar to those used to estimate existing emissions from the project area were applied to the proposed project to determine the net increase in emissions associated with new development.

The revised emissions assessment provides and incorporates details of certain project features and regulatory programs (e.g., Assembly Bill 1493 and Renewables Portfolio Standard). These features and programs influence the greenhouse gas emissions inventory, as well as the evaluation of the project in the context of the BAAQMD's new draft CEQA emissions "efficiency-based" threshold of 4.6 metric tonnes of CO_2e per service population.

The refined operational emissions calculations were prepared using the URBEMIS 2007 emissions model. The commentary to recent amendments to the CEQA Guidelines specifically cites URBEMIS as an appropriate model for performing greenhouse gas emissions calculations. The refined greenhouse gas analysis has modified some of the inputs from the URBEMIS model to incorporate a number of site or project-specific factors, as well as existing greenhouse gas-related regulatory programs, including the following:

- 2008 California Title 24 Energy Code;
- Project-specific energy use estimates rather than generalized estimates;
- Renewable Portfolio Standards, regarding percentages of future electricity produced from renewable sources;
- Site-specific temperature and humidity for mobile source emissions;
- Vehicle trip reductions due to internal trip capture resulting from project's mix of complementary uses and from the project's C/CAG Baseline TDM program.
- Adjustment of greenhouse gas vehicular emissions in light of mandated changes to the vehicle fleet, per Pavley (AB 1493).
- Refinement of the project emissions reduction strategies listed in Table 3.13-6.

Construction Emissions. Project construction activities would require demolition of existing buildings, grading, building construction, paving, and employee and vendor trips. Although specific construction phasing information is not available at this time, for modeling purposes it was assumed that new development proposed under the project would be constructed over a approximately 5-year period, with completion in 2017 at the earliest. The URBEMIS 2007 model was used to estimate annual construction emissions for this period. The updated model outputs are included in Appendix D (of the Final EIR).

Typically, more than 80 percent of the total energy consumption associated with development takes place during the use of buildings, and less than 20 percent is consumed during construction.[46] Using the URBEMIS model, it is estimated that the average daily CO_2 emissions associated with construction equipment exhaust for the proposed project would be approximately 1,097 metric tons CO_2 per year, with total emissions of 5,484 metric tons CO_2. Updated model output sheets are included in Appendix D (of the Final EIR).

Operational Emissions. Operational emissions sources associated with proposed development include direct, indirect, vehicular, and fugitive solid waste emissions. These sources were inventoried according to the methods used to inventory the emissions associated with existing land uses in the project area (refer to Setting). The URBEMIS 2007 model also was used for these calculations. The net operational emissions associated with proposed development would be approximately 11,805 metric tons of CO_2e, as presented in Table 3.13-5, below.

Table 3.13-5
Increased Annual Operational Greenhouse Gas Emissions, Proposed Baseline Project

Source of Emissions	Emissions (metric tons CO_2e)		
	Existing	**Proposed Baseline Project**	**Net Emissions (2020)**
Direct	290	1,239[1]	949
Indirect	936	2,520[1]	1,584
Vehicular	3,159	10,547[2]	7,388
Solid Waste	375	2,227	1,852
Water and Wastewater	23	55[3]	32
Total	**4,783**	**16,588**	**11,805**

Source: PBS&J, 2009. URBEMIS calculations provided in Appendix D.

Notes:

1. Revisions based on latest (2008) Title 24 Standards.
2. Revision based on recently adopted vehicle efficiency regulations (Assembly Bill 1493, see pages 2 and 3 of the Environ report).
3. Revision based on revised baseline water demand estimate prepared for the project by Environ (see Appendix D).

[46] United Nations Environment Programme (UNEP), 2007. Buildings and Climate Change: Status, Challenges and Opportunities, Paris, France.

Effects of Climate Change. Refer to Section 3.5, Hydrology and Water Quality for an evaluation of flooding associated with projected sea level rise in the project area. At this time, as discussed in the Setting, it is not possible to predict other climate change effects specific to the project area.

Standards of Significance

The CEQA Guidelines do not currently provide numeric or quantitative thresholds of significance for greenhouse gas emissions. The Draft CEQA Guideline Amendments, released in April 2009, state that each local lead agency must develop its own significance criteria based on local conditions, data, and guidance from public agencies and other sources. As discussed under Applicable Plans and Policies and shown in Table 3.13-4, the City may adopt an emissions reduction target in the near future. Two options, described in the 2009 version of the CAP, will be considered for future adoption, along with other targets that might be developed during a planned 2009-10 revision of the CAP. However, since neither of these targets has been adopted, the City has chosen not to use either CAP threshold as the standard of significance for this analysis. For the purposes of this analysis, the City has determined that a project's contribution to the cumulative climate change impact would be considerable if it would:

- **Impact Criterion #1:** Fail to implement all emission-reduction strategies deemed to be feasible by the City to reduce GHG emissions below the BAAQMD CEQA Draft Air Quality Guidelines "efficiency-based" threshold of 4.6 tonnes CO_2e per service population per year for operational emissions.

Project Evaluation

This section discusses the potential impacts of the proposed project that would be allowed under the GPA/ZOA. The analysis of the proposed project's climate change impact is essentially an analysis of the project's contribution to a cumulatively significant global warming impact through its emission of greenhouse gases. The cumulative impacts of the proposed project, with respect to the issue of climate change, are therefore captured in this cumulative analysis.

Impact CC-1: *Future development under the proposed project would result in a net increase in greenhouse gas emissions above the BAAQMD CEQA Draft Air Quality Guidelines "efficiency-based" threshold of 4.6 tonnes of CO_2e per service population per year for operational emissions if the project is completed before 2018. Because the project has not implemented all mitigation measures deemed by the City to be feasible, the project would have a potentially significant impact. (PS)*

Greenhouse Gas Emissions. The City's Greenhouse Gas Inventory took into account growth based on existing land use controls. To implement the proposed project, the current zoning and land use designations for the project area would have to be amended. Therefore, the new emissions associated with the project would result in a net increase over the emissions forecasted in the CAP inventory.

As shown in Table 3.13-5, above, future development under the proposed project would be expected to result in a net increase in greenhouse gas emissions in the project area of approximately 11,805 metric tons of CO_2e, approximately 2.4 percent of the 2005 citywide inventory. The citywide inventory, as

presented in the CAP, estimates that the City's total emissions were approximately 493,237 metric tons CO_2e in 2005.

However, this estimate represents a worst-case scenario and does not take into account the design strategies proposed under the project for reducing project greenhouse gas emissions. Strategies that the project sponsor has committed to implementing are listed in Table 3.13-6.

Table 3.13-6
Proposed Project Emissions Reduction Strategies

Strategy
Energy Efficiency, General The project sponsor shall achieve LEED gold for the office buildings and LEED silver for the hotel. The project will attain a minimum of 23 percent energy savings over a similar, conventionally designed structure built to the standards of California's 2008 Title 24 energy code. The project will include the installation of energy efficient heating and cooling systems, appliances and equipment and control systems. The project will also install light emitting diodes (LEDs) for outdoor lighting.
Energy Efficient Roofs and Building Design The proposed project shall incorporate 100% cool and green roofs, for the office and hotel. Between 66 and 75 percent of the roof area of proposed structures could be usable for photovoltaic panels, which could provide a portion of the project's power. This design approach would comply with the intent of this program. Exposed roof finishes will be highly reflective. In addition, buildings will be oriented to maximize passive heating and cooling efficiency, and natural ventilation would be used where appropriate. A high-performance building envelope and glazing, as well as shaded east, south, and west facades, will control heat gain and reduce the demand for cooling. The proposed project would collect heat outputs from laundry and cooking machinery for reuse in building HVAC.
Heat Island Effect Minimization Fifty percent of the parking lot and other hard surfaces will be shaded with tree canopy cover, while remaining area would use reflective surface and grid paving techniques.
Landscaping and Indoor Water Efficiency The proposed project includes a number of water conservation features. Landscape watering would be expected to use 50 percent less water than traditional systems as a result of water delivery system efficiencies and drought-resistant plantings. Evaporative water loss would be minimized by covering pools, adjusting fountain operating hours, and using a water treatment approach for the cooling towers that reduces the need for draw down and replacement. Indoor potable water usage would be reduced through use of low-flow restroom toilets, urinals, lavatories, and sinks. Water from the final laundry rinse cycle would be used as the first rinse cycle of the next load. Though it may not be available until sometime in the future, the project will install the infrastructure to deliver and use reclaimed water for landscape irrigation.
Construction Waste Diversion/Recycling The proposed project will include a construction waste diversion plan. Existing paving and concrete structures would be crushed and reused as a base material, and a high percentage of construction waste would be recycled or salvaged. All facilities would include labeled recycling receptacles to encourage waste diversion.
Alternative Transportation The proposed project will implement the following C/CAG Baseline TDM measures to reduce transportation-related impacts: ▪ Bicycle lockers and racks; ▪ Showers and changing rooms; ▪ Shuttle service to Caltrains stations; ▪ Subsidized public transit passes;

Table 3.13-6 Proposed Project Emissions Reduction Strategies
Strategy
▪ Subsidies for walking and biking to work; ▪ Vanpool program; ▪ Preferential carpool and vanpool parking; ▪ Employee commute surveys; ▪ Alternative work schedules; ▪ Transportation kiosks; ▪ Commute assistance center; ▪ Provision of on-site amenities; ▪ Guaranteed ride home program; and ▪ Improved infrastructure for walking, bicycling, and transit use. Additional TDM measures are included to further assist in reducing vehicle trips: ▪ Provide Translink cards to employees who use transit; ▪ Establish a Commuter Check program for employees; ▪ Establish a car share program; ▪ Provide electric vehicle charging stations.
Infill Development The proposed project would increase the land use intensity of the project area by developing higher intensity uses within the project area, as well as including a more pedestrian-friendly environment with sidewalks and other pedestrian amenities.
Climate Change Education During the leasing process, the project sponsor shall inform prospective tenants about the green building practices used during construction of new structures. This information would help to raise tenant awareness of the proposed project's energy efficiency goals.
Other The project will install charging stations for electric vehicles for employees and visitors. The project will implement a recycled content purchasing policy (e.g. prohibiting use of plastic water bottles), to be approved by the City.
Source: DKS Associates, 2009; Kimley Horn, 2010; PBS&J, 2010.

Implementation of these project features would result in an emissions reduction of at least 3,005 metric tons CO_2e (see Table 3.13-7).[47] The reductions reported are conservative and do not take into account certain features for which quantitative emissions reductions data is not available (e.g., the use of recycled materials, bicycle improvements, etc.). After taking into account proposed emissions reduction strategies, the proposed project would be expected to result in annual greenhouse gas emissions of approximately 13,583 metric tons CO_2e.

[47] In comparison to a similar project that did not include emissions-reducing measures.

Table 3.13-7 Operational Greenhouse Gas Emissions and Reductions, Proposed Project			
Source of Emissions	**Proposed Baseline Project**	**Reduction (metric tons CO_2e)**	**Proposed Project as Designed**
Direct	1,239	333	906
Indirect	2,520	356	2,164
Vehicular	10,547	2,311	8,236
Solid Waste	2,227	N/A	2,227
Water and Wastewater	55	5	50
Total	**16,588**	**3,005**	**13,583**
Source: PBS&J, 2010. Calculations provided in Appendix D, which includes the Environ memorandum.			

The BAAQMD methodology in comparing project generated emissions to the proposed project-level GHG threshold does not include solid waste emissions. Therefore, because the 2,227 tonnes of GHG emissions from solid waste is not included, the emissions totals in Table 3.13-8, which factor in the project's emission reduction strategies set forth in Table 3.13-6, are not exactly comparable to the total of 13,583 tonnes CO_2e, which result from the reductions in year 2020 set forth in Table 3.13-7.

Table 3.13-8 Total Operational Greenhouse Gas Emissions, Proposed Project as Designed			
Source of Emissions	**2020 Completion**	**2018 Completion**	**2017 Completion**
Direct	906	906	906
Indirect	2,164	2,164	2,164
Vehicular	8,236	8,657	8,868
Water and Wastewater	50	50	50
Total	**11,356**	**11,777**	**11,988**
DIVIDED BY SERVICE POPULATION	**4.43**	**4.59**	**4.67**
Source: Environ memorandum, see Appendix D. *Notes:* 1. Total emissions are expressed in terms of metric tons/year. 2. The service population is 2,566 employees as calculated Section 3.9 in the Draft EIR.			

These calculations reveal that, in 2020, the project would have a project emissions inventory of 4.43 tonnes per capita per year, which is below the 4.6 threshold in the BAAQMD draft thresholds, and 4.59 in 2018. If completed in 2018 or after, the project would have a less-than-significant impact and no additional mitigation would be required in light of the project's features (see Table 3.13-6 and Appendix D). If the project is completed before 2018, the project emissions would exceed the 4.6 tonnes per service population threshold, requiring mitigation. The higher emissions in the earlier years are due to a less fuel efficient vehicle fleet, since there are a greater number of older vehicles on the road and there is less time to implement the Pavley standards. If the proposed project were

completed prior to 2018, emissions reductions, such as vehicle trip reduction, would be necessary in order for the project to be below the 4.6 threshold in the BAAQMD draft thresholds. These required emissions reductions could be achieved by transportation demand management (TDM) measures, such as additional subsidies for transit users, bicyclists, and walkers. Such measures would ensure the BAAQMD draft 4.6 threshold would not be exceeded.

To remain below the BAAQMD draft thresholds should the project be completed prior to 2018, mitigation would be required to adequately reduce the number of vehicle trips. Without consideration of internal trip capture or TDM measures, the total project trip generation is 13,132 trips per day. Trips from existing uses on-site are 2,019 per day. Net new trips are 11,113 trips per day (see Draft EIR Table 3.11-5). Daily trips can be adjusted to account for internal capture by 9.6 percent resulting in 11,869 trips per day total or 9,850 net new trips (see Appendix D, Environ Memorandum Table 8). For the calculations presented in Table 3.13-8, daily trips were further reduced by 5.1 percent due to credit for the C/CAG Baseline TDM Program, resulting in 11,261 total daily trips or 9,242 net new trips per day (see Appendix D, ENVIRON Report Table 8). With financial incentives for use of alternate modes of transportation, such as the provision of a $3.50 per day transit pass subsidy, the TDM program reduction could increase from a 5.1 percent credit to a 7 percent credit, resulting in 11,032 total trips or 9,013 net new trips (Environ Memorandum Table 18). These are the maximum number of allowable trips to remain below the BAAQMD draft thresholds if the project is completed prior to the year 2018.

Although the proposed project would include a number of emissions reductions design features, the City has determined that additional feasible emissions reductions strategies are available to reduce emissions below the threshold if the project is completed prior to 2018. Therefore, the proposed project would have a potentially significant impact with respect to climate change if the project is completed prior to 2018.

MITIGATION MEASURE. Mitigation Measures CC-1.1 would reduce potentially significant climate change impacts to a less-than-significant level if the project is completed prior to 2018. (LTS)

CC-1.1 If the project is completed in 2017, greenhouse gas emissions shall be kept below 4.6 tonnes CO_2e/service population annually during 2017. To ensure this level of emissions efficiency total, net new trips to the project site shall not exceed 9,013 trips per day if the project is completed prior to 2018. When calculating net new trips a credit of 2,019 trips per day shall be used for the pre-project existing uses at the site.

- After project build out occurs in 2017, the City of Menlo Park shall perform a traffic count with funds provided by the project sponsor. Counts shall be taken at driveways of the project site. Daily traffic counts shall be the average of at least three weekday counts (Tuesday, Wednesday or Thursday) taken over a three week period. Counts shall be performed between mid-February and late May (before the end of the school year) or between Labor day and Thanksgiving day.

Counts shall avoid days immediately before or after holidays or long weekends and shall not be performed on days of inclement weather conditions.

- Based upon the traffic counts, if the allowable number of net new trips is exceeded, the project sponsor shall implement a plan of additional transportation demand management measures necessary to bring the number of trips into compliance with the trip cap within 30 days of being notified by the City. The plan shall include at a minimum a $3.50 per person, per day transit pass subsidy (i.e., C/CAG base transit subsidy plus $2.50). (Note: Please see Mitigation Measure TR-1.1(I) regarding the TDM strategies).
- Because the 9,013 net trip cap is only required as mitigation if the project is completed in 2017, and would not be required for 2018 or thereafter, any TDM measures, including the additional transit subsidy, that are necessary to meet the 9,013 vehicle trip cap in 2017 shall be discontinued on the latter of (1) January 1, 2018 or (2) six months after the subsidy is first implemented. (Note: Please see Mitigation Measure TR-1CM.1(C) regarding trip limitation that would take effect for 2018 and thereafter).

Appendix D.2: GHG Calculations

Greenhouse Gas Emission Worksheet

Project: Menlo Park General Plan Amendment and Zoning Ordinance Amendment, Existing Conditions

Construction Emissions

URBEMIS 2007 Output short tons	Construction Duration (years)	Total GHG Emissions (metric tons)	Annual GHG Emissions (metric tons/year)
6044.75	5	**5,484** ***metric tons CO2e***	**1097**

Vehicular Emissions

URBEMIS 2007 Output short tons/year	metric tons/year		California Vehicle Efficency and Low Carbon Fuel Standards		Total GHG Emissions
13,473.98	12,223	*metric tons CO2*	*12,835*	*metric tons CO2e* [1]	**10,547** ***metric tons CO2e***

Direct (Area Source) Emissions

URBEMIS 2007 Output short tons/year	Total GHG Emissions metric tons/year
1,365.85	**1,239** ***metric tons CO2e***

Indirect Emissions from Electricity Use

Total Project Annual KWh:	**11,233,639**	kWH/year
Project Annual MWh:	11,234	MWH/year
Title 24 Reduction:	**9,549**	**MWH/year**
Emission Factors for Electricity Use:		
CO2 *	724.12	lbs/MWh/year
CH4 *	0.0302	lbs/MWh/year
N2O *	0.0081	lbs/MWh/year

Total Annual Operational Emissions (metric tons) =
(Electricity Use (kWh) x EF)/ 2,204.62 lbs/metric ton

Conversion to Carbon Dioxide Equivalency (CO2e) Units based on Global Warming Potential (GWP)

CH4	21	GWP
N2O	310	GWP

Annual Emissions from Electricity Use:

	Total Emissions		Total CO2e Units	
CO2 emissions:	3136.2899	metric tons	**3136.3**	metric tons CO2e
CH4 emissions:	0.1308	metric tons	**2.7**	metric tons CO2e
N2O emissions:	0.0351	metric tons	**10.9**	metric tons CO2e
Gross Total:			3,150	metric tons CO2e
State 20% RPS		***Project Total***	***2,520***	***metric tons CO2e***

References

* California Climate Action Registry General Reporting Protocol, Reporting Entity-Wide Greenhouse Gas Emissions, Version 3.1, Appendix C, January 2009.

Indirect Emissions from Water Use

Total Project Annual KWh:	**168,661**	kWH/year
Project Annual MWh:	**169**	MWH/year

Annual Emissions from Electricity Use:

	Total Emissions		Total CO2e Units	
CO2 emissions:	55.3976	metric tons	**55**	metric tons CO2e
CH4 emissions:	0.0100	metric tons	**0.0**	metric tons CO2e
N2O emissions:	0.0027	metric tons	**0.0**	metric tons CO2e
		Project Total	***55***	***metric tons CO2e***

Fugitive Emissions from Solid Waste

Source	Solid Waste tons/year	Landfill Gas tons/year	GHG Emissions (metric tons/year) CO2	CH4		CO2 Equivalent Emissions Emissions (metric tons/year) CO2	CH4	Total
Project (Operational)	2,425	275.2	175.1	100.1		175.1	2,101.4	**2,277** ***metric tons CO2e***

Methodology and emission factors from State Workbook: Methodologies for Estimating Greenhouse Gas Emissions (pages 5-1 to 5-3).

Appendix D.3: Annual Unmitigated Vehicle Emissions

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name:

Project Name: Menlo Gateway Project

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO2
Racquetball/health	1,720.28
Quality resturant	474.54
Hotel	1,610.85
Strip mall	306.72
Office park	9,361.59
TOTALS (tons/year, unmitigated)	13,473.98

Includes correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Racquetball/health		32.93	1000 sq ft	69.47	2,287.65	10,318.44

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Quality resturant		89.95	1000 sq ft	6.95	625.15	2,843.42
Hotel		8.17	rooms	230.00	1,879.10	9,702.62
Strip mall		42.94	1000 sq ft	10.42	447.43	1,836.39
Office park		11.42	1000 sq ft	697.67	7,967.39	56,137.47
					13,206.72	80,838.34

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	56.3	0.0	100.0	0.0
Light Truck < 3750 lbs	11.7	0.0	98.4	1.6
Light Truck 3751-5750 lbs	20.0	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.7	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	0.9	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.1	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.8	40.6	59.4	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.4	0.0	83.3	16.7

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Racquetball/health				5.0	2.5	92.5
Quality resturant				8.0	4.0	88.0
Hotel				5.0	2.5	92.5
Strip mall				2.0	1.0	97.0
Office park				48.0	24.0	28.0

Operational Changes to Defaults

Commercial-based non-work urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based customer urban trip length changed from 7.35 miles to 7.4 miles

Appendix D.4: Water Demand Energy Estimate

Northern California Energy Use Factor
5,411 kWh/million gallons

Project Water Consumption
31.17 million gallons/yr

Water-Related Energy Use For Proposed Project
168660.9 kWh

Project Water Consumption with R&D Alternative
48.71 million gallons/yr

Water-Related Energy Use For R&D Alternative
263569.8 kWh

Appendix D.5: Electricity & Solid Waste Calculations

Menlo Park General Plan Amendment and Zoning Ordinance Amendment

Electricity Calcs

Project Area		*Electricity Generation Rate**		*Use*	*Subtotal*	
	units	5,626.50	kWH/year/unit	Residential	-	
	sf	53.3	kWH/year/sf	Grocery	-	
6,947	sf	47.45	kWH/year/sf	Restaurant	329,635	
	sf	21.7	kWH/year/sf	Hospital	-	
	sf	11.55	kWH/year/sf	University	-	
	sf	10.5	kWH/year/sf	High School	-	
	sf	5.9	kWH/year/sf	Elementary School	-	
697,670	sf	12.95	kWH/year/sf	Office	9,034,827	
173,667	sf	9.95	kWH/year/sf	Hotel	1,727,987	
	sf	4.35	kWH/year/sf	Warehouse	-	
10,420	sf	13.55	kWH/year/sf	Retail	141,191	
	sf	10.5	kWH/year/sf	Miscellaneous	-	
				Total	11,233,639	kWH/year

* From CEC 2005

Solid Waste Calcs

Project Area		*Solid Waste Generation Rate**		*Use*	*Subtotal (tons/year)*	
694,669	sf	0.01	lbs/sf/day	Office	1,268	
253,554	sf	0.025	lbs/sf/day	Shopping Center	1,157	
	sf	0.0312	lbs/sf/day	Department Store	-	
	sf	0.0142	lbs/sf/day	Manufacturing/warehouse	-	
	sf	0.007	lbs/sf/day	School	-	
	beds	16	lbs/bed/day	Hospital	-	
	unit	10	lbs/unit/day	Single-family Residential	-	
	unit	4	lbs/unit/day	Multi-family Residential	-	
				Total	2,425	tons/year

* CIWMB Estimate Solid Waste Generation Rates

Appendix D.6: Emission Reduction Calculations

Emissions Reductions Features

Direct			
	Total GHG Emissions metric tons/year	With energy efficency measures (source: ENVIRON 2010)	
	1,239	332.1	*metric tons CO2e*
Indirect			
	Total GHG Emissions metric tons/year	With energy efficency measures (source: Environ 2010)	
	2,520	355.9	*metric tons CO2e*
Vehicular			
	Reduced URBEMIS 2007 Output short tons/year	Projected Reduction from TDM Plan (source: ENVIRON 2010) metric tons/year	
	10,547	2,311.4	*metric tons CO2e*
Water and Wastewater			
55	Total GHG Emissions metric tons/year	5.4	*metric tons CO2e*
		3,004.8	*metric tons CO2e*

Appendix D.7: Memorandum from ENVIRON to Justin Murphy, City of Menlo Park (March 2010)

ENVIRON

March 3, 2010

Justin Murphy
City of Menlo Park
701 Laurel Street
Menlo Park, CA 94025

Re: Assessment of the GHG Emissions Inventory for the Menlo Gateway Project

Dear Mr. Murphy:

ENVIRON International Corporation (ENVIRON) presents this technical letter report (Report) with respect to the Menlo Gateway Development (Project). ENVIRON has conducted additional quantitative analyses at the request of the Bohannon Development Company to assist in the assessment of the Project's greenhouse gas (GHG) emissions inventory based on our discussions with you and the Bohannon Development Company.

This Report includes a description of our understanding of the Project, recent regulatory developments which will impact the GHG inventory, an analysis of the Project GHG emissions inventory, and a quantitative assessment comparing the Project GHG emissions inventory against the Bay Area Air Quality Management District (BAAQMD) Draft California Environmental Quality Act (CEQA) Guidelines.

Executive Summary

This Report estimates the Proposed Project's GHG emissions and accounts for the anticipated reduction in GHG emissions attributable to certain sustainability and Transportation Demand Management (TDM) features of the Project and certain regulatory measures as described in the BAAQMD Draft CEQA Guidelines, which are described more fully below.

This Report was prepared to supplement the Draft Environmental Impact Report (DEIR) prepared by Post, Buckley, Schuh, Jernigan (PBSJ) for the Project (dated July 2009) (PBSJ report) to support the Response to Comments (RTC) being prepared for inclusion in the Final Environmental Impact Report (FEIR). The DEIR included a GHG emissions inventory for the Project. This report revisits the Project emissions inventory in order to provide details of the Project features and regulatory programs that are likely to influence the GHG emissions inventory, including a more refined Transportation Demand Management (TDM) Program and estimates of the GHG emission reductions associated with regulatory programs expected to reduce the Project's GHG emissions in the future. In addition, ENVIRON has based the analysis on more refined information for building energy use and other aspects of the Project, which has direct bearing on the GHG emissions inventory.

This report reflects a total Project level[1] emissions inventory in 2020 of 11,356 tonnes per year, or 4.43 tonnes per service population per year,[2] which is below the 4.6 tonnes per service population threshold proposed in the BAAQMD Draft CEQA Guidelines. If the project is completed before 2018, the Project level emissions would exceed the 4.6 tonnes per service population threshold. The higher emissions in these earlier years are due to a less fuel efficient vehicle fleet, since there are older vehicles on the road and there is less time to implement the Pavley standards. For example, because we understand that the project is not likely to be

[1] The Project level emissions inventory includes the Project design features as listed below.
[2] Note that the emissions inventory reported here is the gross Project emissions inventory, and does not include the reduction of GHG emissions expected due to the removal of the existing structures at the Project site.

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completed (last building completed and occupied) before 2017, the Project level emissions inventory was calculated for 2017 and would be 11,988 tonnes per year, or 4.67 tonnes per service population per year. Therefore, if the Project were to be completed prior to 2018, emissions reductions (such as vehicle trip reductions) would be necessary (until 2018) in order to meet the BAAQMD Draft CEQA Guidelines. The required emission reductions could be achieved by TDM measures, such as additional subsidies for transit users, bicyclists, and walkers, which are summarized below. This is a conservative estimate for the Project since additional, future regulatory developments that were not taken into account by PBSJ or this analysis are expected to result in even lower GHG emissions than those summarized here.

Project Understanding

ENVIRON understands that the Project includes the development of 173,667 square feet of hotel space, 694,669 square feet of office space, 67,934 square feet of health club space, 6,947 square feet of restaurant space, and 10,420 square feet of retail/community space, which will replace 218,731 square feet of existing office and research and development (R&D) uses. The Project is located in Menlo Park, California and is an urban infill development in a built-out industrial zone. This analysis also conservatively includes 7,000 square feet of café space that would serve the employees of the office space.[3] If this café were built, the square footage of office space would be proportionately reduced. For purposes of this analysis, the GHG emissions associated with the café are conservatively added to the emissions from the Project as described.

Recent Regulatory Developments

The Climate Change section of the DEIR contains detailed discussions of the overall climate change regulatory setting. The regulatory discussion below is an abbreviated summary of recent regulatory developments that impact the analysis undertaken in this Report.

Assembly Bill 1493 (Mobile Source Reductions)

Assembly Bill (AB) 1493 (Pavley Standard) required the California Air Resources Board (CARB) to adopt regulations by January 1, 2005, which would reduce GHG emissions from noncommercial passenger vehicles and light-duty trucks of model year 2009 and thereafter. The bill also required the California Climate Action Registry (CCAR) to develop and adopt protocols for the reporting and certification of GHG emissions reductions from mobile sources for use by CARB in granting emission reduction credits. The bill authorized CARB to grant emission reduction credits for reductions of GHG emissions prior to the date of enforcement of regulations, using model year 2000 as the baseline for reduction.

In 2004, CARB applied to the United States Environmental Protection Agency (USEPA) for a waiver under the federal Clean Air Act to authorize implementation of these regulations. On June 30, 2009 the USEPA granted the waiver for California for its GHG emission standards for motor vehicles. Subsequently, CARB approved amendments on September 24, 2009, which are part of California's commitment toward a nation-wide program to reduce new passenger vehicle GHGs from 2012 through 2016. "With the granting of the waiver on June 30, 2009, it is expected that the Pavley regulations will reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016,[4] all while improving fuel

[3] This 7,000 square foot café is separate of the 6,947 square foot restaurant in the hotel.
[4] Note that these percentages are likely representative of the reduction for vehicles produced in that year.

efficiency and reducing motorists' costs."[5] Automotive manufacturers are continuing to strive to meet these standards.[6,7]

Senate Bills 1078 and 107 (Renewables Portfolio Standard)[8]

Established in 2002 under Senate Bill (SB) 1078 and accelerated in 2006 under SB 107, California's Renewables Portfolio Standard (RPS) requires retail suppliers of electric services to increase procurement from eligible renewable energy resources by at least 1% of their retail sales annually, until they reach 20% by 2010. Executive Order S-14-08 (November 11, 2008) mandates retail suppliers of electric services to increase procurement from eligible renewable energy sources to 33% by 2020. Although the retail suppliers currently have not met the 2010 requirement, efforts to develop renewable energy continue to increase. The U.S. Department of Energy Loan Guarantee Program paves the way for federal support of clean energy projects that use innovative technologies, and spurs further investment in these advanced technologies. The program includes a specific solicitation aimed at developing renewable energy and projects must commence construction by September 30, 2011.[9] Pacific Gas & Electric (PG&E), the energy provider for Menlo Park, is working towards meeting the 2010 RPS by rapidly improving its energy distribution as stated on their website[10], "We are aggressively adding more renewables to our power mix under California's renewable portfolio standard and now have contractual commitments to have more than 20 percent of our future deliveries come from renewables."

Bay Area Air Quality Management District CEQA Guidelines

The BAAQMD is the primary agency responsible for comprehensive air pollution control in the entire San Francisco Bay Area Air Basin. Currently, BAAQMD does not have an adopted or recommended threshold of significance for GHG emissions. However, BAAQMD is in the process of updating its CEQA Guidelines, which include the development of recommended significance thresholds, assessment methodologies, and mitigation strategies for GHG emissions. The draft approach that BAAQMD is considering in its December 2009 document entitled CEQA Draft Air Quality Guidelines[11] includes GHG thresholds for operational emissions from land-use development projects.

The BAAQMD proposed thresholds consist of a three-pronged approach presenting three different criteria that could be used for determining the significance of mixed-use development's operational GHG emissions. The first option is compliance with a qualified Climate Action Plan that includes enforceable measures to reduce GHG emissions consistent with AB 32 goals or Executive Order S-03-05 targets. The second option is a numeric "bright line" threshold of 1,100 metric tonnes CO_2e (carbon dioxide equivalent) per year for operational emission sources including residential and non-residential building energy use, mobile source emissions, area source emissions, and indirect emissions associated with water usage. The third option is a metric based on the "service population" (the residential population plus the number of jobs

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[5] ARB, 2009. Available at: http://www.arb.ca.gov/cc/ccms/ccms.htm. Accessed: December, 2009.
[6] See http://www.toyota.com/about/environment/. Accessed: December, 2009.
[7] See http://www.honda.com/newsandviews/article.aspx?g=environment&id=5232. Accessed: December, 2009.
[8] State of California, 2009. Available at: http://www.cpuc.ca.gov/PUC/energy/Renewables/overview.htm. Accessed: December 2009.
[9] U.S. DOE, 2009. Federal Loan Guarantees for Projects that Employ Innovative Energy Efficiency, Renewable Energy, and Advanced Transmission and Distribution Technologies. July 29.
[10] Pacific Gas & Electric. Clean Energy Solutions. Available at: http://www.pge.com/about/environment/pge/cleanenergy/index.shtml
[11] The Draft Guidelines are available from the BAAQMD web site at http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

associated with the land-uses). This "efficiency-based" threshold metric is 4.6 tonnes CO_2e per service population per year for operational emissions.[12]

The Board will consider adopting the proposed thresholds at a public hearing on April 7, 2010. In October 2009, BAAQMD posted updates to the staff-recommended CEQA thresholds of significance, which eliminate any climate change thresholds of significance criteria for construction emissions. Subsequent updates have not reintroduced thresholds for construction emissions. The BAAQMD Draft CEQA guidelines encourage the lead agency to incorporate best management practices to reduce GHG emissions during construction, as applicable. The applicable best management practices are discussed below.

Greenhouse Gas Emissions Inventory for the Proposed Project

This Report focuses on an evaluation of the vehicular trips (*i.e.,* mobile sources), natural gas consumption, electrical usage, and water usage components of the Project's GHG emissions inventory. These categories of the GHG emissions inventory were selected for analysis since they are the emission sources that the BAAQMD Draft CEQA Guidelines recommend for inclusion. It should be noted that the BAAQMD Draft Guidelines do not recommend that indirect emissions from waste disposal be included; accordingly, these waste disposal emissions are excluded from this analysis.[13] For this analysis, ENVIRON prepared a GHG emission inventory for the Project based on specific usage and emission factors for the purpose of comparing the Project against the draft BAAQMD significance thresholds. ENVIRON has followed the BAAQMD suggested guidelines for determining the Project's GHG emission inventory. ENVIRON relied upon more specific information related to the Project where available, instead of the more generic assumptions provided by BAAQMD if no better estimate is available. In addition, ENVIRON adjusted emission estimates to account for adopted regulations that influence the Project, as suggested by the draft BAAQMD guidelines, which state on page 4-7 "when comparing to the efficiency threshold, reductions associated with implementation of applicable regulations can be accounted for, but the analysis should consider time frame and source type applicability in doing so. BAAQMD leaves the manner in which this is performed to the discretion of the Lead Agency, but should be clearly presented in the analysis." In addition to adjustments necessary to be consistent with BAAQMD guidelines, ENVIRON refined the conservative emission estimates included in the DEIR to more accurately represent the Project.

GHG Emissions Associated with Commercial Buildings

This section describes the methods used to estimate the GHGs associated with activities in commercial buildings, which are primarily due to electricity and natural gas usage. GHGs are emitted during the generation of electricity from fossil fuels. Since electricity generation typically takes place offsite at the power plant, electricity use in a commercial building is considered to result in indirect emissions. Combustion of natural gas for water and space heating emits GHGs directly into the atmosphere onsite and, therefore, it is considered a direct emission. The use of natural gas combustion for space and water heating is the primary component of what is termed "area sources" in the BAAQMD Draft CEQA guidelines.

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[12] The Draft Guidelines document contains a caution that the efficiency metric should be applied with caution to very large projects. Specifically, if a fair argument exists that the project's emission on a mass level will have a cumulatively considerable impact on the region's GHG emission, then the efficiency-based threshold would be overcome. However, the term "very large" is not defined. Other air agencies such as the South Coast Air Quality Management District have proposed that 25,000 tonnes of CO_2e could be used as a threshold for a "very large" project size. (See SCAQMD, 2009. Available: http://www.aqmd.gov/ceqa/handbook/GHG/nov19mtg/nov19.html. Accessed: December 2009.)

[13] Even if solid waste were to be included in the inventory, it should not be incorporated into the efficiency-based metric proposed by the BAAQMD, as emissions from waste are not incorporated into the baseline used to derive the metric.

Energy use in commercial buildings can be divided into two categories: (1) energy consumed by the built environment (buildings and site elements) and (2) energy consumed by uses that are independent of the constructed elements, such as plug-in appliances and equipment. In California, the Title 24 Energy Efficiency Standards govern energy consumed by the built environment, including the HVAC (heating, ventilating, and air conditioning) system, water heating and some fixed lighting. Non-building or 'plug-in' energy use (*e.g.,* refrigeration, other or non-fixed lighting, computers, equipment, etc.) is not governed by Title 24. Both energy consumed by the built environment and energy consumed by plug-in appliances and anticipated equipment were included in the energy usage estimate as described below.

Estimate of Commercial Energy Use Intensity

The GHG emissions are estimated from the amount of energy use and appropriate emission factors. For this Project, KEMA Services Inc. (KEMA) provided the estimated electricity and natural gas usage. The energy use data provided by KEMA was calculated using a model constructed with the eQuest software program utilizing the DOE 2.2 engine. The architectural drawings from the DEIR provided the basis of the model's form, which also includes energy usage from the parking garages.[14]

Energy consumption was estimated based on the defaults from the Title 24 Alternative Compliance Manual and KEMA's engineering experience, including non-Title 24 uses, such as plug-ins. The Project has committed to making all commercial buildings, at a minimum, comply with the 2008 Title 24 Energy Code Standards, or the current Title 24 standard in effect when the Project submits for permitting.[15] The overall minimization of energy usage will be achieved through implementation of the energy efficient features listed in the DEIR Table 3.13-6 with the further refinements below, which have been incorporated into both the proposed Project and the energy models:

- LEED Certification. Project commits to achieving LEED Gold for the Office Buildings and to achieving LEED Silver for the Hotel;

- DEIR Table 3-13.6 stated that, at a minimum, the Project would approach a minimum of 5 to 15% energy savings over similar, conventionally designed structures built to the standards of California's Title 24 Energy Efficiency Standard. In fact, the Project, as currently modeled, has an aggregate (electricity plus natural gas) energy performance margin of 23% energy savings over the 2008 Title 24 Energy Efficiency Standard baseline;

- Cool Roof. The proposed project will specify 100% cool roofs for the office building and hotel;

- Buildings are oriented favorably to optimize heating and cooling efficiency, and incorporate natural ventilation where appropriate;

- Building envelope is designed with high performance glazing, wall and roof assemblies. Significant shading of windows is integrated into design on east, south and west facades;

[14] Note that the office building on Constitution conservatively includes a 7,000 square foot café.
[15] Note that future Title 24 standards are expected to result in lower energy usage and thus lower GHG emissions.

- Heat Island Effect. Parking lots are not immediately adjacent to buildings, which reduces heat island effect. Parking lots and hardscape will be at least 50% shaded with tree canopy. Hardscape will be light colored (reflective) paving; and,

- Heat recovery strategies will be employed with hotel laundry and cooking equipment for reuse in HVAC or other appropriate heat recovery technology.

In addition, the proposed project improves upon baseline standards for energy performance (Title 24 2008) with the following strategies:

- Lighting power density of 0.80 Watts per square foot and daylighting controls in all applicable Tenant Improvement (TI) spaces;

- Building controls systems in all buildings, such as digital controls that monitor the building's lighting, mechanical (heating and cooling) and ventilation systems for purposes of managing energy consumption;

- LED outdoor lighting (formerly listed as a mitigation measure in the DEIR);

- High performance 0.5 kW per ton chillers;

- Variable speed cooling towers, air-handlers, and pumps;

- High performance boilers (minimum 85% efficiency); and,

- Glazing in all buildings required to be low thermal conductivity, double paned and thermally broken framed. Selected glazing exceeds performance of standard "high performance" glazing.

The energy usage estimates are included with KEMA's summary memo (see Attachment A). Per our understanding, emissions and energy use estimates provided in the DEIR did not account for Project-specific features still under design and were not based on a Project-specific energy model that reflects either details of the baseline or Project design. However, it should be noted that this data is not current, does not take into account Project-specific measures, is not based on climate data for Menlo Park, and is not based on an energy model that reflects either the baseline or design case. Consequently, the DEIR numbers overstate energy consumption realities, especially for projects like this one that are specifically designed from inception to be "green," LEED certified, and high energy performance.

The energy use numbers presented in this memo are based on state-of-the-art energy modeling programs and models based on project-specific components, design case and performance specifications. In addition, the modeling is based on the 2008 version of the Title 24 Energy Efficiency Standard, which is adopted for use as of January 1, 2010 and will remain in effect for at least 3 years, until the next version (2011) is adopted (to be effective January 2013 at the earliest). At this time, the 2008 standards provide the most stringent and accurate modeling protocols in existence.

<u>Estimation of Annual Greenhouse Gas Emissions from Commercial Buildings</u>

GHG emissions were calculated from the energy usage estimates using appropriate emission factors. The 2010 Renewable Portfolio Standard (RPS) electricity emission

factor was estimated using the 2007 PG&E PUP[16] with the energy portfolio and distribution specific to PG&E.[17] This approach incorporates SB1078, an adopted regulation that will be fully in effect by the time the Project is complete, and that BAAQMD has considered in its support and justification for adopting the proposed GHG significance thresholds.[18] Emission factors for the combustion of natural gas were taken from the CCAR General Reporting Protocol.[19] A summary of the emission factors for different energy sources can be found in Table 1 and Table 2. The calculation of the 2010 RPS electricity emission factor is shown in Table 3. The RPS electricity emission factor for the 2020 RPS standard is also shown, and is likely a more accurate representation of the emission factors over the lifetime of the Project. However, this analysis conservatively uses the 2010 RPS standard. Table 4 shows the yearly CO_2 emissions for commercial energy use associated with the Project. For these emission sources, the contributions of CH_4 and N_2O were conservatively estimated, as shown in Table 5 consistent with the BAAQMD Draft CEQA Guidelines.[20] The overall GHG emissions associated with commercial energy use in the proposed buildings are 3,070 tonnes CO_2e per year.[21]

GHG Emissions Associated with Mobile Sources

This section estimates GHG emissions from mobile sources. The mobile source emissions considered for the Project include emissions from the typical daily operation of motor vehicles by employees and patrons of retail, office, restaurant, health club, and hotel uses. ENVIRON based the GHG emissions inventory for mobile emissions on Project Trip Generation rates and TDM measures developed by Kimley-Horn & Associates, Inc., the Urban Emissions Model (URBEMIS), and the expected reductions from AB 1493 (Pavley) . Kimley-Horn and Associates also provided quantification of trip reductions due to internal trip capture and certain baseline TDM measures (see Attachment B). The internal trip capture represents the trip reduction due to the complementary mix of land uses within the project site.

Estimating Greenhouse Gas Emissions for Mobile Sources

The CO_2 emissions from mobile sources were calculated in URBEMIS with the trip rates, trip lengths and emission factors for running and starting emissions from EMFAC2007. The basic methodology implemented within URBEMIS is outlined below.

$$\text{Running } CO_2 \text{ emissions} = VMT * EF_{running}$$

Where:

VMT	=	vehicle miles traveled
$EF_{running}$	=	emission factor for running emissions (grams/mile)

The CO_2 calculation involves the following assumptions:

[16] California Climate Action Registry. 2008. Database: Pacific Gas and Electric Company 2007 PUP Report. Available at: https://www.climateregistry.org/CARROT/public/Reports.aspx

[17] The renewable energy portfolio for Pacific Gas and Electric, the power utility that is most likely to provide power to the Menlo Gateway Development. The renewable energy distribution is based on 2007 data available at: http://www.pgecorp.com/corp_responsibility/reports/2007/environment/energy-future.html

[18] BAAQMD, 2009. Revised Draft Options and Justifications Report. October. Note that the updated justification reports are not yet available.

[19] California Climate Action Registry (CCAR). 2009. General Reporting Protocol. Version 3.1. January. Available at: http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf

[20] BAAQMD, 2009. Draft Bay Area CEQA Air Quality Guidelines. pg. 4-5. December.

[21] Note that due to rounding, the summing of numbers from tables may appear to be slightly different from values reported in the text.

- EMFAC emission factors from the year 2020 were used for $EF_{running}$ based on the San Mateo County fleet mix.

- Temperature specific to Redwood City[22], as this is the closest meteorological station to the Project site and is assumed to represent the temperature conditions where the majority of the vehicle miles would occur.

- Relative humidity specific to San Francisco[23], as this is the closest Western Regional Climate Center (WRCC) climate data with humidity records.

Startup emissions are CO_2 emitted from starting a vehicle and are calculated as follows:

$$\text{Startup } CO_2 \text{ emissions} = \text{trips} * EF_{startup}$$

Where:

Trips	=	trips made by vehicles
$EF_{startup}$	=	emission factor for startup (grams/trip)

Startup emissions were calculated using the following assumptions:

- The number of starts is equal to the number of trips made annually.
- The breakdown in vehicles was EMFAC fleet mix for San Mateo County in 2020.

Idling emissions are CO_2 emitted during the idling of vehicles (typically medium- and heavy-duty vehicles) and are calculated as follows:

$$\text{Idling } CO_2 \text{ emissions} = \text{trips} * EF_{idling}$$

Where:

Trips	=	trips made by vehicles
EF_{idling}	=	emission factor for idling (grams/trip)

Idling emissions were calculated using the following assumptions:

- The number of idle events is equal to the number of trips made annually.
- The breakdown in vehicles was EMFAC fleet mix for San Mateo County in 2020.

URBEMIS Model Inputs

The URBEMIS model runs are included as Attachment C and the inputs into the URBEMIS model included the following:

- Temperature data specific to the Project Site, as shown in Table 6;

- Reduced Vehicle Trip Generation Rates: The trips generated for each land use are based on daily trips estimated in the DEIR[24] and by Kimley-Horn &

[22] Temperature Data for Redwood City (Station # 047339) is from Western Regional Climate Center (WRCC). Available at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7339

[23] Humidity data for San Francisco from Western Regional Climate Center (WRCC). Available at: http://www.wrcc.dri.edu/summary/lcd.html

Associates (Kimley-Horn), which account for internal trip capture due to the presence of complementary land uses within the site (a 9.6% overall reduction from the daily vehicle trips otherwise generated due to the Project[25]). Note that Kimley-Horn has made a conservative estimate of the internal capture by not including the additional internal capture of retail trips.

For each commercial land use, URBEMIS characterizes trips into three categories: commercial commute, commercial non-work, and commercial customer. The percentage breakdown between each category can be seen in Table 7. Reductions due to Project TDM measures are conservatively applied to commercial commute and commercial non-work trips only. A further explanation of this is provided by Kimley-Horn and can be found in Attachment B.

The expected reduction of trips due to Project TDM measures is also included and summarized in Attachment B (C/CAG Baseline). The inventory uses the total daily trip reduction to estimate the average reduction in trips due to these TDM measures. A summary of reduced vehicle trip rates which are used to replace default URBEMIS trip rates can be seen in Table 8. Kimley-Horn estimated the peak and off-peak trip reduction due to a number of TDM measures, which include:

- Bike Lockers and Racks;
- Showers and Changing facilities;
- Enhanced shuttles to Menlo Park Station;
- New Shuttles to Redwood City Station;
- Subsidized Transit Passes ($1/day);
- Subsidized Walk/Bike ($1/day);
- Preferential car/van pool parking;
- Vanpool programs;
- Commuter assistance center;
- Guaranteed ride home programs;
- Compressed Work Week; and,
- Flexible Work Hours.

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[24] Draft EIR for Menlo Gateway Project. July, 2009. Appendix J, Summary Report. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/Appendix-J-TDM-Plan.pdf

[25] Draft EIR for Menlo Gateway Project. July, 2009. Section 3-11. Table 3.11-5. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/3-11-Traffic-and-Circulation.pdf
The 9.6% internal capture reduction conservatively assumes 0% internal capture for retail facilities. Details of this assumption are provided by Kimley-Horn and Associates, Inc. and can be found in Appendix B.

- Worker Commute Trip Percentage: After the reduction due to Project TDM measures is applied to commercial commute and commercial non-work trips, the breakdown by trip category no longer equals the URBEMIS default values. The actual percentage breakdown of commercial commute, commercial non-work, and commercial customer trips has been calculated. The resulting commercial commute trip percentage has been entered into URBEMIS to replace the default worker commute trip percentage. Table 7 lists the default URBEMIS values as well as the adjusted values following the commercial commute and commercial non-work trip reductions.

- 2020 vehicle fleet: Although the Project is expected to have more than a 40 year lifetime, the year 2020 was selected as a conservative estimate since fuel efficiency is expected to increase over the lifetime of the Project. The applicable regulatory programs, such as AB 32, also cite the year 2020 as a benchmark to assess greenhouse gas reduction efforts.

- Inclusion of diverted-link trips: URBEMIS allows users to select a pass-by trip option, which splits trips into percentages of primary, pass-by, and diverted-linked trips specific to each land use[26]. Primary trips are trips made for the specific purpose of visiting the designated land use. Pass-by trips are trips made as intermediate stops directly on the way from an origin to a primary trip destination. Diverted-linked trips are trips attracted from the traffic volume on roadways in the vicinity of the destination but which require a diversion from that roadway to another roadway to gain access to the site.[27]

  Kimley-Horn's evaluation indicates that the trips associated with all land uses are a mixture of primary and diverted-linked trips (as shown in Table 7); therefore, ENVIRON included this option for all land uses in the URBEMIS run. ENVIRON has conservatively estimated all non-primary trips as diverted-linked trips due to Kimley-Horn's land use evaluation.[28] This represents a conservative approach, since the Project is located in an urbanized area near existing residential areas and the 101 Highway, a major artery for traffic; therefore, it is expected some trips may be pass-by trips. The URBEMIS run outputs can be found in Attachment C.

Estimating Reduction in Emissions due to AB 1493 (Pavley Standard) for Mobile Sources

The URBEMIS output, in terms of projected emissions, was reduced based on the expected emission reductions due to the Pavley Standard noted above. This approach incorporates an adopted regulation that will be in effect by the time the Project is complete. Furthermore, BAAQMD considered the Pavley Standard in its support and justification for its proposed GHG significance thresholds.[29] A 20.25% reduction was applied to the estimated emissions generated by vehicles subject to the Pavley Standard, which is based on the expected reductions by 2020 (see Table 9).[30] The Pavley Standard will only apply to selected vehicle

[26] When the pass-by option is not selected, URBEMIS assumes all trips are primary trips.
[27] Jones and Stokes, 2007. Software User's Guide: URBEMIS2007 for Windows. Version 9.2. Pg 16. November.
[28] URBEMIS assumes that diverted-linked trip lengths are assumed to equal 25% of the primary trip length. If pass-by trips were accounted for, URBEMIS assumes these trips result in virtually no extra travel, with a trip length of 0.1 miles. Ref: URBEMIS2007 for Windows Users' Guide. Pg. 16. November 2007.
[29] BAAQMD, 2009. Revised Draft Options and Justifications Report. October. Note that the updated justification reports are not yet available.
[30] A 20.25% reduction in emissions was taken to account for the Pavley Standards for Classes 1-4 based on ARB 2008. California Air Resources Board (ARB). 2008b. Comparison of Greenhouse Gas Reductions For the United States and Canada Under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations.

classes, therefore, this analysis applies the expected reduction only to the emissions associated with the applicable vehicle classes. The percentage of emissions associated with vehicle classes subject to the Pavley Standard was calculated using emission factors and fleet mix data generated in EMFAC, as shown in Table 10. Based on this calculation, the reduction due to the Pavley Standard was applied to 88% of the Project's mobile emissions.

Mobile sources also emit CH_4, NO_2, and HFCs[31]. The USEPA recommends assuming that CH_4, N_2O and HFCs account for 5% of mobile source GHG emissions, taking into account their respective global warming potentials (GWP).[32] GWP indicates, on a pound for pound basis, how much a gas is predicted to contribute to global warming relative to how much warming would be predicted to be caused by the same mass of CO_2. CO_2 emissions for mobile sources were adjusted to account for non-CO_2 GHGs in order to estimate the total CO_2e emissions.

The estimated emissions for mobile sources are shown in Table 11. The Project's total mobile source emissions, accounting for the Project's sustainability, C/CAG Baseline TDM measures, and the Pavley Standard, are 8,236 tonnes CO_2e per year for the completed Project in 2020.

GHG Emissions Associated with Water Usage

Water and wastewater supply and treatment systems

The GHG emissions related to the energy used to convey, treat and distribute water and wastewater are primarily indirect emissions associated with the production of electricity to power these systems. Additional emissions from wastewater treatment include direct methane and nitrous oxide emissions from the wastewater.

The amount of electricity required to treat and supply water depends on the volume of water involved. KEMA's water and wastewater supply and treatment systems calculations (see Attachment A) show that the Project would generate a total water demand of 48.71 million gallons per year assuming a worst case water use scenario that corresponds to a 100% R&D use for all 694,669 square feet of office space and taking into account reductions due to water saving strategies. Note that the water use may be as low as 31.17 million gallons per year if the there is less R&D in the office. The water saving strategies in the Menlo Gateway project design include:

- Indoor potable water usage will be reduced through use of low-flow and high-efficiency plumbing fixtures, including showers, lavatories, toilets and sinks[33]; and
- Establishing an operational program to reduce water loss from water features by covering pools, adjusting fountain operating hours, and using a water treatment approach that reduces the need for draw down and replacement.
- Laundry equipment to capture and reuse rinse water; and
- Highly efficient irrigation systems and drought-resistant plantings.

Table 11. Available at: http://www.climatechange.ca.gov/publications/arb/ARB-1000-2008-012/ARB-1000-2008-012.PDF

[31] HFCs can be emitted from air conditioning systems.

[32] USEPA. 2005. *Emission Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle.* Office of Transportation and Air Quality. February. (http://www.epa.gov/otaq/climate/420f05004.pdf)

[33] Water savings from this strategy in the office buildings are not taken into account, so actual savings may be greater than assumed here. Menlo Gateway Energy and Water Estimates prepared by KEMA Services Inc. December 2009. Attachment A.

In addition, the proposed project eventually could improve upon baseline standards for water usage with the following strategy, formerly a mitigation measure in DEIR Table 1-1:

- Install infrastructure to deliver municipal reclaimed water to site so that it may be used should it become available in the future.

The entire water demand amount is assumed to be potable water supplied by Menlo Park Municipal Water District (MPMWD). Three processes are necessary to supply potable water to commercial users: (1) supply and conveyance of the water from the source; (2) treatment of the water to potable standards; and (3) distribution of the water to individual users.

Energy use for different aspects of water treatment (e.g. source water pumping and conveyance, water treatment, distribution to users) was determined using the stated volumes of water and energy intensities values (i.e., energy use per unit volume of water) provided by the 2005 report from the California Energy Commission (CEC).[34] Indirect emissions resulting from electricity use were determined by multiplying electricity use by the CO_2 emission factor provided by the local electricity supplier, PG&E.[35] The emission factors and GHG emissions for all these processes are shown in Table 12. The annual emissions from water treatment and distribution and wastewater treatment are approximately 50 tonnes CO_2e per year.

Assessment of the Project Level GHG Emissions Inventory

This section assesses the Project's consistency with the BAAQMD Draft CEQA Guidelines. ENVIRON has evaluated the Project level GHG emissions taking into account the GHG emission reductions attributable to the Project's sustainability and C/CAG Baseline TDM measures, as well as regulations promulgated to comply with AB 32, as discussed above.

As described above, the BAAQMD Guidelines include an efficiency-based metric which assesses the GHG emissions of a project relative to the service population of that project. The service population includes residents and employees. ENVIRON used the service population of 2,566 as calculated in Section 3.9 (Population and Housing) of the DEIR.[36] Accordingly, the Project level emissions inventory is 11,356 tonnes per year in 2020, or 4.43 tonnes per service population per year (see Table 13), which is below the BAAQMD draft threshold of 4.6 tonnes per service population per year for 2020 or later. Note that the emissions inventory reported here is the gross Project emissions inventory, and does not include the reduction of GHG emissions expected due to the removal of the existing structures at the Project site.

It should be noted, however, that if the Project were separated by hotel/restaurant/retail/fitness versus office structures, the hotel/restaurant/retail/fitness emission inventory alone would be approximately 13.70 tonnes per service population per year (See Table 14), which greatly exceeds the BAAQMD draft efficiency based threshold of 4.6 tonnes per service population per year. By way of comparison, the office emissions would be approximately 3.43 tonnes per service population per year (See Table 15), which falls well below the draft threshold. This dramatic difference between the hotel/restaurant/retail/fitness and office components of the Project is a consequence of the draft efficiency metric developed by BAAQMD, which excludes

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[34] California Energy Commission. November, 2005. California's Water-Energy Relationship. Final Staff Report. CEC-700-2005-101-SF. Accessed December, 2009. Available at: http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF
Energy intensity values are specific to Northern California.

[35] California Climate Action Registry (CCAR) Database. Los Angeles Department of Water and Power PUP Report. 2007.

[36] Section 3.9 of the DEIR. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/3-09-Pop-and-Housing.pdf

the hotel guests and retail/restaurant/fitness customers from the "service population" equation. Per the BAAQMD Draft Guidelines, "service population" is calculated by "adding the number of residents to the number of jobs estimated for a given point in time."[37] Therefore, even though the Project has committed to highly robust sustainability and TDM measures that substantially reduce the Project's GHG emissions inventory, the hotel/restaurant/retail/fitness by itself would exceed the draft BAAQMD efficiency threshold. Note that while hotel guests and customers are not included in the service population, emissions attributable to hotel guests and customers, such as those from vehicle trips and guest power use, are included in the inventory. ENVIRON believes that a more refined approach is necessary to fairly represent the hotel, restaurant, retail, and fitness facilities such as including hotel guests and customers or removing mobile emissions (trips) attributed to the hotel guests. Such approaches likely would result in an efficiency metric that more accurately assesses the hotel's emission inventory and would improve the Project's overall efficiency results to even further below the 4.6 tonnes per service population threshold. However, for purposes of this memorandum, ENVIRON has conservatively followed the BAAQMD draft guidelines in its analysis of the hotel, restaurant, retail, and fitness facilities.

This analysis includes the emission categories consistent with the BAAQMD Draft CEQA Guidelines. That is, the BAAQMD Draft CEQA Guidelines do not include solid waste emissions, per chapter 4.2 of the BAAQMD Draft CEQA Guidelines.[38] The analysis does include the emission reductions based on the Renewable Portfolio Standards for 2010 and Pavley Standards, which are appropriately applicable regulations as described by the BAAQMD Draft CEQA Guidelines (see page 4-7).

To be conservative, this analysis also evaluates the Project level emissions prior to 2020 since the Project could conceivably be completed as early as 2017. The evaluation of Project completion before 2020 affects the estimates of mobile emissions (See Table 16). For example, if the Project is completed by 2017, the mobile emissions initially may be higher due to a lesser reduction in vehicle emissions attributable to the Pavley Standard. The reduction due to the Pavley Standard is approximately 13.13% in 2017, compared to 20.25% in 2020. Table 17 shows the Project level emissions inventory assuming vehicle emission factors in 2017 and the anticipated reduction due to the Pavley Standard in 2017 (13.13%). Thus, if the Project were to be completed in 2017, the Project level emissions inventory would be 11,988 tonnes per year, or 4.67 tonnes per service population per year. This analysis shows that the Project level GHG emissions would be higher than the BAAQMD draft efficiency-based threshold of 4.6 tonnes per service population per year in 2017. However, in each subsequent year after 2017 there would be additional emission reductions due to the Pavley Standard. The Project emissions per service population would be lower each subsequent year after 2017 and would continue to decrease over time. As a result, by 2018, the Project would meet the BAAQMD 4.6 tonnes per service population per year threshold even without mitigation.

The Project level emissions inventory estimate is a conservative estimate for the Project since additional future state and regulatory developments are expected to result in even lower GHG emissions than those summarized here. Over the Project lifetime, the RPS standard is expected to further reduce the estimated emissions from electricity usage and vehicle fuel efficiency standards also are anticipated to further reduce vehicle emissions.

[37] BAAQMD, 2009. California Environmental Quality Act Guidelines. Pg 9-4. December.
[38] BAAQMD, 2009. California Environmental Quality Act Guidelines. Chapter 4.2. December.

Assessment of the Project's *Mitigated* GHG Emissions Inventory

For the Project to be below the draft BAAQMD efficiency threshold of 4.6 tonnes per service population per year, the emissions inventory cannot exceed 11,777 tonnes per year. If the Project is completed in 2017, the required emission reductions would be 211 tonnes.

For purposes of this analysis, ENVIRON assumed that the Project might achieve the required 211 tonnes reduction in 2017 by adopting the following additional TDM mitigation measures:

- Subsidized Transit Passes (total $3.50/day)[39]
- Subsidized Walk/Bike (total $1.00/day)

Kimley-Horn calculates that these TDM measures combined with the C/CAG Baseline TDM measures could reduce the expected Project trips by 14.6% (see Attachment B), sufficient to achieve the needed 1.8% reduction to the Project emissions inventory in 2017. The mitigated Project vehicle trips are summarized in Table 18. The 2017 *mitigated* Project mobile emissions are summarized in Table 19. ENVIRON's analysis of the mobile emissions based on this trip reduction percentage shows that the mobile emissions would be reduced to 8,653 tonnes per year in 2017. The mitigated Project emissions inventory would then be 11,773 tonnes per year in 2017, or 4.59 tonnes per service population in (see Table 20). Under this mitigation scenario, the Project would fall below the Draft BAAQMD efficiency threshold for 2017.

If the Project is completed between 2015 and 2017, the amount of trip reduction and level of emissions reduction necessary would gradually decrease until 2018 and subsequent years when the 4.6 tonnes per service population threshold is met without mitigation. See Table 21 for the estimated TDM reductions necessary to meet the draft BAAQMD efficiency threshold in years 2015-2017, assuming all mitigation would be met through mobile emission reductions.

The mitigation strategy outlined above is based on a potential Project completion date in 2017, while recognizing the possibility that the Project may be completed somewhere in the 2015-2017 period. If it becomes apparent that the Project is likely to be completed before 2018, conditions can be added to achieve the required trip reductions necessary to meet the draft BAAQMD efficiency threshold during the interval before 2018. For example, a condition could be added so that if the Project is completed in 2017, then the Project would be required to achieve the necessary trip reduction, for example, through additional TDM measures such as subsidies for transit and walk/bike.

Best Management Practices for Construction

As discussed above, the BAAQMD Draft CEQA guidelines do not have construction significance thresholds. However, the BAAQMD Draft CEQA guidelines recommend implementation of the following performance-based best management practices, as applicable or feasible:

- Alternative-fueled (e.g., biodiesel, electric) construction vehicles/equipment of at least 15 percent of the fleet;
- Local building materials of at least 10 percent;

[39] Monetary value represents 2010 dollars.

- Recycle at least 50 percent of construction waste or demolition materials; and,
- Construction equipment with diesel motors equipped with a catalyzed diesel particulate filter to the extent feasible.

The Project will reduce its construction emissions with feasible best management practices.

Applicable Project Design Features and Regulations Not Incorporated into the Analysis

The following are project design features and regulations that are not incorporated into the analysis, but are expected to further reduce the Project emissions inventory reported above.

- Emission reductions due to the heavy-duty vehicle GHG measure[40];
- Preferred space for share car programs such as Zipcar; and,
- Preferred space for electric car charging stations.

Concluding Comments

Please note that this analysis is based on the information provided to ENVIRON and the currently accepted methodology for such analyses. To the extent that information relied upon changes, ENVIRON's analyses and results may also change.

Sincerely,

Eric C Lu, MS, PE
Senior Manager

Shari Beth Libicki, PhD
Principal, Global Air Quality Practice Leader

ECL:py

cc: Justin Murphy, City of Menlo Park
David Bohannon, Bohannon Development Company

Attachments: Tables
A – KEMA Memo
B – Kimley-Horn Memo
C – URBEMIS Output
D – EMFAC Output

[40] California Air Resources Board. 2008. Public hearing to consider adoption of the regulation to reduce greenhouse gas emissions from heavy-duty vehicles, Appendix C: Emission Inventory Development - Analysis and Results. October. Available at: http://www.arb.ca.gov/regact/2008/ghghdv08/ghgisor.pdf.

List of Tables:

Table 1 – Emission Factors for Different Energy Sources
Table 2 – Emission Factors for CH_4 and N_2O
Table 3 – GHG Emissions from Renewables Portfolio Standards
Table 4 – GHG Emissions from Commercial Buildings – CO_2
Table 5 – GHG Emissions from Commercial Buildings - CH_4 and N_2O
Table 6 – Average Summer and Winter Temperature for Redwood City, CA
Table 7 – % of Trip Type for Land Uses
Table 8 – Trip Rates for Input into URBEMIS
Table 9 – Applicable Mobile Emissions Reductions for 2020 Vehicle Fleet
Table 10 – Percent of Vehicle Fleet Emissions for with Pavley Reduction can be Applied
Table 11 – GHG Emissions from Mobile Sources – 2020
Table 12 – GHG Emissions from Water Use
Table 13 – Comparison to BAAQMD Threshold – 2020
Table 14 - Comparison to BAAQMD Threshold – 2020 – “Hotel” Scenario
Table 15 – Comparison to BAAQMD Threshold – 2020 – “Office” Scenario
Table 16 – GHG Emissions from Mobile Sources – 2017 – Project Level
Table 17 – Comparison to BAAQMD Threshold – 2017 – Project Level
Table 18 – Trip Rates for Input into URBEMIS – 2017 – Mitigated
Table 19 - GHG Emissions from Mobile Sources – 2017 – Mitigated
Table 20 - Comparison to BAAQMD Threshold – 2017 – Mitigated
Table 21 – Reductions Needed in 2015-2017

TABLES

Table 1
Emission Factors for Different Energy Sources
Menlo Gateway Project
Menlo Park, CA

Energy Source	Scenario	Unit	Conversion Factor [lb CO_2/Unit]	Conversion Factor [tonne CO_2/Unit]
Electricity	2007 emission factor[1]	kWh	0.636	2.88E-04
	2010 RPS (20%)[2]		0.574	2.60E-04
Natural Gas[3]	-	kBTU	0.117	5.31E-05
	-	therm	11.698	5.31E-03

Notes:

1. Emission factor for electricity provided by PG&E for the year 2007, obtained from the California Climate Action Registry Database.
2. Emission factor for electricity has been adjusted to account for the 20% Renewables Portfolio Standard required of electricity providers by 2010.
3. Emission factor for natural gas obtained from California Climate Action Registry Reporting Protocol, Table C7.

Abbreviations:

CO_2 - carbon dioxide
kBTU - 1000 British thermal units
kWh - kilowatt-hour
lb - pound
PG&E - Pacific Gas and Electric
RPS - Renewables Portfolio Standard

Sources:

California Climate Action Registry 2009. General Reporting Protocol, Version 3.1. Accessed December, 2009. Available at: http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January2009.pdf

California Climate Action Registry. 2008. Database: Pacific Gas and Electric Company 2007 PUP Report. Accessed December, 2009. Available at: https://www.climateregistry.org/CARROT/public/Reports.aspx

Table 2
Emission Factors for CH_4 and N_2O
Menlo Gateway Project
Menlo Park, CA

Energy Source	Pollutant	Conversion Factor [g/MMBTU]	Conversion Factor [lb/MWh]	GWP	Unit	Conversion Factor[3,4] [lb CO_2e/Unit]	Conversion Factor [tonne CO_2e/Unit]
Electricity[1]	CH_4	--	0.029	21	kWh	6.09E-04	2.76E-07
	N_2O		0.011	310		3.41E-03	1.55E-06
Natural Gas[2]	CH_4	5	--	21	therm	2.31E-02	1.05E-05
	N_2O	0.1		310		6.83E-03	3.10E-06

Notes:

1. Electricity emission factors for CH_4 and N_2O are from ARB's Local Government Operations Protocol (LGOP), Version 1.0, subregion designation CAMX, WECC California, year 2004, as recommended in the BAAQMD Draft Guidelines.

2. Natural gas emission factors for CH_4 and N_2O are from ARB's Local Government Operations Protocol (LGOP), Version 1.0, Table G.3 for Commercial/Institutional end-use sector.

3. Emission factors from the LGOP have been converted to carbon dioxide equivalents by multiplying by their global warming potential (GWP).

4. Global warming potentials can be found in Appendix E, Table E.1 of ARB's Local Government Operations Protocol (LGOP), Version 1.0. As specified in Appendix E, Second Assessment Report (SAR) GWPs are still used by international convention and the United States, and are therefore used here.

Abbreviations:
ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
CEQA - California Environmental Qualtiy Act
CO_2 - carbon dioxide
CH_4 - methane
GWP - Global Warming Potential
N_2O - nitrous oxide
kBTU - 1000 British thermal units
kWh - kilowatt-hour
lb - pound
PG&E - Pacific Gas and Electric
RPS - Renewables Portfolio Standard

Sources:
ARB Local Government Operations Protocol, Version 1.0. Appendix G. Accessed December 2009. Available at:
http://www.arb.ca.gov/cc/protocols/localgov/pubs/final_lgo_protocol_2008-09-25.pdf

BAAQMD Draft CEQA Guidelines. December, 2009. Section 4.2. Available at:
http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

Table 3
GHG Emissions from Renewables Portfolio Standards
Menlo Gateway Project
Menlo Park, CA

Renewable Energy Source	Energy Delivered [million kWh]	Percentage of Renewable Energy Delivered[1] [%]
Wind	1,357	15%
Small hydro	1,900	21%
Biogas	0	0%
Solar	0	<1
Biomass	3,076	34%
Geothermal	2,714	30%
Total[2]	9,047	100%
% of Total Energy From Renewables[2]	11%	
% of Total Energy From Non-Renewables	89%	
Total Energy Delivery[3]	79,450,904	MWh
from renewables	9,047,125	MWh
from non-renewables	70,403,779	MWh
CO_2 Emissions per Total Energy Delivered	635.67	lbs CO_2/MWh delivered
Total CO_2 Emissions[4]	22,908,502	metric tonnes CO_2
CO_2 Emissions per Total Non-Renewable Energy[5]	717.36	lbs CO_2/MWh delivered
Estimated Emission Factors for Total Energy Delivered[6]		
2010 RPS (20%)	573.9	lbs CO_2/MWh delivered
2020 RPS (33%)	480.6	lbs CO_2/MWh delivered

Notes:

1. The renewable energy portfolio for Pacific Gas and Electric, the power utility that is most likely to provide power to the Menlo Gateway Development. The renewable energy distribution is based on 2007 data available at: http://www.pgecorp.com/corp_responsibility/reports/2007/environment/energy-future.html

2. The percent of total energy from renewables was calculated by taking the sum of renewable generation and dividing by the total from all generation sources as reported in the Pacific Gas and Electric's 2008 Annual Entity Emissions: Electric Power Generation/Electric Utility Sector for 2007 report. Available at: https://www.climateregistry.org/CARROT/public/Reports.aspx

3. Total energy value reported for 2007 by Pacific Gas and Electric in its 2008 Annual Entity Emissions: Electric Power Generation/Electric Utility Sector report. Available at: https://www.climateregistry.org/CARROT/public/Reports.aspx

4. The amount of CO2 emissions is provided in Pacific Gas and Electric's 2008 Annual Entity Emissions: Electric Power Generation/Electric Utility Sector for 2007 report. Available at: https://www.climateregistry.org/CARROT/public/Reports.aspx

5. The emissions metric presented here is calculated based on the total CO_2 emissions divided by the energy delivered from non-renewable sources.

6. The emission factors for total energy delivered are estimated by multiplying the percentage of energy delivered from non-renewable energy by the CO2 emissions per total non-renewable energy metric calculated above. Two emission factors are presented here for the current 20% RPS goal for 2010 and the presumed 33% RPS for 2020. The estimate provided here and the 2007 PUP report issued by Pacific gas and Electric assume that renewable energy sources do not result in any CO2 emissions. This is not necessarily true for biogas- and biomass-sourced energy but some consider these sources to be "carbon neutral."

Abbreviations:

CO_2 = carbon dioxide
kWh = kilowatt-hour
lbs = pounds
MWh = Megawatt-hour
PUP = Power/Utility Protocol
RPS = Renewables Portfolio Standard

Sources:

California Climate Action Registry. 2008. Database: Pacific Gas and Electric Company 2007 PUP Report. Available at: https://www.climateregistry.org/CARROT/public/Reports.aspx

Pacific Gas & Electric 2007 Corporate Respnsibility Report. Available at: http://www.pgecorp.com/corp_responsibility/reports/2007/environment/energy-future.html

Table 4
GHG Emissions from Commercial Buildings - CO_2
Menlo Gateway Project
Menlo Park, CA

Land Use	Annual Energy Use[1,2]			Conversion Factor	CO_2 Emissions
	Source	Quantity	Unit	(tonnes CO_2/unit)[3]	(tonnes CO_2/yr)[3]
Hotel and Health Club[4]	Electricity	1,677,756	kWh	2.60E-04	437
	Natural Gas	89,122	therms	5.31E-03	473
Independence (Office and Retail)	Electricity	1,811,600	kWh	2.60E-04	472
	Natural Gas	21,545	therms	5.31E-03	114
Constitution (Office with Café)[5]	Electricity	2,026,400	kWh	2.60E-04	527
	Natural Gas	32,398	therms	5.31E-03	172
Constitution (Office)	Electricity	2,016,700	kWh	2.60E-04	525
	Natural Gas	27,230	therms	5.31E-03	144
Garage A	Electricity	182,045	kWh	2.60E-04	47
	Natural Gas	--	therms	5.31E-03	--
Garage B	Electricity	208,854	kWh	2.60E-04	54
	Natural Gas	--	therms	5.31E-03	--
Garage C	Electricity	330,988	kWh	2.60E-04	86
	Natural Gas	--	therms	5.31E-03	--
				Total	**3,052**

Notes:

1. Annual Energy Use was provided by KEMA Services Inc. and can be found in Table 1-1 of Attachment A.

2. All buildings were modeled using eQuest software utilizing the DOE 2.2 engine, with energy consumption estimated based on the defaults from the Title 24 Alternative Compliance Manual and engineering experience. Model inputs and assumptions can be found in Attachment A. Garages A, B, and C include electricity use due to parking lighting.

3. CO_2 emissions are calculated assuming 20% of energy will be provided by renewables by the Project completion date. This is consistent with the 2010 Renewables Portfolio Standard.

4. The hotel includes a 6,947 square foot restaurant.

5. The Constitution office conservatively includes a 7,000 square foot café as a potential replacement of office space.

Abbreviations:

CO_2 - carbon dioxide
kWh - kilowatt hour
GHG - greenhouse gas
Sq.Ft. - square feet

Sources:

Menlo Gateway Energy and Water Estimates prepared by KEMA Services Inc. Attachment A.

Table 5
GHG Emissions from Commercial Buildings - CH_4 and N_2O
Menlo Gateway Project
Menlo Park, CA

Land Use	Source	Annual Energy Use[1,2]			Conversion Factor	CO_2e Emissions
		Source	Quantity	Unit	(tonnes CO_2/unit)[3]	(tonnes CO_2/yr)[3]
Hotel and Health Club[4]	Electricity	CH_4	1,677,756	kWh	2.76E-07	0.5
		N_2O			1.55E-06	2.6
	Natural Gas	CH_4	89,122	therm	1.05E-05	0.9
		N_2O			3.10E-06	0.3
Independence (Office and Retail)	Electricity	CH_4	1,811,600	kWh	2.76E-07	0.5
		N_2O			1.55E-06	2.8
	Natural Gas	CH_4	21,545	therm	1.05E-05	0.2
		N_2O			3.10E-06	0.1
Constitution (Office with Café)[5]	Electricity	CH_4	2,026,400	kWh	2.76E-07	0.6
		N_2O			1.55E-06	3.1
	Natural Gas	CH_4	32,398	therm	1.05E-05	0.3
		N_2O			3.10E-06	0.1
Constitution (Office)	Electricity	CH_4	2,016,700	kWh	2.76E-07	0.6
		N_2O			1.55E-06	3.1
	Natural Gas	CH_4	27,230	therm	1.05E-05	0.3
		N_2O			3.10E-06	0.1
Garage A	Electricity	CH_4	182,045	kWh	2.76E-07	0.1
		N_2O			1.55E-06	0.3
Garage B	Electricity	CH_4	208,854	kWh	2.76E-07	0.1
		N_2O			1.55E-06	0.3
Garage C	Electricity	CH_4	330,988	kWh	2.76E-07	0.1
		N_2O			1.55E-06	0.5
					Total	**17**

Notes:

1. Annual Energy Use was provided by KEMA Services Inc. and can be found in Table 1-1 of Attachment A.

2. All buildings were modeled using eQuest software utilizing the DOE 2.2 engine, with energy consumption estimated based on the defaults from the Title 24 Alternative Compliance Manual and engineering experience. Model inputs and assumptions can be found in Attachment A. Garages A, B, and C include electricity use due to parking lighting.

3. CO_2e emissions are calculated using emission factors for CH_4 and N_2O from ARB's Local Government Operations Protocol (LGOP), Version 1.0, as recommended in the BAAQMD Draft Guidelines. Global warming potentials can be found in Appendix E, Table E.1 of ARB's Local Government Operations Protocol (LGOP), Version 1.0. As specified in Appendix E, Second Assessment Report (SAR) GWPs are still used by international convention and the United States, and are therefore used here.

4. The hotel includes a 6,947 square foot restaurant.

5. The Constitution office conservatively includes a 7,000 square foot café as a potential replacement of office space.

Abbreviations:

ARB - California Air Resources Board
CO_2e - carbon dioxide equivalent
CH_4 - methane
GHG - greenhouse gas
GWP - Global Warming Potential
N_2O - nitrous oxide
kWh - kilowatt hour
Sq.Ft. - square feet

Sources:

ARB Local Government Operations Protocol, Version 1.0, Table G.6. Accessed December 2009. Available at:
http://www.arb.ca.gov/cc/protocols/localgov/pubs/final_lgo_protocol_2008-09-25.pdf

Menlo Gateway Energy and Water Estimates prepared by KEMA Services Inc. Attachment A.

Table 6

Average Summer and Winter Temperature for Redwood City, CA[1]
Menlo Gateway Project
Menlo Park, CA

Season	Average Max	Average Min	Overall Average[4]
	(^{o}F)		
Summer[2]	78.2	51.3	60
Winter[3]	64.0	42.8	50

Notes:

1. Redwood City (Station #047339) is the closest meteorological station to the Project site.

2. Summer includes April, May, June, July, August, and September.

3. Winter includes October, November, December, January, February, and March.

4. The overall average temperature of summer and winter are rounded to the nearest 10 degrees F as required for input into URBEMIS for "Ambient Summer" and "Ambient Winter" temperatures.

Abbreviations:

F- Fahrenheit

Sources:

Temperature Data for Redwood City (Station # 047339) is from Western Regional Climate Center (WRCC). Available at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7339

Table 7
% of Trip Type for Land Uses
Menlo Gateway Project
Menlo Park, CA

Land Use	Trip Source	% of Trip Source[1]	% of Trip Source with 10.6% TDM[2]	% of Trip Source with 14.6% TDM[3]	Trip Length (miles)[4]	Trip Type	% of Trip Type[5]
Hotel	Commercial Commute	5.0%	4.5%	4.3%	9.5	Primary	60%
	Commercial Non-work	2.5%	2.3%	2.2%	7.4	Diverted[6]	40%
	Commercial Customer	92.5%	93.2%	93.5%	7.4	Pass-by[7]	0%
Raquetball/health	Commercial Commute	5.0%	4.5%	4.3%	9.5	Primary	50%
	Commercial Non-work	2.5%	2.3%	2.2%	7.4	Diverted	50%
	Commercial Customer	92.5%	93.2%	93.5%	7.4	Pass-by	0%
Office Park	Commercial Commute	48.0%	46.5%	45.8%	9.5	Primary	80%
	Commercial Non-work	24.0%	23.2%	22.9%	7.4	Diverted	20%
	Commercial Customer	28.0%	30.3%	31.3%	7.4	Pass-by	0%
Quality Restaurant	Commercial Commute	8.0%	7.2%	7.0%	9.5	Primary	50%
	Commercial Non-work	4.0%	3.6%	3.5%	7.4	Diverted	50%
	Commercial Customer	88.0%	89.1%	89.6%	7.4	Pass-by	0%
Strip Mall	Commercial Commute	2.0%	1.8%	1.7%	9.5	Primary	45%
	Commercial Non-work	1.0%	0.9%	0.9%	7.4	Diverted	55%
	Commercial Customer	97.0%	97.3%	97.4%	7.4	Pass-by	0%

Notes:

1. Trip Source allocation is based on URBEMIS Guidance.

2. Trip Source allocation after commercial commute and commercial non-work trips have been reduced 10.6% (corresponding to the C/CAG Baseline). The commercial commute trip percentage should be entered into URBEMIS to replace the default worker commute trip percentage.

3. Trip Source allocation after commercial commute and commercial non-work trips have been reduced 14.6%. The commercial commute trip percentage should be entered into URBEMIS to replace the default worker commute trip percentage.

4. Trip length is based on URBEMIS default values for San Mateo County.

5. Trip Type allocation is based on URBEMIS defaults, with all pass-by trips counted as diverted trips (based on guidance provided by Kimley-Horn and Associates, Inc.).

6. URBEMIS assumes that diverted-link trips are equal to 25% of the primary trip length.

7. URBEMIS assumes that pass-by trips are virtually no extra travel, with a trip length of 0.1 miles.

Abbreviations:

URBEMIS - Urban Emissions Model

Sources:

Software User's Guide for URBEMIS2007 for Windows. Available at: http://www.urbemis.com/software/URBEMIS9%20Users%20Manual%20Main%20Body.pdf

Transportation Demand Management (TDM) Recommended Program Implementation and URBEMIS Application. Kimley-Horn and Associates, Inc. Attachment B.

Table 8
Trip Rates for Input into URBEMIS
Menlo Gateway Project
Menlo Park, CA

URBEMIS Land Use Designation	Unadjusted Daily trips[1]	% Reduction Due to Internal Capture[2]	Daily Trips Adjusted for Internal Capture[2]	% Commercial Commute Trips[3]	% Commercial Non-work Trips[3]	% Reduction Due to Project Features[4]	Effective % Reduction Due to Project Features[5]	Daily Trips Adjusted for Project Features	Unit	Land Use Value[6]	Trips/Unit[7]
Hotel	1,879	18.1%	1,539	5.0%	2.5%	10.6%	0.8%	1,527	rooms	230	6.64
Raquetball/health	2,517	20.7%	1,997	5.0%	2.5%	10.6%	0.8%	1,981	1,000 sq. ft.	69.47	28.52
Office Park	7,649	1.8%	7,511	48.0%	24.0%	10.6%	7.6%	6,938	1,000 sq. ft.	694.67	9.99
Quality Restaurant	625	42.5%	359	8.0%	4.0%	10.6%	1.3%	355	1,000 sq. ft.	6.95	51.08
Strip Mall	462	0.0%	462	2.0%	1.0%	10.6%	0.3%	461	1,000 sq. ft.	10.42	44.20
Total	13,132	9.6%	11,869	--	--	--	5.1%	11,261	--	--	--

Notes:

1. Unadjusted daily trips were provided by DKS Associates in Section 3.11 of the DEIR.

2. Daily trips adjusted for internal capture include an overall 9.6% reduction to account for internal capture due to the mix of uses in the development. The strip mall has been conservatively assumed to have no reduction of trips due to internal capture. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B.

3. The percent commercial commute and commercial non-work trips can be found for each land use in Table 7 and are based on URBEMIS guidance.

4. A 10.6% reduction in trips due to project features (corresponds to C/CAG baseline in Attachment B) has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($1/day); subsidized walk/bike ($1/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B.

5. The effective reduction due to project features is based on the percent reduction due to the project features applied to the percent commercial commute and commercial non-work trips for each land use. The overall effective reduction due to the project features is 5.1%.

6. The land use values represent the maximum area or number of rooms for each land use (units can be found in the units column). These values can be found in Table 2-1 of Section 2.1 (Project Description) of the DEIR.

7. Trips/Unit are entered into URBEMIS to replace the default trip rates.

Abbreviations:
sq. ft. - square feet
EIR - Environmental Impact Report
URBEMIS - Urban Emissions Model

Sources:

Draft EIR for Menlo Gateway Project. July, 2009. Appendix J, Summary Report. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/Appendix-J-TDM-Plan.pdf

Draft EIR for Menlo Gateway Project. July, 2009. Section 2.1, Project Description. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/2-Project-Description.pdf

Draft EIR for Menlo Gateway Project. July, 2009. Section 3.11, Traffic and Circulation. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/3-11-Traffic-and-Circulation.pdf

Transportation Demand Management (TDM) Recommended Program Implementation and URBEMIS Application. Kimley-Horn and Associates, Inc. Attachment B.

Table 9
Applicable Mobile Emission Reductions for 2020 Vehicle Fleet
Menlo Gateway Project
Menlo Park, CA

Vehicle Class	Abbreviation	Description	Weight Class (lbs)	Applicable Reductions[1]	Percent of Vehicle Class for which Reductions Apply[1]	Emission Reduction[1] (%)
1	LDA	Light-Duty Automobile	All	Pavley Standards	100%	20.25%
2	LDT1	Light-Duty Trucks	0-3750	Pavley Standards	100%	20.25%
3	LDT2	Light-Duty Trucks	3751-5750	Pavley Standards	100%	20.25%
4	MDV	Medium-Duty Trucks	5751-8500	Pavley Standards	100%	20.25%
5	LHD1	Light-Heavy-Duty	8501-10,000	--	--	0
6	LHD2	Light-Heavy-Duty	10,001-14,000	--	--	0
7	MHD	Medium-Heavy-Duty	14,001-33,000	--	--	0
8	HHD	Heavy-Heavy-Duty	33,001-60,000	--	--	0
9	OBUS	Other Buses	All	--	--	0
10	UBUS	Urban Buses	All	--	--	0
11	MCY	Motorcycles	All	--	--	0
12	SBUS	School Buses	All	--	--	0
13	MH	Motor Homes	All	--	--	0

Notes:
1. A 20.25% reduction in emissions due to Pavley Standards applies to vehicle classes 1-4 in 2020 based on a Pavley reduction assessment performed by ARB in 2008.

Abbreviations:
ARB - California Air Resources Board
lbs - pounds

Sources:
California Air Resources Board (ARB). 2008. Comparison of Greenhouse Gas Reductions For the United States and Canada Under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations. Table 11. Available at: http://www.climatechange.ca.gov/publications/arb/ARB-1000-2008-012/ARB-1000-2008-012.PDF

Table 10
Percent of Vehicle Fleet Emissions for which Pavley Reduction can be Applied
Menlo Gateway Project
Menlo Park, CA

Running Emissions[1]					
Vehicle Class	**EF - Grams/Mile[2] (35 mph)**	**% VMT[3]**	**Grams/Mile Adjusted[4]**	**% Emissions[5]**	**% Vehicle Emissions with Pavley Reduction[6]**
1	303.6	55.8%	169.4	45.0%	**88%**
2	381.8	12.6%	48.1	12.8%	
3	387.0	20.4%	79.0	20.9%	
4	527.0	6.5%	34.3	9.1%	
5	502.2	0.8%	4.0	1.1%	
6	508.1	0.6%	3.0	0.8%	
7	1332.1	1.6%	21.3	5.7%	
8	1737.8	0.3%	5.2	1.4%	
9	1278.2	0.2%	2.6	0.7%	
10	2076.1	0.4%	8.3	2.2%	
11	138.3	0.8%	1.1	0.3%	
12	1290.9	0.0%	0.0	0.0%	
13	608.4	0.1%	0.6	0.2%	
Starting Emissions[1]					
Vehicle Class	**EF - Grams/Trip[7] (720 min)**	**% Trip[8]**	**Grams/Trip Adjusted[9]**	**% Emissions[10]**	**% Vehicle Emissions with Pavley Reduction[6]**
1	204.5	55.0%	112.5	48.2%	**89%**
2	255.2	10.9%	27.8	11.9%	
3	260.3	17.9%	46.6	20.0%	
4	354.3	5.6%	19.8	8.5%	
5	399.4	3.1%	12.4	5.3%	
6	347.6	2.0%	7.0	3.0%	
7	130.2	4.1%	5.3	2.3%	
8	300.9	0.1%	0.3	0.1%	
9	180.6	0.4%	0.7	0.3%	
10	98.9	0.0%	0.0	0.0%	
11	84.8	0.8%	0.7	0.3%	
12	93.6	0.0%	0.0	0.0%	
13	390.1	0.0%	0.0	0.0%	

Notes:

1. The running and starting emission factors are based on EMFAC for the year 2020 in San Mateo County, with an average temperature of 55 degrees Fahrenheit and 74% relative humidity.

2. The running emission factor (in grams/mile) for vehicle classes 1-13, travelling at 35 mph (the URBEMIS default trip speed).

3. The percent of vehicle miles travelled for vehicle classes 1-13.

4. The running emission factor adjusted to reflect the percent of vehicles miles travelled by each vehicle class. [Grams/Mile Adjusted = Grams/Mile x % VMT.]

5. The contribution of running emissions from each vehicle class based on the adjusted running emission factors.
6. The Pavley reduction applies to emissions from vehicle classes 1-4 as seen in Table 9.
7. The starting emission factor (in grams/trip) for vehicle classes 1-13, assuming 720 minutes between each start-up.
8. The percent of trips taken for vehicle classes 1-13.

9. The starting emission factor adjusted to reflect the percent of trips taken by each vehicle class. [Grams/Trip Adjusted = Grams/Trip x % Trip.]

10. The contribution of starting emissions from each vehicle class based on the adjusted starting emission factors.

Abbreviations:
EF - Emission Factor
EMFAC - EMission FACtor model
URBEMIS - Urban Emissions Model
VMT - Vehicle Miles Traveled

Sources:

Temperature Data for Redwood City (Station # 047339) is from Western Regional Climate Center (WRCC). Available at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7339

Humidity data for San Francisco from Western Regional Climate Center (WRCC). Available at: http://www.wrcc.dri.edu/summary/lcd.html

Table 11
GHG Emissions from Mobile Sources - 2020
Menlo Gateway Project
Menlo Park, CA

Scenario	URBEMIS Output			Pavley Reduction[3]	% Vehicle Emissions With Pavley Reduction[4]	Tonnes CO_2e With Reduction[5]
	(tons CO_2/yr)	(tonnes CO_2/yr)	(tonnes CO_2e/yr)[2]			
Project[1]	10,488	9,515	10,016	20.25%	88%	8,236
					Total	8,236

Notes:

1. All land uses include an overall 9.6% reduction in trip rates due to internal capture which accounts for the mix of uses in the development. A 10.6% reduction in trips rates has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($1/day); subsidized walk/bike ($1/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B. Based on guidance provided by Kimley-Horn & Associates, Inc., primary and diverted trips (with all pass-by trips conservatively counted as diverted trips) were accounted for in all land uses. A 20.25% reduction was applied to 88% of the vehicle fleet emissions due to Pavley Reductions.

2. $CO_2e=CO_2/0.95$: The United States Environmental Protection Agency (USEPA) recommends assuming that CH_4, N_2O, and HFCs are 5% of emissions on a CO2e basis.

3. A 20.25% reduction in emissions due to Pavley Standards applies to vehicle classes 1-4 based on a Pavley reduction assessment performed by ARB in 2008.

4. The percent of vehicle emissions applicable to Pavley reductions includes vehicle classes 1-4 and can be found in Table 10. The percent of vehicle running emissions applicable to the Pavley reduction is used because running emissions account for the majority of vehicle emissions and this is a conservative approach.

5. Tonnes CO2e for the project reduces 88% of the emissions by 20.25% to account for Pavley Standards.

Abbreviations:

ARB - California Air Resources Board
GHG - greenhouse gas
URBEMIS - Urban Emissions Model

Sources:

California Air Resources Board (ARB). 2008. Comparison of Greenhouse Gas Reductions For the United States and Canada Under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations.

Transportation Demand Management (TDM) Recommended Program Implementation and URBEMIS Application. Kimley-Horn and Associates, Inc. Attachment B.

Table 12
GHG Emissions from Water Use
Menlo Gateway Project
Menlo Park, CA

Source	Energy Requirements[1]	Units	Conversion Factor[2]	Units	Emission Factor[2]	Units	Water Demand[3]	Units	Total CO_2e Emissions	Units
Water Conveyance[4]	1,450	kWh/Mgal	2.62E-04	tonne CO_2e/kWh	0.38	tonne CO_2e/Mgal	48.71	Mgal/yr	18.5	tonne CO_2e/yr
Wastewater Treatment[5]	2,500	kWh/Mgal	2.62E-04	tonne CO_2e/kWh	0.66	tonne CO_2e/Mgal	48.71	Mgal/yr	31.9	tonne CO_2e/yr
								Total	**50**	tonne CO_2e/yr

Notes:

1. Energy Requirements for water and wastewater are based on a CEC (2005) study, as recommended in the BAAQMD Draft CEQA Guidelines.

2. Emission Factor based on 2010 RPS electricity emission factor as well as CH_4 and N_2O emission factors from ARB's Local Government Operations Protocol (LGOP), Version 1.0.

3. The Project water demand was provided by KEMA Services Inc. and has conservatively assumed the worst case water use scenario corresponding to 100% R&D space for 694,669 square feet. The following water saving strategies are included: low-flow and high-efficiency plumbing fixtures, including showers, lavatories, toilets, and sinks; covering pools; adjusting fountain operating hours; using a water treatment approach that reduces the need for draw down and replacement; laundry equipment to capture and reuse rinse water; highly efficient irrigation systems; drought resistant plantings; and installing infrastructure to deliver municipal reclaimed water to site so that it may be used should it become available in the future. The water demand for each land use and details of water saving strategies can be found in Attachment A.

4. The energy requirement for water conveyance is based on information provided in CEC 2005, specific to Northern California, and includes water supply and conveyance, treatment, and distribution.

5. The energy requirement for wastewater treatment is based on information provided in CEC 2005, specific to Northern California. All potable water demand was assumed to be wastewater.

Abbreviations:

CEC - California Energy Commission
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
kW-hr - kilowatt hour
Mgal - million gallons
RPS - Renewables Portfolio Standard
yr - year

Sources:

ARB Local Government Operations Protocol, Version 1.0, Table G.6. Accessed December 2009. Available at: http://www.arb.ca.gov/cc/protocols/localgov/pubs/final_lgo_protocol_2008-09-25.pdf

California Energy Commission. November, 2005. California's Water-Energy Relationship. Final Staff Report. CEC-700-2005-101-SF. Accessed December, 2009. Available at: http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF

Menlo Gateway Energy and Water Estimates prepared by KEMA Services Inc. Attachment A.

BAAQMD Draft CEQA Guidelines. December, 2009. Section 4.2. Available at: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

Table 13
Comparison to BAAQMD Threshold - 2020
Menlo Gateway Project
Menlo Park, CA

Source	Project (tonnes CO_2e/yr)
Commercial Buildings[1]	3,070
Mobile[2]	8,236
Water[3]	50
Total	11,356
Service Population[4]	2,566
Tonne CO_2e/SP	4.43
Less than Threshold?[5]	YES

Notes:

1. Commercial Building emissions were calculated using building energy use developed by KEMA and applying the 2010 RPS emission factor for electricity and the natural gas emission factor obtained from California Climate Action Registry Reporting Protocol, Table C7. CH_4 and N_2O emissions from electricity and natural gas, coverted to CO_2e, are also included, as recommended in the BAAQMD Draft CEQA Guidelines.

2. Mobile emissions were calculated using URBEMIS with an overall 9.6% reduction in trip rates due to internal capture which accounts for the mix of uses in the development. A 10.6% reduction in trips rates has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($1/day); subsidized walk/bike ($1/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B. Based on guidance provided by Kimley-Horn & Associates, Inc., primary and diverted trips (with all pass-by trips conservatively counted as diverted trips) were accounted for in all land uses. A 20.25% reduction was applied to 88% of the vehicle fleet emissions due to Pavley Reductions.

3. Water emissions were calculated using CEC 2005 energy requirement factors for Northern California and the water demand incorporates the following water saving strategies: low-flow and high-efficiency plumbing fixtures, including showers, lavatories, toilets, and sinks; covering pools; adjusting fountain operating hours; using a water treatment approach that reduces the need for draw down and replacement; laundry equipment to capture and reuse rinse water; highly efficient irrigation systems; drought resistant plantings; and installing infrastructure to deliver municipal reclaimed water to site so that it may be used should it become available in the future.

4. Service population is from Section 3.9 (Population and Housing) of the DEIR.

5. The BAAQMD Draft CEQA Guidelines published December, 2009 specifies a 4.6 MT CO_2e/SP/yr threshold of significance for GHGs - Projects other than Stationary Sources.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CEQA - California Environmental Qualtiy Act
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
MT - metric ton
SP - service population
SF - San Francisco
URBEMIS - Urban Emissions Model
yr - year

Sources:

BAAQMD Draft CEQA Guidelines. December, 2009. Available at: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

Draft EIR for Menlo Gateway Project. July, 2009. Section 3.9, Population and Housing. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/3-09-Pop-and-Housing.pdf

Table 14
Comparison to BAAQMD Threshold - 2020 - "Hotel" Scenario
Menlo Gateway Project
Menlo Park, CA

Source	Hotel[1] (tonnes CO_2e/yr)
Commercial Buildings[2]	943
Mobile[3]	2,445
Water[4]	22
Total	3,411
Service Population[5]	249
Tonne CO_2e/SP	13.70
Less than Threshold?[6]	NO

Notes:

1. The "Hotel" scenario includes all emissions as a result of the hotel, restaurant, retail, and fitness facilities.

2. Commercial Building emissions were calculated using building energy use developed by KEMA and applying the 2010 RPS emission factor for electricity and the natural gas emission factor obtained from California Climate Action Registry Reporting Protocol, Table C7. CH_4 and N_2O emissions from electricity and natural gas, coverted to CO_2e, are also included, as recommended in the BAAQMD Draft CEQA Guidelines. Building energy use for the restaurant and retail facilites were calculated by scaling the Independence office and retail energy use with the ratio of (Retail square footage)/(Independence Office + Retail square footage) and adding this to the hotel/health club energy use (which includes the restaurant).

3. Mobile emissions were calculated using URBEMIS with an overall 9.6% reduction in trip rates due to internal capture which accounts for the mix of uses in the development. A 10.6% reduction in trips rates has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($1/day); subsidized walk/bike ($1/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B. Based on guidance provided by Kimley-Horn & Associates, Inc., primary and diverted trips (with all pass-by trips conservatively counted as diverted trips) were accounted for in all land uses. A 20.25% reduction was applied to 88% of the vehicle fleet emissions due to Pavley Reductions.

4. Water emissions were calculated using CEC 2005 energy requirement factors for Northern California and the water demand incorporates the following water saving strategies: low-flow and high-efficiency plumbing fixtures, including showers, lavatories, toilets, and sinks; covering pools; adjusting fountain operating hours; using a water treatment approach that reduces the need for draw down and replacement; laundry equipment to capture and reuse rinse water; highly efficient irrigation systems; drought resistant plantings; and installing infrastructure to deliver municipal reclaimed water to site so that it may be used should it become available in the future. Water demand for the restaurant and retail facilites were calculated by scaling the Independence office and retail water demand with the ratio of (Retail square footage)/(Independence Office + Retail square footage) and adding this to the hotel/health club water demand (which includes the restaurant).

5. Service population is from Section 3.9 (Population and Housing) of the DEIR.

6. The BAAQMD Draft CEQA Guidelines published December, 2009 specifies a 4.6 MT CO_2e/SP/yr threshold of significance for GHGs - Projects other than Stationary Sources.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CEQA - California Environmental Qualtiy Act
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
MT - metric ton
SP - service population
SF - San Francisco
URBEMIS - Urban Emissions Model
yr - year

Sources:

BAAQMD Draft CEQA Guidelines. December, 2009. Available at: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

Draft EIR for Menlo Gateway Project. July, 2009. Appendix F, Table I-1, Housing Needs Analysis. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/Appendix-F-HNA.pdf

Table 15
Comparison to BAAQMD Threshold - 2020 - "Office" Scenario
Menlo Gateway Project
Menlo Park, CA

Source	Office[1] (tonnes CO_2e/yr)
Commercial Buildings[2]	2,127
Mobile[3]	5,790
Water[4]	28
Total	7,945
Service Population[5]	2,317
Tonne CO_2e/SP	3.43
Less than Threshold?[6]	YES

Notes:

1. The "Office" scenario includes all emissions as a result of the office facilities only. The Constitution office conservatively includes a 7,000 square foot café as a potential replacement of office space.

2. Commercial Building emissions were calculated using building energy use developed by KEMA and applying the 2010 RPS emission factor for electricity and the natural gas emission factor obtained from California Climate Action Registry Reporting Protocol, Table C7. CH_4 and N_2O emissions from electricity and natural gas, coverted to CO_2e, are also included, as recommended in the BAAQMD Draft CEQA Guidelines. Building energy use for the office was calculated by scaling the Independence office and retail energy use with the ratio of (Independence Office square footage)/(Independence Office + Retail square footage) and adding this to the Constitution office energy use. The emissions due to the parking garages were conservatively added to this scenario.

3. Mobile emissions were calculated using URBEMIS with an overall 9.6% reduction in trip rates due to internal capture which accounts for the mix of uses in the development. A 10.6% reduction in trips rates has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($1/day); subsidized walk/bike ($1/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B. Based on guidance provided by Kimley-Horn & Associates, Inc., primary and diverted trips (with all pass-by trips conservatively counted as diverted trips) were accounted for in all land uses. A 20.25% reduction was applied to 88% of the vehicle fleet emissions due to Pavley Reductions.

4. Water emissions were calculated using CEC 2005 energy requirement factors for Northern California and the water demand incorporates the following water saving strategies:low-flow and high-efficiency plumbing fixtures, including showers, lavatories, toilets, and sinks; covering pools; adjusting fountain operating hours; using a water treatment approach that reduces the need for draw down and replacement; laundry equipment to capture and reuse rinse water; highly efficient irrigation systems; drought resistant plantings; and installing infrastructure to deliver municipal reclaimed water to site so that it may be used should it become available in the future. Water demand for the office was calculated by scaling the Independence office and retail water demand with the ratio of (Independence Office square footage)/(Independence Office + Retail square footage) and adding this to the Constitution office water demand.

5. Service population is from Section 3.9 (Population and Housing) of the DEIR.

6. The BAAQMD Draft CEQA Guidelines published December, 2009 specifies a 4.6 MT CO_2e/SP/yr threshold of significance for GHGs - Projects other than Stationary Sources.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CEQA - California Environmental Qualtiy Act
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
MT - metric ton
SP - service population
SF - San Francisco
URBEMIS - Urban Emissions Model
yr - year

Sources:

BAAQMD Draft CEQA Guidelines. December, 2009. Available at: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

Draft EIR for Menlo Gateway Project. July, 2009. Appendix F, Table I-1, Housing Needs Analysis. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/Appendix-F-HNA.pdf

Table 16
GHG Emissions from Mobile Sources - 2017 - Project Level
Menlo Gateway Project
Menlo Park, CA

Scenario	URBEMIS Output			Pavley Reduction[3]	% Vehicle Emissions With Pavley Reduction[4]	Tonnes CO_2e With Reduction[5]
	(tons CO_2/yr)	(tonnes CO_2/yr)	(tonnes CO_2e/yr)[2]			
Project[1]	10,496	9,522	10,023	13.13%	88%	8,868
					Total	8,868

Notes:

1. All land uses include an overall 9.6% reduction in trip rates due to internal capture which accounts for the mix of uses in the development. A 10.6% reduction in trips rates has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($1/day); subsidized walk/bike ($1/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B. Based on guidance provided by Kimley-Horn & Associates, Inc., primary and diverted trips (with all pass-by trips conservatively counted as diverted trips) were accounted for in all land uses. A 13.13% reduction was applied to 88% of the vehicle fleet emissions due to Pavley Reductions.

2. $CO_2e=CO_2/0.95$: The United States Environmental Protection Agency (USEPA) recommends assuming that CH_4, N_2O, and HFCs are 5% of emissions on a CO2e basis.

3. A 13.13% reduction in emissions due to Pavley Standards applies to vehicle classes 1-4 based on a Pavley reduction assessment performed by ARB in 2008.

4. The percent of vehicle emissions applicable to Pavley reductions includes vehicle classes 1-4 and can be found in Table 10. The percent of vehicle running emissions applicable to the Pavley reduction is used because running emissions account for the majority of vehicle emissions and this is a conservative approach.

5. Tonnes CO2e for the project reduces 88% of the emissions by 13.13% to account for Pavley Standards.

Abbreviations:
ARB - California Air Resources Board
GHG - greenhouse gas
URBEMIS - Urban Emissions Model

Sources:

California Air Resources Board (ARB). 2008. Comparison of Greenhouse Gas Reductions For the United States and Canada Under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations.

Transportation Demand Management (TDM) Recommended Program Implementation and URBEMIS Application. Kimley-Horn and Associates, Inc. Attachment B.

Table 17
Comparison to BAAQMD Threshold - 2017 - Project Level
Menlo Gateway Project
Menlo Park, CA

Source	Project (tonnes CO_2e/yr)
Commercial Buildings[1]	3,070
Mobile[2]	8,868
Water[3]	50
Total	11,988
Service Population[4]	2,566
Tonne CO_2e/SP	4.67
Less than Threshold?[5]	NO

Notes:

1. Commercial Building emissions were calculated using building energy use developed by KEMA and applying the 2010 RPS emission factor for electricity and the natural gas emission factor obtained from California Climate Action Registry Reporting Protocol, Table C7. CH_4 and N_2O emissions from electricity and natural gas, coverted to CO_2e, are also included, as recommended in the BAAQMD Draft CEQA Guidelines.

2. Mobile emissions were calculated using URBEMIS with an overall 9.6% reduction in trip rates due to internal capture which accounts for the mix of uses in the development. A 10.6% reduction in trips rates has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($1/day); subsidized walk/bike ($1/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B. Based on guidance provided by Kimley-Horn & Associates, Inc., primary and diverted trips (with all pass-by trips conservatively counted as diverted trips) were accounted for in all land uses. A 13.13% reduction was applied to 88% of the vehicle fleet emissions due to Pavley Reductions.

3. Water emissions were calculated using CEC 2005 energy requirement factors for Northern California and the water demand incorporates the following water saving strategies: low-flow and high-efficiency plumbing fixtures, including showers, lavatories, toilets, and sinks; covering pools; adjusting fountain operating hours; using a water treatment approach that reduces the need for draw down and replacement; laundry equipment to capture and reuse rinse water; highly efficient irrigation systems; drought resistant plantings; and installing infrastructure to deliver municipal reclaimed water to site so that it may be used should it become available in the future.

4. Service population is from Section 3.9 (Population and Housing) of the DEIR.

5. The BAAQMD Draft CEQA Guidelines published December, 2009 specifies a 4.6 MT CO_2e/SP/yr threshold of significance for GHGs - Projects other than Stationary Sources.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CEQA - California Environmental Qualtiy Act
CO_2e - carbon dioxide equivalent
GHG - greenhouse gas
MT - metric ton
SP - service population
SF - San Francisco
URBEMIS - Urban Emissions Model
yr - year

Sources:

BAAQMD Draft CEQA Guidelines. December, 2009. Available at: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

Draft EIR for Menlo Gateway Project. July, 2009. Section 3.9, Population and Housing. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/3-09-Pop-and-Housing.pdf

Table 18
Trip Rates for Input into URBEMIS - 2017 - Mitigated
Menlo Gateway Project
Menlo Park, CA

URBEMIS Land Use Designation	Unadjusted Daily trips[1]	% Reduction Due to Internal Capture[2]	Daily Trips Adjusted for Internal Capture[2]	% Commercial Commute Trips[3]	% Commercial Non-work Trips[3]	% Reduction Due to Project Features[4]	% Reduction Due to Additional TDM[5]	Effective % Reduction Due to Project Features and Additonal TDM[6]	Daily Trips Adjusted for TDM	Unit	Land Use Value[7]	Trips/Unit[8]
Hotel	1,879	18.1%	1,539	5.0%	2.5%	10.6%	4.0%	1.1%	1,522	rooms	230	6.62
Raquetball/health	2,517	20.7%	1,997	5.0%	2.5%	10.6%	4.0%	1.1%	1,975	1,000 sq. ft.	69.47	28.44
Office Park	7,649	1.8%	7,511	48.0%	24.0%	10.6%	4.0%	10.5%	6,721	1,000 sq. ft.	694.67	9.68
Quality Restaurant	625	42.5%	359	8.0%	4.0%	10.6%	4.0%	1.8%	353	1,000 sq. ft.	6.95	50.83
Strip Mall	462	0.0%	462	2.0%	1.0%	10.6%	4.0%	0.4%	460	1,000 sq. ft.	10.42	44.14
Total	13,132	9.6%	11,869	--	--	--	--	7.0%	11,032	--	--	--

Notes:

1. Unadjusted daily trips were provided by DKS Associates in Section 3.11 of the DEIR.

2. Daily trips adjusted for internal capture include an overall 9.6% reduction to account for internal capture due to the mix of uses in the development. The strip mall has been conservatively assumed to have no reduction of trips due to internal capture. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B.

3. The percent commercial commute and commercial non-work trips can be found for each land use in Table 7 and are based on URBEMIS guidance.

4. A 10.6% reduction in trips due to project features (corresponds to C/CAG baseline in Attachment B) has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($1/day); subsidized walk/bike ($1/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B.

5. An additional 4.0% reduction in trips due to additional TDM (for a total trip reduction of 14.6%) has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for subsized transit passes increased to $3.50/day. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B.

6. The effective reduction due to project features and additional TDM is based on the percent reduction due to the project features and additional TDM applied to the percent commercial commute and commercial non-work trips for each land use. The overall effective reduction due to the project features is 7.0%.

7. The land use values represent the maximum area or number of rooms for each land use (units can be found in the units column). These values can be found in Table 2-1 of Section 2.1 (Project Description) of the DEIR.

8. Trips/Unit are entered into URBEMIS to replace the default trip rates.

Abbreviations:

sq. ft. - square feet
EIR - Environmental Impact Report
TDM - Transportation Demand Management
URBEMIS - Urban Emissions Model

Sources:

Draft EIR for Menlo Gateway Project. July, 2009. Appendix J, Summary Report. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/Appendix-J-TDM-Plan.pdf

Draft EIR for Menlo Gateway Project. July, 2009. Section 2.1, Project Description. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/2-Project-Description.pdf

Draft EIR for Menlo Gateway Project. July, 2009. Section 3.11, Traffic and Circulation. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/3-11-Traffic-and-Circulation.pdf

Transportation Demand Management (TDM) Recommended Program Implementation and URBEMIS Application. Kimley-Horn and Associates, Inc. Attachment B.

Table 19
GHG Emissions from Mobile Sources - 2017 - Mitigated
Menlo Gateway Project
Menlo Park, CA

Scenario	URBEMIS Output			Pavley Reduction[3]	% Vehicle Emissions With Pavley Reduction[4]	Tonnes CO_2e With Reduction[5]
	(tons CO_2/yr)	(tonnes CO_2/yr)	(tonnes CO_2e/yr)[2]			
Project[1]	10,242	9,292	9,781	13.13%	88%	8,653
					Total	8,653

Notes:

1. All land uses include an overall 9.6% reduction in trip rates due to internal capture which accounts for the mix of uses in the development. A 14.6% reduction in trips rates has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($3.50/day); subsidized walk/bike ($1.00/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B. Based on guidance provided by Kimley-Horn & Associates, Inc., primary and diverted trips (with all pass-by trips conservatively counted as diverted trips) were accounted for in all land uses. A 13.13% reduction was applied to 88% of the vehicle fleet emissions due to Pavley Reductions.

2. $CO_2e=CO_2/0.95$: The United States Environmental Protection Agency (USEPA) recommends assuming that CH_4, N_2O, and HFCs are 5% of emissions on a CO2e basis.

3. A 13.13% reduction in emissions due to Pavley Standards applies to vehicle classes 1-4 based on a Pavley reduction assessment performed by ARB in 2008

4. The percent of vehicle emissions applicable to Pavley reductions includes vehicle classes 1-4 and can be found in Table 10. The percent of vehicle running emissions applicable to the Pavley reduction is used because running emissions account for the majority of vehicle emissions and this is a conservative approach.

5. Tonnes CO2e for the project reduces 88% of the emissions by 13.13% to account for Pavley Standards.

Abbreviations:
ARB - California Air Resources Board
GHG - greenhouse gas
URBEMIS - Urban Emissions Model

Sources:

California Air Resources Board (ARB). 2008. Comparison of Greenhouse Gas Reductions For the United States and Canada Under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations.

Transportation Demand Management (TDM) Recommended Program Implementation and URBEMIS Application. Kimley-Horn and Associates, Inc. Attachment B.

Table 20
Comparison to BAAQMD Threshold - 2017 - Mitigated
Menlo Gateway Project
Menlo Park, CA

Source	Project (tonnes CO_2e/yr)
Commercial Buildings[1]	3,070
Mobile[2]	8,653
Water[3]	50
Total	11,773
Service Population[4]	2,566
Tonne CO_2e/SP	4.59
Less than Threshold?[5]	YES

Notes:

1. Commercial Building emissions were calculated using building energy use developed by KEMA and applying the 2010 RPS emission factor for electricity and the natural gas emission factor obtained from California Climate Action Registry Reporting Protocol, Table C7. CH_4 and N_2O emissions from electricity and natural gas, coverted to CO_2e, are also included, as recommended in the BAAQMD Draft CEQA Guidelines.

2. Mobile emissions were calculated using URBEMIS with an overall 9.6% reduction in trip rates due to internal capture which accounts for the mix of uses in the development. A 14.6% reduction in trips rates has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($3.50/day); subsidized walk/bike ($1.00/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B. Based on guidance provided by Kimley-Horn & Associates, Inc., primary and diverted trips (with all pass-by trips conservatively counted as diverted trips) were accounted for in all land uses. A 13.13% reduction was applied to 88% of the vehicle fleet emissions due to Pavley Reductions.

3. Water emissions were calculated using CEC 2005 energy requirement factors for Northern California and the water demand incorporates the following water saving strategies: low-flow and high-efficiency plumbing fixtures, including showers, lavatories, toilets, and sinks; covering pools; adjusting fountain operating hours; using a water treatment approach that reduces the need for draw down and replacement; laundry equipment to capture and reuse rinse water; highly efficient irrigation systems; drought resistant plantings; and installing infrastructure to deliver municipal reclaimed water to site so that it may be used should it become available in the future.

4. Service population is from Section 3.9 (Population and Housing) of the DEIR.

5. The BAAQMD Draft CEQA Guidelines published December, 2009 specifies a 4.6 MT CO_2e/SP/yr threshold of significance for GHGs - Projects other than Stationary Sources.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CEQA - California Environmental Qualtiy Act
CO_2e - carbon dioxide equivalent
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MT - metric ton
SP - service population
SF - San Francisco
URBEMIS - Urban Emissions Model
yr - year

Sources:

BAAQMD Draft CEQA Guidelines. December, 2009. Available at: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

Draft EIR for Menlo Gateway Project. July, 2009. Section 3.9, Population and Housing. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/3-09-Pop-and-Housing.pdf

Table 21
Reductions Needed in 2015-2017
Menlo Gateway Project
Menlo Park, CA

Year	% Pavley Reduction[1]	Mobile Inventory (with C/CAG Baseline)[2]	Project Inventory	Trip Reduction Due to Project Features (C/CAG Baseline)[3]	Target Inventory[4]	Remaining Reduction[5]	Target Mobile Inventory[6]	Additional Trip Reduction to Reach Target Inventory[7]	Total Trip Reduction to Reach Target Inventory[8]
		(tonnes CO_2e)			(tonnes CO_2e)				
2015	9.05%	9,237	12,357	10.6%	11,777	580	8,657	10.3%	20.9%
2016	10.97%	9,063	12,183	10.6%	11,777	406	8,657	7.2%	17.8%
2017	13.13%	8,868	11,988	10.6%	11,777	211	8,657	3.7%	14.3%
2018	15.51%	8,657	11,777	10.6%	11,777	0	8,657	--	10.6%
2019	17.92%	8,444	11,564	10.6%	11,777	-213	8,657	--	10.6%
2020	20.25%	8,236	11,356	10.6%	11,777	-421	8,657	--	10.6%

Notes:

1. The Pavley reduction increases each year due to lower emissions standards. Pavley reductions for each year were calculated by following the same method as performed by ARB in their 2008 assessment comparing Pavley and Café Standards. EMFAC was run for the year in consideration for a state-wide average to develop baseline values as shown in Table 11 of the ARB assessment. To calculate the reductions for each year, the baseline values were multiplied by the percent GHG reductions shown in Table 11 (originally from Table 4) of the ARB assessment. The total reduction is then divided by the baseline value to achieve an effective percent reduction due to the Pavley Standards.

2. The mobile inventory (with C/CAG baseline) decreases each year due to a more fuel efficient vehicle fleet, since there are fewer older vehicles on the road and there is more time to implement the Pavley standards.

3. A 10.6% reduction in trips due to project features (corresponds to C/CAG baseline in Attachment B) has been applied to commercial commute and commercial non-work trips only (based on guidance provided by Kimley-Horn and Associates, Inc.) to account for bike lockers and racks; showers and changing areas; enhanced shuttles to Menlo Park station; new shuttles to Redwood City Station; subsized transit passes ($1/day); subsidized walk/bike ($1/day); preferential car/van pool parking; van pool program; guaranteed ride home; commute assistance center; compressed work week; and flexible work hours. Trip reduction esimates are provided by Kimley-Horn and Associates, Inc. and can be found in Attachment B.

4. The target inventory is calculated by multiplying 4.59 by the service population from the DEIR (2,566).

5. The remaining reduction is the emission reduction necessary to meet the 4.6 tonnes per service population threshold proposed in the BAAQMD Draft CEQA Guidelines.

6. The target mobile inventory is calculated by applying the remaining reduction to the mobile inventory (with C/CAG Baseline).

7. The additional trip reduction (beyond the C/CAG baseline) to reach the target inventory assuming the remaining reduction for each year will be achieved through mobile reductions only. This trip reduction is only applied to commercial commute and commercial non-work trips. The project inventory for 2018-2020 is below the target inventory, therefore no additional trip reduction is necessary.

8. The total trip reduction is the sum of the trip reduction due to project features (C/CAG baseline) and the additional trip reduction needed to reach the target inventory (achieved through additional transportation demand management measures). Since the project inventory for years 2018-2020 is below the target inventory, the total reduction is equal to the reduction due to project features (C/CAG baseline).

Sources:

Draft EIR for Menlo Gateway Project. July, 2009. Section 3.9, Population and Housing. Available at: http://www.menlopark.org/departments/pln/bohannon/DEIR/3-09-Pop-and-Housing.pdf

California Air Resources Board (ARB). 2008. Comparison of Greenhouse Gas Reductions For the United States and Canada Under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations. Available at: http://www.climatechange.ca.gov/publications/arb/ARB-1000-2008-012/ARB-1000-2008-012.PDF

A T T A C H M E N T A

KEMA Memo

Menlo Gateway: Energy and Water Use Estimates

March 18, 2010

1. Overview

Menlo Gateway will employ energy and water efficient design, equipment and management techniques with the goal of reducing overall energy consumption and potable water needs of the site contributing toward the ultimate goal of reducing site related greenhouse gas emissions. Tables 1-1 and 1-2 below summarize the annual utility consumption for both the "baseline case" and Menlo Gateway as currently designed. All values are for the new project only and do not include any assumptions or corrections for the consumption of the existing buildings on-site that will be demolished as part of the Menlo Gateway project.

Table 1-1
Annual Energy Conservation

	Proposed Campus			Standard Campus			Savings
Building	**Electricity (kWh/yr)**	**Natural Gas (Therms)**	**Total Energy (kBtu/yr)**	**Electricity (kWh/yr)**	**Natural Gas (Therms)**	**Total Energy (kBtu/yr)**	**Energy (%)**
Hotel and Healthclub	1,677,756	89,122	14,636,703	2,086,508	107,050	17,824,165	18%
Independence Office and Retail	1,811,600	21,545	8,335,679	2,148,300	32,217	10,551,700	21%
Constitution Office w/ Cafe	2,026,400	32,398	10,153,877	2,363,600	48,615	12,926,103	21%
Constitution Office	2,016,700	27,230	9,603,980	2,370,500	43,926	12,480,746	23%
Garage A	182,045	0	621,138	364,090	0	1,242,276	50%
Garage B	208,854	0	712,610	417,708	0	1,425,221	50%
Garage C	330,988	0	1,129,331	661,976	0	2,258,661	50%
Total	8,254,343	170,295	45,193,319	10,412,682	231,808	58,708,871	23%

Table 1-2
Annual Water Conservation

Water (gallons/yr.)			
Building	**Design**	**Baseline**	**Savings**
Hotel and Healthclub	21,657,806	27,922,247	22%
Independence Office and Retail	2,310,360	3,026,920	24%
Constitution Office w/ Cafe	3,710,209	4,797,311	23%
Constitution Office	3,493,057	5,602,820	38%
Total	31,171,432	41,349,298	25%

Table 1-3 summarizes the usage type and area breakdown for the analysis.

Table 1-3
Space Use Assumptions

Hotel	173,667	s.f.
Health Club	69,467	s.f.
Restaurant in hotel	6,947	s.f.
Office	694,669	s.f.
Retail/Community Facilities	10,420	s.f.
Outdoor Rec. Water Features	28,379	c.f
Irrigated Landscape	6.8	acres
Café*	7,000	s.f.

*Energy and water impacts added this consumption to the total.
Please note that this is not additional square footage, but would replace office if employed.

Additional information about the calculation methodology, inputs and assumptions behind these calculations are provided in Sections 2 and 3 below.

2. Energy Saving Measures, Inputs and Assumptions

The Project has committed to making all commercial buildings exceed the standard in effect when projects are submitted for permitting. Currently that standard is the 2008 Title 24 Energy Code Standards, which the Project exceeds by more than 23%. The overall minimization of energy usage will be achieved through implementation of the energy efficient features listed in the Draft EIR Table 3.13-6. These design elements have been incorporated into energy models created for each building. Features of the Project include:

- LEED Certification. Project commits to achieving LEED Gold for the Office Buildings and to achieving LEED Silver for the Hotel;
- Energy Efficiency. Exceed the energy efficiency of similar, conventionally designed structures built to the standards of California's Title 24 energy code. The Project, as currently modeled, has an aggregate (electricity plus natural gas) energy performance margin of 23% energy savings. Energy performance is a result of these design elements:
    - → Cool Roof. The proposed project will specify 100% cool roofs for the office building and hotel;
    - → Buildings are oriented favorably to optimize heating and cooling efficiency, and incorporate natural ventilation where appropriate;
    - → Building envelope is designed with high performance glazing, wall and roof assemblies. Significant shading of windows is integrated into design on east, south and west facades;
    - → Glazing in all buildings required to be low thermal conductivity, double paned and thermally broken framed. Selected glazing exceeds performance of standard "high performance" glazing.
    - → Heat Island Effect. Parking lots are not immediately adjacent to buildings, which reduces heat island effect. Parking lots and hardscape will be at least 50% shaded with tree canopy. Hardscape will be light colored (reflective) paving;
    - → Heat recovery strategies will be employed with hotel laundry and cooking equipment for reuse in HVAC or other appropriate heat recovery technology;
    - → Lighting power density of 0.80 Watts per square foot and daylighting controls in all applicable Tenant Improvement (TI) office spaces;
    - → Building controls systems in all buildings, such as digital controls that monitor the building's lighting, mechanical (heating and cooling) and ventilation systems for purposes of managing energy consumption;
    - → LED outdoor lighting (formerly a mitigation measure in the DEIR);

→ High performance 0.5 kW per ton chillers;

→ Variable speed cooling towers, air-handlers, and pumps; and

→ High performance boilers (minimum 85% efficiency).

Per our understanding, emissions and energy use estimates provided in the DEIR were based on the South Coast Air Quality Management District (SCAQMD) CEQA handbook of 1993 as data source. These numbers in the DEIR overstate energy consumption especially for projects like this one that are specifically designed from inception to be "green", LEED certified, and targeting high energy performance.

All direct electricity and natural gas consuming elements of the project buildings are included in the energy model. This includes energy used by the site lighting and in the parking garages. Pool heating and pumping loads are included in the hotel and health club figures in Table 1-1.

The energy use numbers presented in this memo are based on state-of-the-art energy modeling programs and models based on project-specific components, design, and performance specifications. The energy savings are estimated by constructing "baseline" buildings meeting the minimum requirements of the 2008 version of the Title 24 standard, which was adopted for use on January 1, 2010 and will remain in effect for at least 3 years until the next version (2011) is adopted (January 2013 at the earliest). At this time, the 2008 standards provide the most stringent and accurate modeling protocols in existence.

The energy models have been constructed in the eQuest software program utilizing the DOE 2.2 engine. eQuest is an industry-standard energy modeling software program developed by the Department of Energy and Lawrence Berkeley National Laboratory. It takes into account site location, climate data, building envelope design characteristics, and mechanical, electrical and hot water system design elements. The resulting report is an accurate characterization of annual energy usage of the proposed building. Please see the eQuest website http://www.doe2.com/eQuest/ for further information.

The early architectural drawings from the EIR provided the basis of the model's form. Energy consumption was estimated based on the defaults from the Title 24 Alternative

Compliance Manual (which includes process loads: e.g. elevators) and engineering experience.

Table 2-1 below lists the modeling inputs and assumptions that were used to generate the estimates in Table 1-1. A more detailed list of inputs for each building can be found in Appendix A.

Table 2-1: Energy Model Parameters

Scenario	Baseline	Current Design
Building Description		
Building Floor Area (sf)	Independence= 200,000 Constitution Bldgs= 242,000/252,000 Hotel / Healthclub= 245,000	Independence= 200,000 Constitution Bldgs= 242,000/252,000 Hotel / Healthclub= 245,001
Climate Zone	3	3
Number of Stories	Office Bldgs.= 8 Hotel= 11	Office Bldgs.= 8 Hotel= 11
Utility Rate Schedules	Electric- PG&E R19	Electric- PG&E R19
	Gas- PG&E GNR-1	Gas- PG&E GNR-1
Vertical Glazing % of Wall		
North	Constitution Bldgs =40% Independence= 32% Hotel / Healthclub= 31%	Constitution Bldgs =42% Independence= 32% Hotel / Healthclub= 31%
East	Constitution Bldgs =39% Independence= 27% Hotel / Healthclub= 14%	Constitution Bldgs =39% Independence= 27% Hotel / Healthclub= 14%
South	Constitution Bldgs =40% Independence= 27% Hotel / Healthclub= 27%	Constitution Bldgs =41% Independence= 27% Hotel / Healthclub= 27%
West	Constitution Bldgs =40% Independence= 31% Hotel / Healthclub= 25%	Constitution Bldgs =42% Independence= 31% Hotel / Healthclub= 25%
Fenestrations		
Windows / Glazing Type	T24 Minimum Compliant Glass Table 143-A	Virocon 6-67 or Solarban product NFRC Rated
U-Value	Offices= 0.77; hotel rms= 0.47	0.32
Solar Heat Gain Coefficient (SHGC) Non-North	Offices= 0.41; hotel rms= 0.31	0.31
Solar Heat Gain Coefficient (SHGC) North	Offices= 0.61; hotel rms= 0.61	0.31
Frame Type	n/a	Aluminum w/o thermal break

Envelope Constructions		
Exterior Wall Construction	T24 Minimum Compliant Table 143-A	Metal Frame with spandrel glass
Insulation	n/a	R -19 batt insulation
Maximum Assembly U-Value	Office= 0.082; Hotel= 0.105	
Roof Construction	Metal framed	Built-up Roof
Insulation	n/a	R-38
Total U-Value	0.039	0.053
Floor Construction	Concrete slab on grade	Concrete slab on grade
Internal Gains		
Peak Lighting Power Density (W/sf)	T24 Table146-F Office = 0.90; Retail= 1.0 Dining= 0.8; Kitchen= 1.2 Hotel= 1.5; Exercise= 1.0 Guest Rms.= 0.5; Garage= 2.0	Office = 0.80; Retail= 1.3 Dining= 0.80; Kitchen= 1.2 Hotel= 0.80; Exercise= 0.85 Guest Rms.= 0.5; Garage= 1.0
Lighting Controls	Daylighting and Occupancy controls in spaces mandatory by code	Daylighting and Occupancy controls in spaces mandatory by code
Office / Misc Equipment (W/sf)	T24 Table N2-5 Office = 1.34; Retail = 1.0 Dining = 0.5; Kitchen= 1.5	T24 Table N2-5 Office = 1.34; Retail = 1.0 Dining = 0.5; Kitchen= 1.5
Daylighting Controls	Yes	Yes
HVAC Systems		
Cooling Type	Central VAV with Gas fired reheat	1. Chilled Water VAV with hot water reheat at zone 2. Hotel rooms served by 4-pipe fancoil system
Cooling System	Chilled Water	Chilled Water
Cooling Efficiency	T24 Table 112-D 6.10 COP; 0.576 kW/ton	7.03 COP; 0.500 kW/ton Variable speed drives
Heating System	Hot Water Boiler	Hot Water Boiler
Heating Efficiency	0.80 Thermal Eff	0.85 Thermal Eff
Fan System	VAV	VAV
Fan Efficiency	Standard	Premium
Air-side Economizer	Diff Temperature	Diff Temperature
Minimum Outdoor Air	15 cfm/pp or 0.15 cfm/sf	15 cfm/pp or 0.15 cfm/sf
Heating Setpoints (ºF)	70	70
Cooling Setpoint (ºF)	72	72
Demand Control Ventilation	In Mandatory spaces	In Mandatory spaces
Evaporative Pre Cooling	No	No
Displacement Ventilation	No	No
Cooling Tower Drive	2-speed	Variable Speed Drives
Chilled Water primary pumps	No Chiller	Constant Speed
Chilled Water secondary pumps	Variable Speed Drives	Variable Speed Drives
Condenser Water pumps	Constant Speed	Constant Speed
Hot Water pumps	Constant speed	Variable Speed Drives
Heating Supply Reset (Y/N)	No	Yes
Cooling Supply Reset (Y/N)	No	Yes

3. Water Saving Measures, Inputs and Assumptions

Menlo Gateway will employ highly efficient water use and management techniques with the goal of reducing overall potable water needs of the site. This section maps the differential water savings between Menlo Gateway and a baseline case for a project of similar size and scope.

Water use patterns, unlike energy use, are dependent on a project's occupancy and the behavior of those occupants. A project is assumed to consume water differently based on each use type.

The overall minimization of water usage will be achieved through implementation of the landscaping and indoor water efficiency features listed in the DEIR Table 3.13-6, which have been incorporated into both the proposed Project and the water supply assessment models:

- Landscape irrigation water requirements less than traditional systems through water efficient irrigation systems and drought-resistant plantings.
- Establishing an operational program to reduce water loss from water features by covering pools, adjusting fountain operating hours, and using a water treatment approach in the cooling towers that reduces the need for draw down and replacement.
- Indoor potable water usage will be reduced through use of low-flow and high-efficiency plumbing fixtures, including showers, lavatories, toilets and sinks[1].
- Laundry equipment to capture and reuse rinse water.

In addition, the proposed project provides the ability to improve upon baseline standard for water usage with the following strategy, formerly a mitigation measure in DEIR Table 1-1:

- Install infrastructure to deliver municipal reclaimed water to site so that it may be used should it become available in the future.

[1] Please note that water savings from these strategies in the office buildings are not reflected in Table 1, so actual savings are expected to be greater than what is shown herein.

3.1. Water Demand by Space Type

In general, the following water demand figures in Table 3-0 are the same as what was provided in the Draft Water Supply Assessment dated June 2009. However, in three cases, staff and the consultant decided that more conservative baseline estimates were appropriate and these changes are noted in the table.

Table 3-0. Proposed Site Data and Water Demands

		Site Data		Demand Factor	
A	Hotel* (w/ Restaurant & Laundry)	230	rooms	160	gpd/room
B	Office	694,669	s.f.	0.053	gpd/s.f.
C	Café	7,000	s.f.	0.57	gpd/s.f.
D	Retail/Community Facilities	10,420	s.f.	0.1	gpd/s.f.
E	Health Club	69,467	s.f.	0.488	gpd/s.f.
F	R&D	-	s.f.	0.155	gpd/s.f.
G	Outdoor Rec. Water Features*	28,379	c.f.	0.061	gpd/c.f.
H	Irrigated Landscape*	6.8	acres	1.6	ft/s.f./yr

*WSA demand factor has been updated.

References

A Hotel Water Conservation: A Seattle Demonstration. July 2002. Seattle Public Utilities.
B Based on 400 s.f. per employee, 30 gpd/employee, 260 days/yr
C Mazzetti & Associates, June 2005 for Palo Alto Medical Foundation-
San Carlos Center Water Demand Study. Sutter Health Foundation.
D Billings, R. Bruce and C. Vaughn Jones, 1996. Forecasting Urban Water Demand.
E Water use at 40,000 s.f. California Fitness Center, 2004. Daily consumption of approx.
19,500 gallons. Mazzetti & Associates, June 2005 for Palo Alto Medical Foundation.
F Cal Water South San Francisco Service area median water demands for R&D users.
G Based on Water Supply Assessment (DEIR App. G). See Appendix E.
H Based on LEED water efficient irrigation calculations. See Appendix D.

Since the Baseline data is calculated using per hotel room and per building and site area average water consumption the savings measures herein are weighed against those figures using industry standards, usage studies and other relevant research. KEMA identified appropriate measures for project inclusion by evaluating specific water conservation measures using publicly available and privately held calculators, such as the LEED® water use reduction methodology, however those calculations are not included in this report as they are not directly comparable to the baseline standards.

The Draft Water Supply Assessment dated June 2009 does reference the “Indoor Plumbing Fixture Memo” provided by KEMA and dated June 17, 2009. This memo summarizes only the indoor plumbing fixtures and potential savings from those specific fixtures, but does not

include HVAC, process water, outdoor recreation or irrigation water needs. For reference, this document is available in Appendix B. Some fixture assumptions have changed since the June 17, 2009 memo. All fixture performance assumptions made herein are correct.

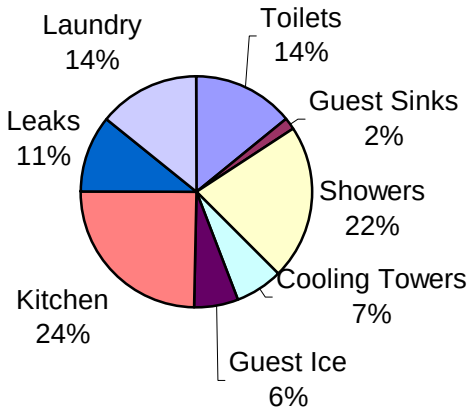
3.2. Water Savings by Space Type

For the purposes of evaluating conservation and efficiency measures, each impacted use type will be examined individually.

Hotel

Water use in hotels is especially behaviorally driven, however there are many equipment efficiency upgrades that can greatly impact overall water use reduction. Based on the Seattle study[2] cited to establish the baseline usage in the Water Supply Assessment, the following chart represents a typical breakdown of hotel water use for facilities with restaurants and laundries.

Figure 3A: Hotel Water Use Breakdown



High efficiency toilets, low-flow showers and low-flow lavatory faucets will be included as part of the project's design. Also, the cooling towers will be designed and operated more efficiently than standard allowing water circulation cycles to double. The Water Efficiency

[2] "Hotel Water Conservation: A Seattle Demonstration". July 2002. Seattle Public Utilities.

Guide[3] published by the Australian government shows an average of 45% water savings from this measure. A 30% water savings of cooling tower blowdown is assumed here to take into consideration local climate. Table 3-1 shows the resulting savings of each of these measures individually for a cumulative savings of 18%.

The project plans to use laundry equipment that captures the "greywater" from the last rinse of every load of laundry and use it for the first rinse of the next load. Based on the typical equipment used in these kinds of commercial facilities and a study by the City of Ventura[4] it is assumed that 4 rinse cycles per load is typical, thus resulting in a ¼ (25%) reduction in water use.

Table 3-1: Hotel Project Measures

	Baseline Use	Design Use	Percent Savings	% of Guest Room Use	Weighted Savings
High Efficiency Toilets (gpf)	1.6	1.28	20%	14%	3%
Low Flow Showers (gpm)	2.5	2	20%	22%	4%
Lavatory Faucets (gpm)	2.5	0.5	80%	2%	2%
Reuse Water from 1 Laundry Rinse Cycle			25%	14%	4%
Double Cooling Tower Circulation[2] (cycles)			30%	7%	2%
					14%

This savings is then applied to the baseline to estimate the total gallons saved per year.

Table 3-2: Hotel Water Savings

	Site Data		Demand Factor		Baseline Ave gpd	Est. Savings	Design Ave gpd	Days/ Year	Annual Water Consumption Baseline (gallons)	Annual Water Consumption Design (gallons)
Hotel	230	rooms	160	gpd/room^	36,800	14%	31,607	365	13,432,000	11,536,701

Health Club

As there are no comprehensive studies available that show the breakdown of water use components in a health club, it has been assumed that the usage profile is the same as an average hotel. As such the water use breakdown summarized in Figure 3B is based on an average of the hotels in the Seattle study[5]. The same technologies are being employed in this portion of the facility.

[3] Water Efficiency Guide: Office and Public Buildings. Australian Government, Department of the Environment and Heritage. October 2006. http://www.environment.gov.au/settlements/publications/government/pubs/water-efficiency-guide.pdf

[4] *Water/Energy Conservation Study—Doubletree Hotel*, Black & Veatch for the City of Ventura, California, May 1992.

[5] "Hotel Water Conservation: A Seattle Demonstration". July 2002. Seattle Public Utilities.

Figure 3B. Health Club Water Use Breakdown

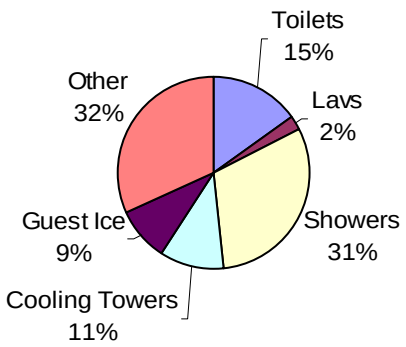


Table 3-3: Health Club Project Measures

	Baseline Use	Design Use	Percent Savings	% of Health Club Use	Weighted Savings
High Efficiency Toilets (gpf)	1.6	1.28	20%	15%	3%
Low Flow Showers (gpm)	2.5	1.0	60%	31%	19%
Lavatory Faucets (gpm)	2.5	0.5	80%	2%	2%
Double Cooling Tower Circulation[2] (cycles)			30%	11%	3%
					27%

This savings is then applied to the baseline to estimate the total gallons saved per year.

Table 3-4: Health Club (ClubSport) Water Savings

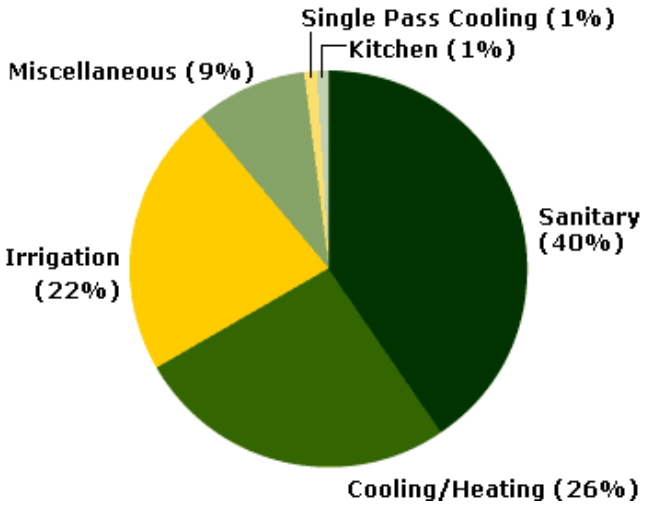
	Site Data		Demand Factor		Baseline Ave gpd	Est. Savings	Design Ave gpd	Days per Year	Annual Water Consumption Baseline (gallons)	Annual Water Consumption Design (gallons)
ClubSport	69,467	s.f.	0.488	gpd/s.f.	33,900	27%	24,747	365	12,373,462	9,032,627

Office

In an office building, cooling towers and domestic water consumption (noted as sanitary below and inclusive of sinks, showers, and toilets) are again the major culprits of water use. Figure 3B from the U.S. Environmental Protection Agency[6] illustrates the water consumption in a typical office building.

[6] US Environmental Protection Agency. http://www.epa.gov/oaintrnt/water/lab_vs_office.htm

Figure 3B: Typical Office Water Use



Using the breakdown of use types identified in Table 2-1, and assuming that the cooling/heating category is all cooling towers and the sanitary category is 2/3 (67%) water closets (of which 1/6 (11%) are urinals and 5/6 (56%) are toilets), 1/12 (8%) showers and 1/4 (25%) faucets, the savings are anticipated using the same technologies employed at the hotel. The estimated impact of these measures is summarized in Table 3-5.

Table 3-5: Office Project Measures

	Baseline Use	Design Use	Percent Savings	% of Category	% of Office Use	Weighted Savings
High Efficiency Toilets (gpf)	1.6	1.28	20%	56%	40%	4%
High Efficiency Urinals (gpf)*	1.5	0.125	92%	11%	40%	4%
Low Flow Showers (gpm)	2.5	1.0	60%	8%	40%	2%
Lavatory Faucets (gpm)	2.5	0.5	80%	25%	40%	8%
Double Cooling Tower Circulation[2] (cycles)			30%	100%	26%	8%
						26%

*Urinals are assumed to be 1/6 of daily uses (toilets+urinals)

This savings is then applied to the baseline to estimate the total gallons saved per year in Table 3-6.

Table 3-6: Office Water Savings

	Site Data		Demand Factor		Baseline Ave gpd	Est. Savings	Design Ave gpd	Days/ Year	Annual Water Consumption Baseline (gallons)	Annual Water Consumption Design (gallons)
Independence Site										
Independ. Office	200,000	s.f.	0.053	gpd/s.f.	10,600	26%	7,844	260	2,756,000	2,039,440
Constitution Office 1	242,450	s.f.	0.053	gpd/s.f.	12,850	26%	9,509	260	3,340,961	2,472,311
Constitution Office 2	252,219	s.f.	0.053	gpd/s.f.	13,368	26%	9,892	260	3,475,578	2,571,928

Restaurant/Café

According to North Carolina Department of Environment and Natural Resources Division of Pollution Prevention and Environmental Assistance, water efficient devices and employee education in restaurants can result in a 29% savings in water consumption. Further, the Seattle hotel study cited above, suggests a series of efficiency measures which when combined result in roughly 15% savings. To be conservative, a 15% reduction is assumed based on efficiency measures alone which will include low-flow pre-rinse spray nozzles, and Energy Star Rated dishwashers and ice machines.

Table 3-7: Cafe Project Measures

	Percent Savings	% of Restaurant/ Cafe Use	Weighted Savings
High Efficiency Dishwashing Equipment	15%	50%	8%
Double Cooling Tower Circulation[2] (cycles)	30%	26%	8%
Ice Making, Food Prep, Other	0%	24%	0%
			15%

Applying this 15% savings to the baseline consumption results in total gallons per year estimated savings for the café as summarized in Table 3-8.

Table 3-8: Cafe Water Savings

	Site Data		Demand Factor		Baseline Ave gpd	Est. Savings	Design Ave gpd	Days per Year	Annual Water Consumption Baseline (gallons)	Annual Water Consumption Design (gallons)
Café	7,000	s.f.	0.57	gpd/s.f.	3,990	15%	3,392	365	1,456,350	1,237,898

Retail/Community Facilities

While similar equipment efficiency measures will be implemented in the retail portion of the project, the overall impact is very small so it has been excluded from this report.

Outdoor Recreational Water Features

A 2001 study shows that pool covers and smart operating strategies can reduce swimming pool water use by 30%[7], which is reflected in Table 3-9: Outdoor Water Features.

Table 3-9: Outdoor Water Features

	Percent Savings	Annual Water Consumption	
		Baseline (gallons)	Design (gallons)
Pools[6]	30%	631,125	441,788
Other	0%	1,900	1,900
		633,025	443,687

Irrigation

Irrigation water demand will be reduced through the use of low water use plant species, a highly efficiency water delivery system, and weather-based smart controllers. At this time, a rainwater collection system has not been included due to the amount of water storage needed and the seasonal nature of precipitation in the region.

Please note that the Draft Water Supply Assessment dated June 2009 uses the Leadership in Energy and Environmental Design (commonly referred to as LEED®) water efficient landscaping methodology. The irrigation demand for both baseline and design are summarized in Table 3-10 below, but full calculations can be found in Appendix D of this document. It should also be noted that the plant palette has not yet been finalized, but the design estimate assume average (or moderate) water consuming plant species for 80% of the palette and only 20% of low water consuming species to estimate water savings conservatively. Design will comply with the City Landscaping Ordinance currently in draft. If adopted ordinance requires less water, project design will be adjusted accordingly.

Table 3-10: Summary of Irrigation Calculations

	Site Data (acres)	Extrapolated Baseline ft/s.f./yr	Extrapolated Design ft/s.f./yr	Annual Water Consumption	
				Baseline (gallons)	Design (gallons)
Independence Irrigation	2.8	1.6	0.6	1,489,070	586,173
Constitution Irrigation	4	1.6	0.6	2,127,242	837,391
				3,616,312	1,423,564

[7] *Maddaus*, L.A., & P.W. *Mayer*. *2001*. Splash or Sprinkler? Comparing Water Use of Swimming Pools and Irrigated Landscapes. AWWA Annual Conference Proceedings.

Water Efficiency Summary

Through the use of efficient equipment and operational procedures it is anticipated that the Menlo Gateway project, as currently designed, will consume 25% less water per day than the baseline case.

Table 3-11: Estimated Water Savings - Proposed Project Design

	Site Data		Demand Factor		Baseline Ave gpd	Est. Savings	Design Ave gpd	Days/ Year	Annual Water Consumption Baseline (gallons)	Annual Water Consumption Design (gallons)
Independence Site										
Independ. Office	200,000	s.f.	0.053	gpd/s.f.	10,600	26%	7,844	260	2,756,000	2,039,440
Retail	10,420	s.f.	0.1	gpd/s.f.	1,042	0%	1,042	260	270,920	270,920
								Subtotal for Indep. Office	**3,026,920**	**2,310,360**
Hotel	230	rooms	160	gpd/room^	36,800	14%	31,607	365	13,432,000	11,536,701
ClubSport	69,467	s.f.	0.488	gpd/s.f.	33,900	27%	24,747	365	12,373,462	9,032,627
Outdoor Rec Water*	28,379	c.f.	0.061	gpd/c.f.	1,720	30%	1,206	365	633,025	443,687
Irrigation	2.8	acres	1.60	ft/s.f./yr	4,080	61%	1,591	365	1,489,070	644,791
								Subtotal for Hotel/ClubSport	**27,927,557**	**21,657,806**
Constitution Site										
Constitution Office 1	242,450	s.f.	0.053	gpd/s.f.	12,850	26%	9,509	260	3,340,961	2,472,311
Café	7,000	s.f.	0.57	gpd/s.f.	3,990	15%	3,392	365	1,456,350	1,237,898
								Subtotal for Const. Office 1	**4,797,311**	**3,710,209**
Constitution Office 2	252,219	s.f.	0.053	gpd/s.f.	13,368	26%	9,892	260	3,475,578	2,571,928
Irrigation	4	acres	1.60	ft/s.f./yr	5,828	61%	2,273	365	2,127,242	921,130
								Subtotal for Const. Office 2	**5,602,820**	**3,493,057**
				Total Daily Demand	*124,177*		*93,102*			
								Total	**41,354,608**	**31,171,432**
								Savings		25%

*Includes entire project.
^demand factor reflects 130 gpd/room for baseline hotel and restaurant plus 30 gpd/room for laundry.

3.3. Site Occupancy Scenarios

There are 3 development scenarios called out in Table 3.12-3 of the Draft Environmental Impact Report. Please note that it appears the estimated average daily demand values on Table 3.12-3 are derived from Table 3-1: Menlo Gateway Development Water Demands in the June 2009 Water Supply Assessment (WSA). The proposed project water demands in the WSA table are based on the Indoor Plumbing Fixtures Water Savings memo found in Appendix A, which excludes all process, HVAC, recreational and irrigation water.

Everything contained in this document to this point relates to Scenario 1, the project as proposed. Table 3-12 below summarizes the actual water demands for Scenario 1 as well as Scenarios 2 (a worst case water use scenario assuming 100% R&D space for 694,669 s.f.), 3 (63% office and 37% R&D) and 4 (90% office and 10% R&D).

Table 3-12. Water Demand for Specific Development Scenarios

	Estimated Average Daily Demand - Baseline (gal/day)	Estimated Average Daily Demand - Design (gal/day)**
1. Proposed "Design" Project		
Independence Site	88,141	68,037
Constitution Site	36,036	25,065
TOTAL	**124,177**	**93,102**
2. Worst Case Scenario (100% R&D)		
Combined Sites	195,003	161,188
3. Split Option Scenario (63% Office and 37% R&D)		
Combined Sites	150,363	118,693
4. Split Option Scenario B (90% Office and 10% R&D)		
Combined Sites	131,232	100,481

**Scenarios 2, 3 and 4 assume a 10% efficiency improvement between design and baseline for R&D spaces.

The worst case (Scenario 2) totals would be as summarized in Table 3-13. The split option totals would be as summarized in Table 3-14 (Scenario 3) and 3-15 (Scenario 4).

Table 3-13: Estimated Water Savings
Scenario 2 - 100% R&D, 0% Office

	Site Data		Demand Factor		Baseline Ave gpd	Est. Savings	Design Ave gpd	Days/ Year	Annual Water Consumption Baseline (gallons)	Annual Water Consumption Design (gallons)
Independence Site										
Independ. R&D	200,000	s.f.	0.155	gpd/s.f.	31000	10%	27900	260	8,060,000	7,254,000
Retail	10,420	s.f.	0.1	gpd/s.f.	1042	0%	1042	260	270,920	270,920
								Subtotal for Indep. Office	**8,330,920**	**7,524,920**
Hotel	230	rooms	160	gpd/room	36,800	18%	30176	365	13,432,000	11,014,240
ClubSport	69,467	s.f.	0.488	gpd/s.f.	33,900	27%	24747	365	12,373,462	9,032,627
Outdoor Rec Water*	28,379	c.f.	0.061	gpd/c.f.	1,720	30%	1206	365	633,025	443,687
Irrigation	2.8	acres	1.60	ft/s.f./yr	4,080	61%	1591	365	1,489,070	644,791
								Subtotal for Hotel/ClubSport	**27,927,557**	**21,135,345**
Constitution Site										
Constitution R&D	242,450	s.f.	0.155	gpd/s.f.	37580	10%	33822	260	9,770,735	8,793,662
Café	6,947	s.f.	0.57	gpd/s.f.	3960	18%	3247	365	1,445,323	1,185,165
								Subtotal for Const. Office 1	**11,216,058**	**9,978,827**
Constitution R&D	252,219	s.f.	0.155	gpd/s.f.	39094	10%	35185	260	10,164,426	9,147,983
Irrigation	4	acres	1.60	ft/s.f./yr	5,828	61%	2273	365	2,127,242	921,130
								Subtotal for Const. Office 2	**12,291,668**	**10,069,113**
			Total Daily Demand		*195,003*		*161,188*			
								Total	**59,766,203**	**48,708,205**
								Savings		19%

*Includes entire project.
^demand factor reflects 130 gpd/room for baseline hotel and restaurant plus 30 gpd/room for laundry.

Table 3-14: Estimated Water Savings
Scenario 3 - 37% R&D, 63% Office

	Site Data		Demand Factor		Baseline Ave gpd	Est. Savings	Design Ave gpd	Days/ Year	Annual Water Consumption: Baseline (gallons)	Annual Water Consumption: Design (gallons)
Independence Site										
Independ. Office	200,000	s.f.	0.053	gpd/s.f.	10,600	20%	8,480	260	2,756,000	2,204,800
Retail	10,420	s.f.	0.1	gpd/s.f.	1,042	0%	1,042	260	270,920	270,920
								Subtotal for Indep. Office	**3,026,920**	**2,475,720**
Hotel	230	rooms	160	gpd/room	36,800	18%	30,176	365	13,432,000	11,014,240
ClubSport	69,467	s.f.	0.488	gpd/s.f.	33,900	27%	24,747	365	12,373,462	9,032,627
Outdoor Rec Water*	28,379	c.f.	0.061	gpd/c.f.	1,720	30%	1,206	365	633,025	443,687
Irrigation	2.8	acres	1.60	ft/s.f./yr	4,080	61%	1,591	365	1,489,070	644,791
								Subtotal for Hotel/ClubSport	**27,927,557**	**21,135,345**
Constitution Site										
Constitution Office 1	-	s.f.	0.053	gpd/s.f.	-	20%	-	260	-	-
R&D	257,028	s.f.	0.155	gpd/s.f.	39,839	10%	35,855	260	10,358,209	9,322,389
Café	6,947	s.f.	0.57	gpd/s.f.	3,960	18%	3,247	365	1,445,323	1,185,165
								Subtotal for Const. Office 1	**11,803,533**	**10,507,554**
Constitution Office 2	237,641	s.f.	0.053	gpd/s.f.	12,595	20%	10,076	260	3,274,693	2,619,754
Irrigation	4	acres	1.60	ft/s.f./yr	5,828	61%	2,273	365	2,127,242	921,130
								Subtotal for Const. Office 2	**5,401,935**	**3,540,884**
			Total Daily Demand		*150,363*		*118,693*			
								Total	**48,159,945**	**37,659,503**
								Savings		22%

*Includes entire project.
^demand factor reflects 130 gpd/room for baseline hotel plus 30 gpd/room for laundry.

Table 3-15: Estimated Water Savings
Scenario 4 - 10% R&D, 90% Office

	Site Data		Demand Factor		Baseline Ave gpd	Est. Savings	Design Ave gpd	Days/ Year	Annual Water Consumption Baseline (gallons)	Annual Water Consumption Design (gallons)
Independence Site										
Independ. Office	200,000	s.f.	0.053	gpd/s.f.	10,600	20%	8,480	260	2,756,000	2,204,800
Retail	10,420	s.f.	0.1	gpd/s.f.	1,042	0%	1,042	260	270,920	270,920
								Subtotal for Indep. Office	**3,026,920**	**2,475,720**
Hotel	230	rooms	160	gpd/room	36,800	18%	30,176	365	13,432,000	11,014,240
ClubSport	69,467	s.f.	0.488	gpd/s.f.	33,900	27%	24,747	365	12,373,462	9,032,627
Outdoor Rec Water*	28,379	c.f.	0.061	gpd/c.f.	1,720	30%	1,206	365	633,025	443,687
Irrigation	2.8	acres	1.60	ft/s.f./yr	4,080	61%	1,591	365	1,489,070	644,791
								Subtotal for Hotel/ClubSport	**27,927,557**	**21,135,345**
Constitution Site										
Constitution Office 1	172,983	s.f.	0.053	gpd/s.f.	9,168	20%	7,334	260	2,383,707	1,906,966
R&D	69,467	s.f.	0.155	gpd/s.f.	10,767	10%	9,691	260	2,799,516	2,519,564
Café	6,947	s.f.	0.57	gpd/s.f.	3,960	18%	3,247	365	1,445,323	1,185,165
								Subtotal for Const. Office 1	**6,628,547**	**5,611,695**
Constitution Office 2	252,219	s.f.	0.053	gpd/s.f.	13,368	20%	10,694	260	3,475,578	2,780,462
Irrigation	4	acres	1.60	ft/s.f./yr	5,828	61%	2,273	365	2,127,242	921,130
								Subtotal for Const. Office 2	**5,602,820**	**3,701,592**
			Total Daily Demand		*131,232*		*100,481*			

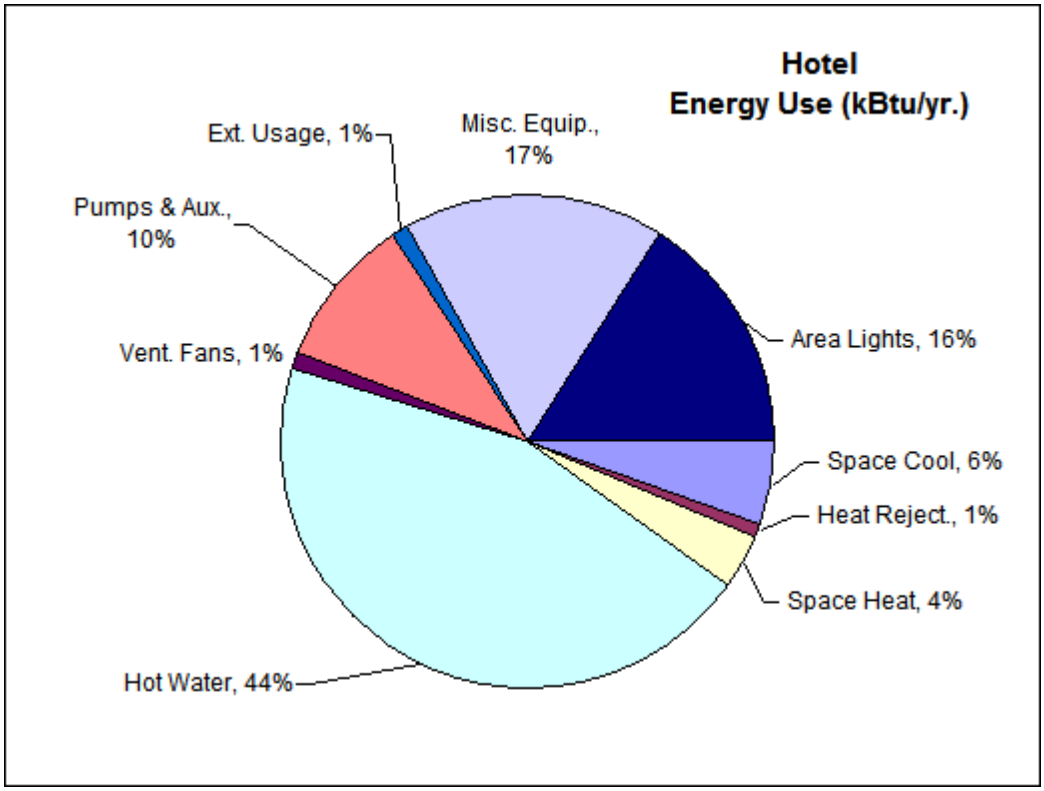
*Includes entire project.
^demand factor reflects 130 gpd/room for baseline hotel plus 30 gpd/room for laundry.

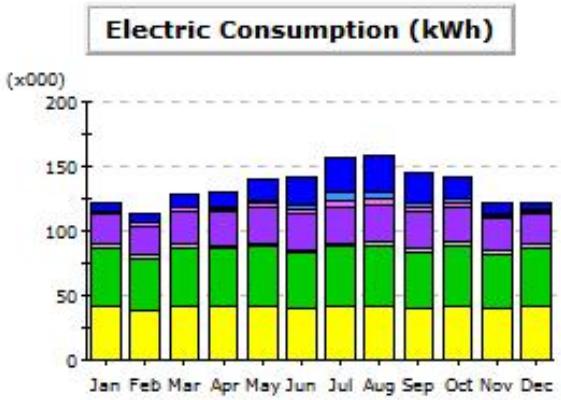
Total	**43,185,843**	**32,924,352**
Savings		24%

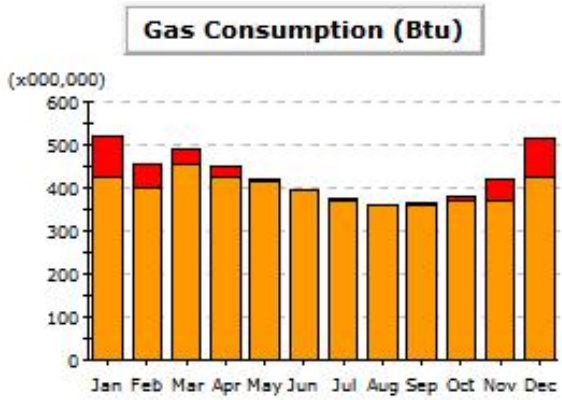
Hotel / Healthclub

Energy Summary

	T24 Proposed			T24 Baseline			
End Use	Electricity kWh (x000)	Natural Gas MBtu	Total Energy kBtu/yr	Electricity kWh (x000)	Natural Gas MBtu	Total Energy kBtu/yr	Savings
Space Cool	176.5	0	602,218	313.5	0	1,069,662	44%
Heat Reject.	26.2	0	89,394	29.5	0	100,654	11%
Space Heat	0	377.00	377,000	0	502.10	502,100	25%
Hot Water	0	4,759.20	4,759,200	0	6,204.20	6,204,200	23%
Vent. Fans	38.1	0	129,997	50.7	0	172,988	25%
Pumps & Aux.	312.9	0	1,067,615	519.9	0	1,773,899	40%
Ext. Usage	33.8	0	115,326	33.8	0	115,326	0%
Misc. Equip.	536.10	11.4	1,840,573	536.10	11.4	1,840,573	0%
Area Lights	492.4	0	1,680,069	539.5	0	1,840,774	9%
Total	1,616.00	5,147.60	10,661,392	2,023.00	6,717.70	13,620,176	22%







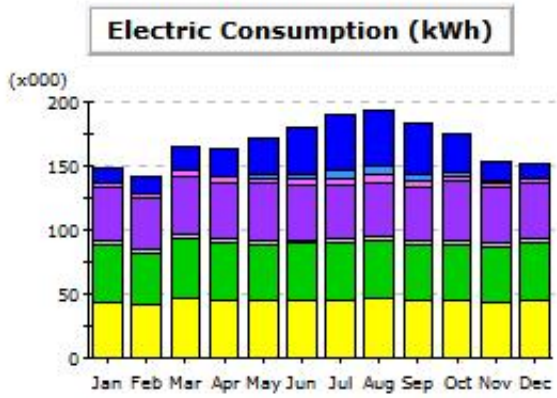
Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

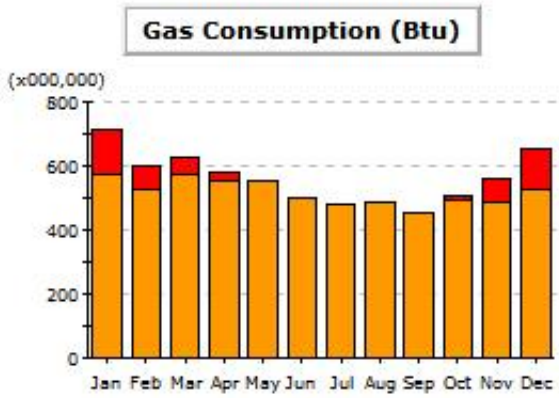
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	5.5	6.9	9.2	11.1	16.6	21.0	27.1	26.9	22.4	16.2	7.9	5.7	176.5
Heat Reject.	0.1	0.4	0.7	1.0	2.3	3.5	5.8	5.7	3.9	2.3	0.5	0.1	26.2
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	1.9	2.1	2.7	2.9	3.7	3.9	4.6	4.6	4.0	3.5	2.3	2.0	38.1
Pumps & Aux.	23.5	22.7	25.9	25.5	27.4	27.3	28.8	28.8	27.6	27.5	24.4	23.5	312.9
Ext. Usage	3.4	2.6	2.9	2.8	2.0	1.9	2.0	3.2	3.1	3.2	3.3	3.4	33.8
Misc. Equip.	45.3	41.0	45.4	44.9	45.9	43.7	45.9	46.0	43.7	45.9	43.1	45.3	536.2
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	41.6	37.6	41.7	41.4	42.3	40.1	42.3	42.4	40.0	42.3	39.4	41.6	492.5
Total	121.3	113.2	128.4	129.6	140.2	141.3	156.5	157.6	144.7	141.0	120.9	121.5	1,616.2

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	97.8	52.8	34.0	27.0	6.3	2.4	1.3	1.5	2.6	12.1	50.5	89.1	377.4
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	423.5	401.0	456.4	423.6	411.6	393.6	370.4	359.6	359.6	368.1	369.4	422.5	4,759.2
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	1.0	0.9	1.0	1.0	1.0	0.9	1.0	1.0	0.9	1.0	0.9	1.0	11.4
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	522.3	454.6	491.4	451.5	418.8	396.9	372.7	362.1	363.1	381.1	420.8	512.5	5,148.1





Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

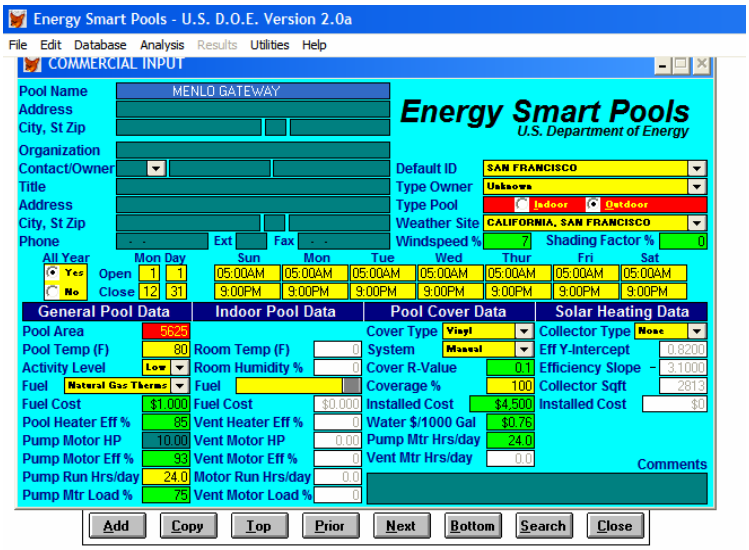
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	11.5	13.9	18.4	21.0	29.2	35.9	43.1	43.6	39.6	29.8	15.8	11.8	313.4
Heat Reject.	0.0	0.1	0.2	0.5	2.6	4.6	7.0	6.9	5.0	2.4	0.1	0.0	29.5
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	3.1	3.3	4.1	4.0	4.4	4.9	5.2	5.4	5.1	4.5	3.5	3.2	50.7
Pumps & Aux.	42.4	40.8	46.3	44.8	44.8	42.6	42.1	42.2	42.0	45.3	43.6	42.9	519.9
Ext. Usage	3.4	2.6	2.9	2.8	2.0	1.9	2.0	3.2	3.1	3.2	3.3	3.4	33.8
Misc. Equip.	43.7	40.5	46.0	44.4	44.3	44.4	44.9	45.4	43.8	44.3	43.2	44.8	529.5
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	44.0	41.2	47.3	45.5	44.8	45.5	45.7	46.4	44.7	44.8	43.8	45.6	539.3
Total	148.1	142.4	165.0	162.9	172.1	179.8	190.0	193.1	183.2	174.3	153.3	151.8	2,016.1

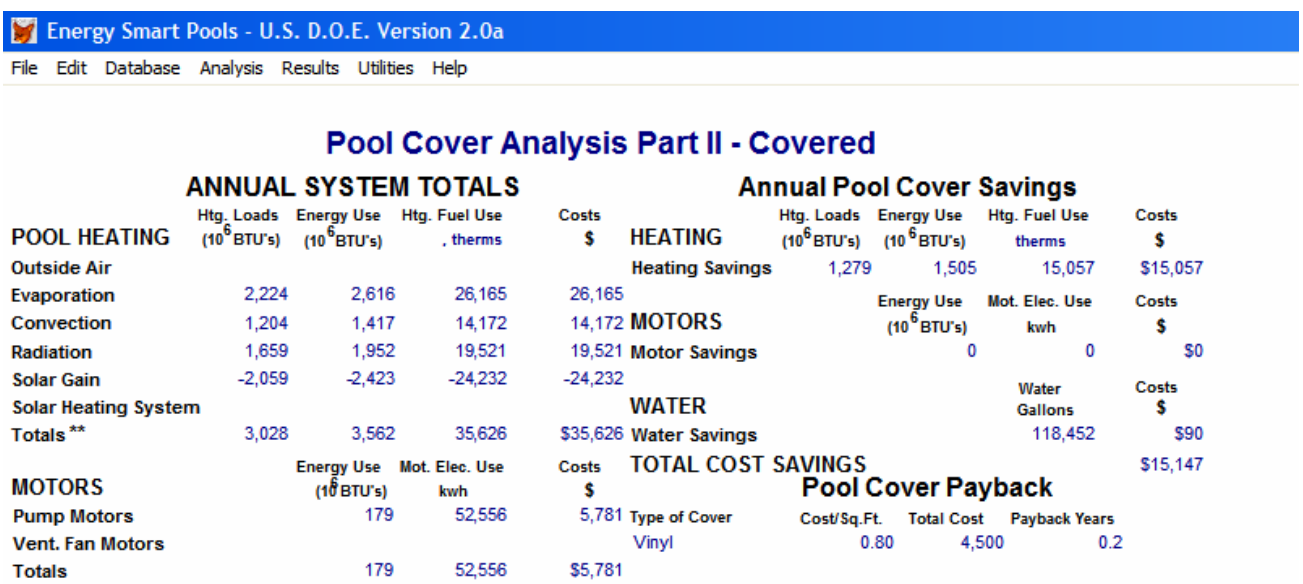
Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	139.7	75.9	53.2	26.8	0.2	-	-	-	-	7.9	75.3	128.0	506.8
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	571.8	523.3	574.5	553.1	555.0	496.6	481.3	487.4	452.4	495.0	486.7	527.0	6,204.2
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	0.9	0.9	1.0	1.0	0.9	1.0	1.0	1.0	0.9	0.9	0.9	1.0	11.4
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	712.5	600.0	628.7	580.8	556.2	497.6	482.2	488.4	453.4	503.8	562.9	655.9	6,722.4

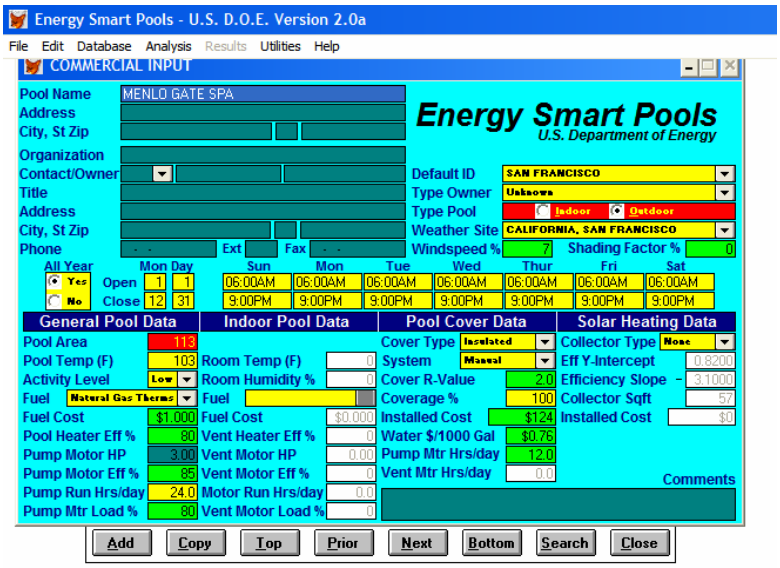
Total Pool area = 5,625 sq. ft.

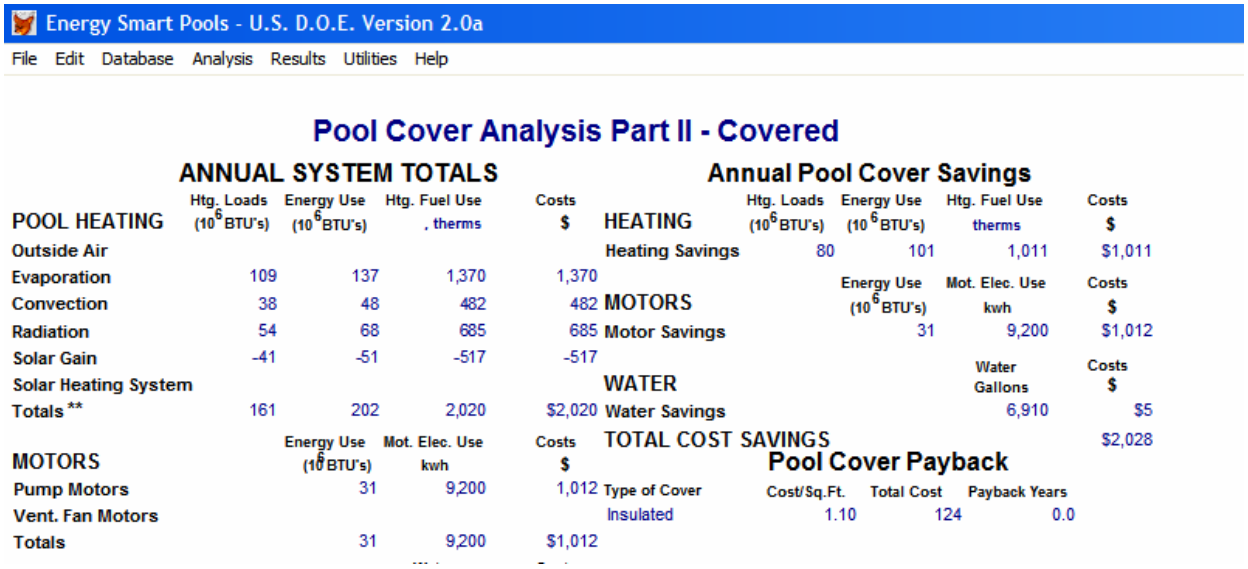
Screenshots of Pool calculation using Energy Smart Pools software from U.S. Department of Energy.





Screenshot of Spa calculation using Energy Smart Pools software from U.S. Department of Energy.

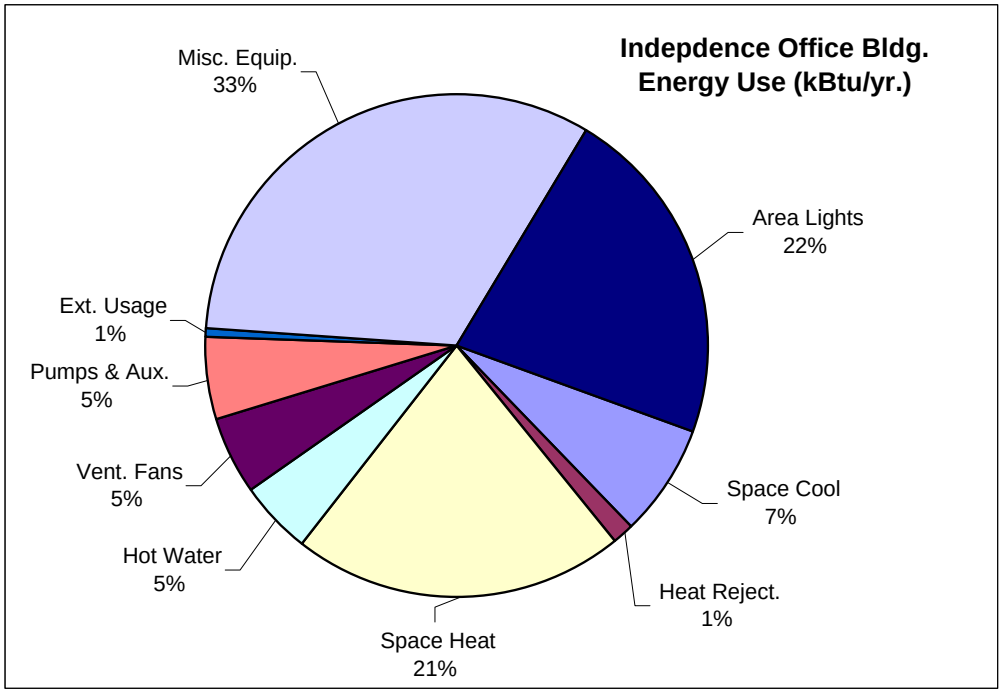




Independence Bldg.

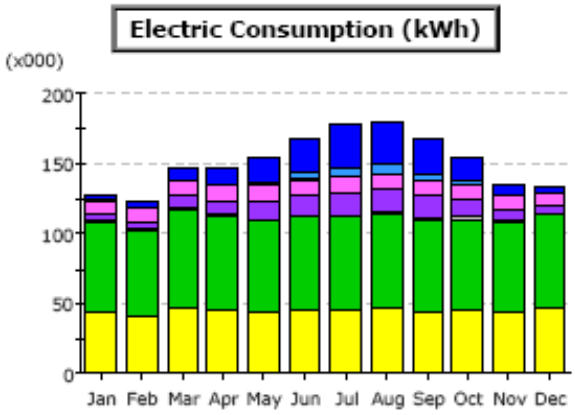
Energy Summary

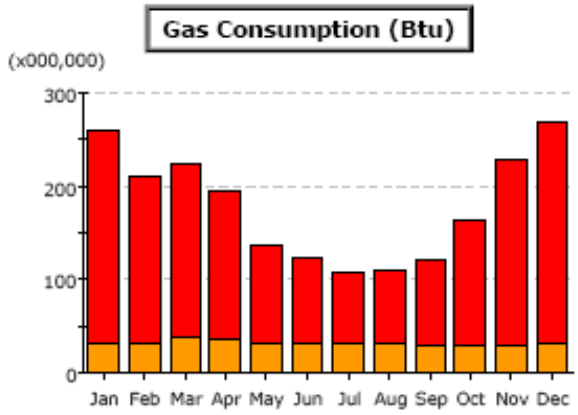
	T24 Proposed			T24 Baseline			
End Use	Electricity kWh (x000)	Natural Gas MBtu	Total Energy kBtu/yr	Electricity kWh (x000)	Natural Gas MBtu	Total Energy kBtu/yr	Savings
Space Cool	178.8	0	610,066	307	0	1,047,484	42%
Heat Reject.	33.5	0	114,302	36.8	0	125,562	9%
Space Heat	1.5	1,769	1,774,118	0	2,812	2,812,100	37%
Hot Water	0	385.5	385,500	0	409.6	409,600	6%
Vent. Fans	124.2	0	423,770	161	0	549,332	23%
Pumps & Aux.	128.4	0	438,101	208.1	0	710,037	38%
Ext. Usage	15.2	0	51,862	15.2	0	51,862	0%
Misc. Equip.	793.50	0	2,707,422	793.50	0	2,707,422	0%
Area Lights	536.5	0	1,830,538	626.7	0	2,138,300	14%
Total	1,811.60	2,155	8,335,679	2,148.30	3,221.70	10,551,700	21%



Independence Bldg.

Proposed Design eQuest Output





Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	2.4	4.8	7.9	11.3	18.0	23.8	29.9	29.0	25.1	17.3	6.4	2.8	178.8
Heat Reject.	0.1	0.2	0.3	0.7	3.1	5.3	7.8	7.5	5.7	2.6	0.2	0.1	33.5
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	1.5
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	9.9	9.4	11.0	10.6	10.2	10.7	10.8	10.9	10.4	10.2	9.9	10.3	124.2
Pumps & Aux.	3.5	5.7	8.4	10.1	13.3	14.9	16.4	16.3	15.5	13.1	7.2	4.0	128.4
Ext. Usage	1.5	1.2	1.3	1.2	0.9	0.9	0.9	1.5	1.4	1.5	1.5	1.5	15.2
Misc. Equip.	64.5	60.6	69.7	67.1	65.8	67.1	67.1	68.4	65.8	65.8	64.5	67.1	793.5
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	44.3	41.4	47.3	45.1	43.7	44.8	44.7	45.8	44.3	44.6	44.2	46.5	536.5
Total	126.3	123.6	146.1	146.3	155.0	167.5	177.6	179.4	168.2	155.1	134.0	132.4	1,811.6

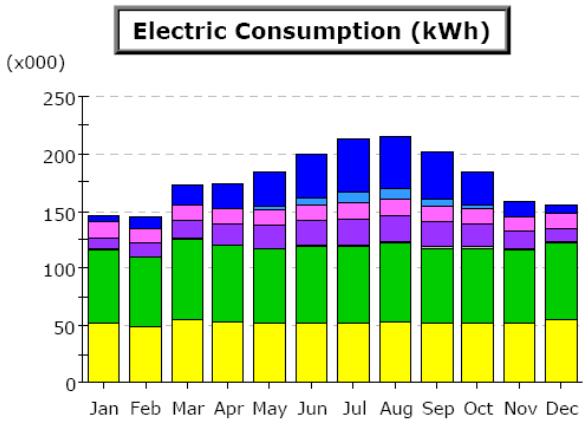
Gas Consumption (Btu x000,000)

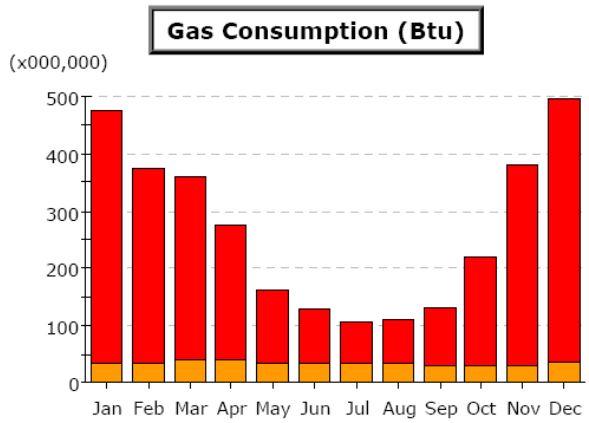
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	227.1	177.8	186.8	158.6	104.8	92.7	77.5	80.8	93.8	135.7	198.2	235.2	1,769.0
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	32.3	32.3	38.2	36.2	32.4	32.6	30.3	30.2	28.9	29.0	30.0	33.1	385.5
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	259.4	210.1	225.0	194.8	137.2	125.2	107.8	111.0	122.7	164.7	228.2	268.2	2,154.5

Independence Bldg.

Baseline Design eQuest Output

Project/Run: MG Indep Office- Baseline - Baseline Design Run Date/Time: 02/16/10 @ 14:24





Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	6.2	10.6	15.3	20.2	30.9	39.2	47.2	46.0	41.2	29.1	13.0	8.1	307.0
Heat Reject.	0.0	0.2	0.3	0.7	3.3	5.7	9.2	8.6	5.8	2.9	0.1	0.1	36.8
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	12.6	12.0	14.1	13.7	13.3	14.1	14.2	14.3	13.6	13.3	12.7	13.1	161.0
Pumps & Aux.	9.6	12.3	15.7	17.5	19.6	21.0	22.6	22.6	21.1	19.4	14.9	11.8	208.1
Ext. Usage	1.5	1.2	1.3	1.2	0.9	0.9	0.9	1.5	1.4	1.5	1.5	1.5	15.2
Misc. Equip.	64.5	60.6	69.7	67.1	65.8	67.1	67.1	68.4	65.8	65.8	64.5	67.1	793.5
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	51.6	48.4	55.2	52.8	51.1	52.4	52.3	53.5	51.7	52.0	51.6	54.2	626.7
Total	146.0	145.4	171.5	173.1	185.0	200.3	213.5	214.8	200.6	184.0	158.2	155.8	2,148.2

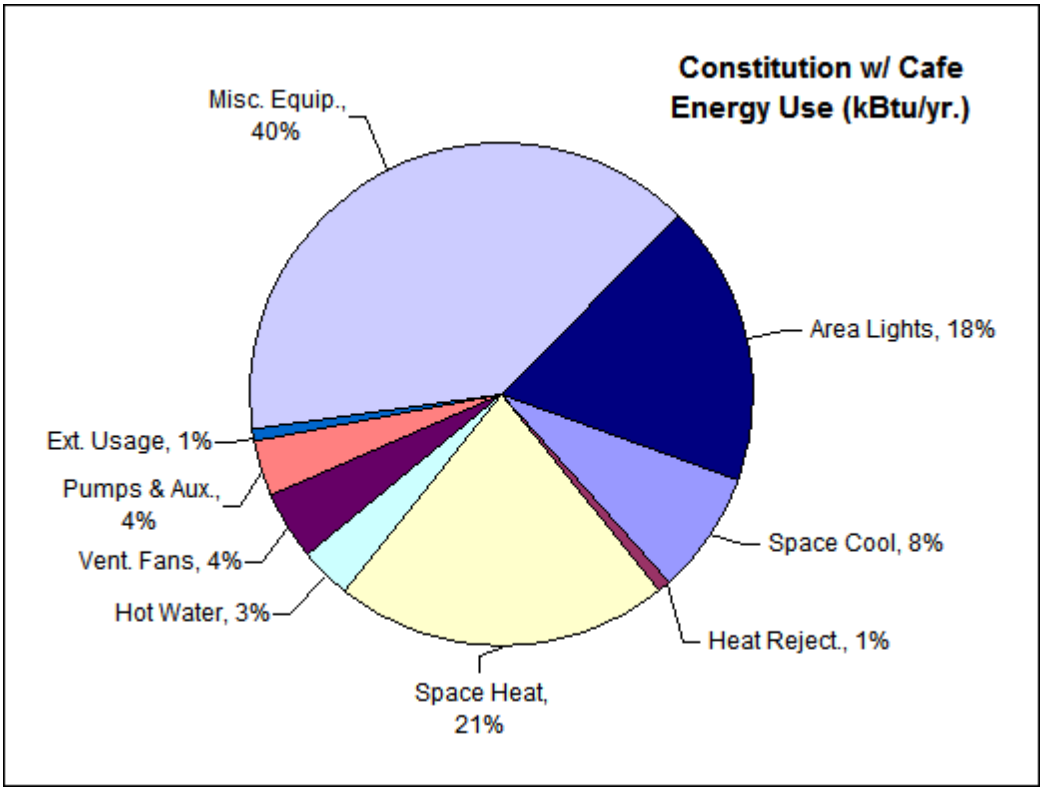
Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	442.4	341.3	320.4	234.8	127.4	92.6	73.8	78.4	99.1	188.9	350.3	462.7	2,812.1
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	34.4	34.3	40.6	38.5	34.4	34.6	32.2	32.1	30.7	30.8	31.9	35.1	409.6
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	476.8	375.6	361.0	273.3	161.9	127.2	106.0	110.5	129.7	219.7	382.2	497.9	3,221.7

Constitution with Cafe

Energy Summary

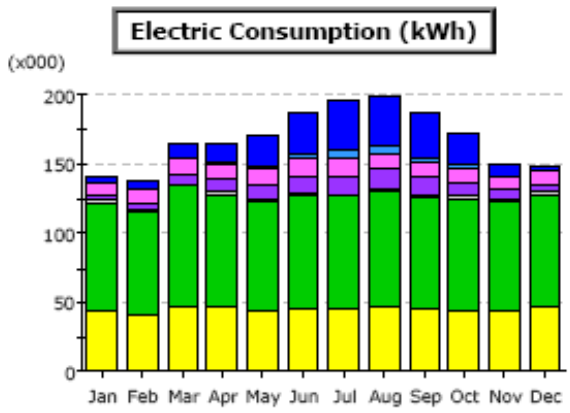
	T24 Proposed			T24 Baseline			
End Use	Electricity kWh (x000)	Natural Gas MBtu	Total Energy kBtu/yr	Electricity kWh (x000)	Natural Gas MBtu	Total Energy kBtu/yr	
Space Cool	227.6	0	776,571	337	0	1,149,844	32%
Heat Reject.	28	0	95,536	38	0	129,656	26%
Space Heat	1.5	2,160.20	2,165,318	0	3,760.20	3,760,200	42%
Hot Water	0	348.5	348,500	0	370.2	370,200	6%
Vent. Fans	131.2	0	447,654	155.3	0	529,884	16%
Pumps & Aux.	109.5	0	373,614	212.7	0	725,732	49%
Ext. Usage	20	0	68,240	20	0	68,240	0%
Misc. Equip.	970.40	731.1	4,042,105	970.40	731.1	4,042,105	0%
Area Lights	538.2	0	1,836,338	630.2	0	2,150,242	15%
Total	2,026.40	3,239.80	10,153,877	2,363.60	4,861.50	12,926,103	21%

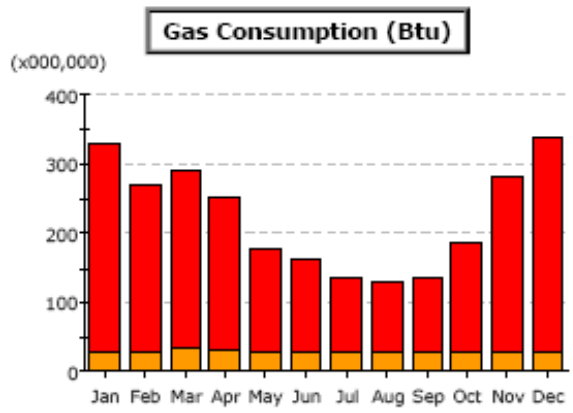


Constitution with cafe

Proposed Design eQuest Output

Project/Run: MG Constit w cafe- Proposed - Baseline Design Run Date/Time: 02/16/10 @ 14:14





Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	2.9	5.8	10.0	14.2	22.7	30.3	36.4	36.1	32.8	21.6	7.8	3.7	224.2
Heat Reject.	0.1	0.4	0.7	1.1	2.5	3.6	6.5	5.6	3.8	2.7	0.4	0.2	27.5
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	1.6
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	10.0	9.7	11.5	11.1	10.6	11.3	11.4	11.5	10.9	10.6	10.1	10.6	129.3
Pumps & Aux.	2.8	4.7	7.4	8.8	10.8	13.0	13.9	14.0	13.1	10.8	6.2	3.8	109.4
Ext. Usage	2.0	1.5	1.7	1.6	1.2	1.1	1.2	1.9	1.9	1.9	1.9	2.0	20.0
Misc. Equip.	78.3	74.1	85.7	82.5	80.2	82.5	82.0	83.8	80.6	80.2	78.7	81.9	970.4
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	43.6	41.5	48.1	45.8	43.3	45.4	44.7	46.1	44.5	44.2	44.2	46.7	538.2
Total	139.9	137.9	165.2	165.2	171.3	187.3	196.2	199.2	187.7	172.1	149.6	149.1	2,020.6

Gas Consumption (Btu x000,000)

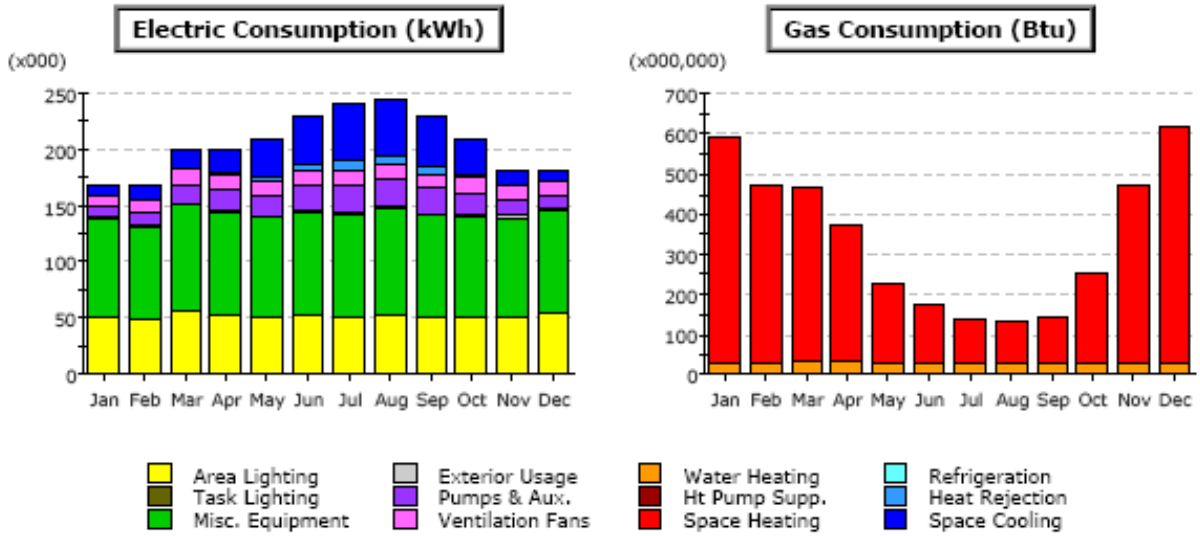
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	299.4	241.3	256.6	219.6	149.0	133.2	107.6	102.8	108.6	158.9	252.5	309.2	2,338.7
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	27.8	27.6	32.6	30.9	27.8	28.0	26.1	26.1	24.9	25.0	25.8	28.4	331.1
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	1.0	1.0	1.1	1.1	1.0	1.1	1.1	1.1	1.0	1.0	1.0	1.1	12.6
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	328.1	269.8	290.3	251.6	177.9	162.3	134.8	129.9	134.6	185.0	279.4	338.6	2,682.3

eQUEST 3.63.6510 Monthly Energy Consumption by Enduse Page 1

Constitution with cafe

Baseline Design eQuest Output

Project/Run: MG Constit w cafe- Baseline - Baseline Design Run Date/Time: 02/16/10 @ 14:11



Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	6.6	11.5	17.2	22.6	33.1	42.7	50.6	50.0	45.0	31.7	14.2	9.1	334.3
Heat Reject.	0.0	0.2	0.3	0.7	3.4	5.3	8.9	8.6	6.7	3.2	0.2	0.1	37.7
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	11.9	11.6	13.7	13.2	12.6	13.6	13.5	13.7	13.2	12.7	12.1	12.6	154.4
Pumps & Aux.	8.5	11.9	16.3	18.4	19.3	22.6	23.9	24.1	22.1	19.3	14.2	12.0	212.4
Ext. Usage	2.0	1.5	1.7	1.6	1.2	1.1	1.2	1.9	1.9	1.9	1.9	2.0	20.0
Misc. Equip.	87.0	82.4	95.2	91.6	89.1	91.6	91.2	93.1	89.6	89.1	87.5	91.1	1,078.5
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	51.2	48.6	56.2	53.5	50.6	53.1	52.3	54.0	52.1	51.8	51.8	54.9	630.2
Total	167.2	167.7	200.7	201.8	209.3	230.1	241.5	245.5	230.4	209.7	181.9	181.7	2,467.5

Gas Consumption (Btu x000,000)

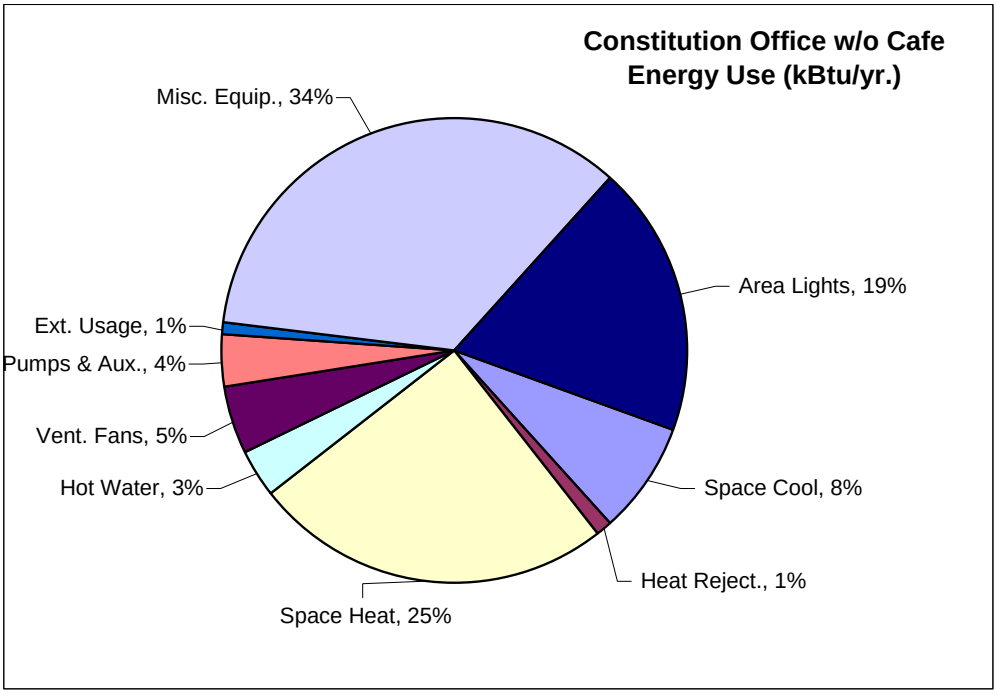
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	565.1	442.1	432.1	338.3	194.2	144.5	108.1	102.8	116.4	225.8	443.0	590.1	3,702.4
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	29.5	29.3	34.6	32.9	29.6	29.7	27.8	27.7	26.5	26.6	27.5	30.2	351.7
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.3
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	595.1	471.9	467.3	371.7	224.3	174.7	136.4	131.0	143.4	252.9	470.9	620.8	4,060.4

eQUEST 3.63.6510 Monthly Energy Consumption by Enduse Page 1

Constitution without cafe

Energy Summary

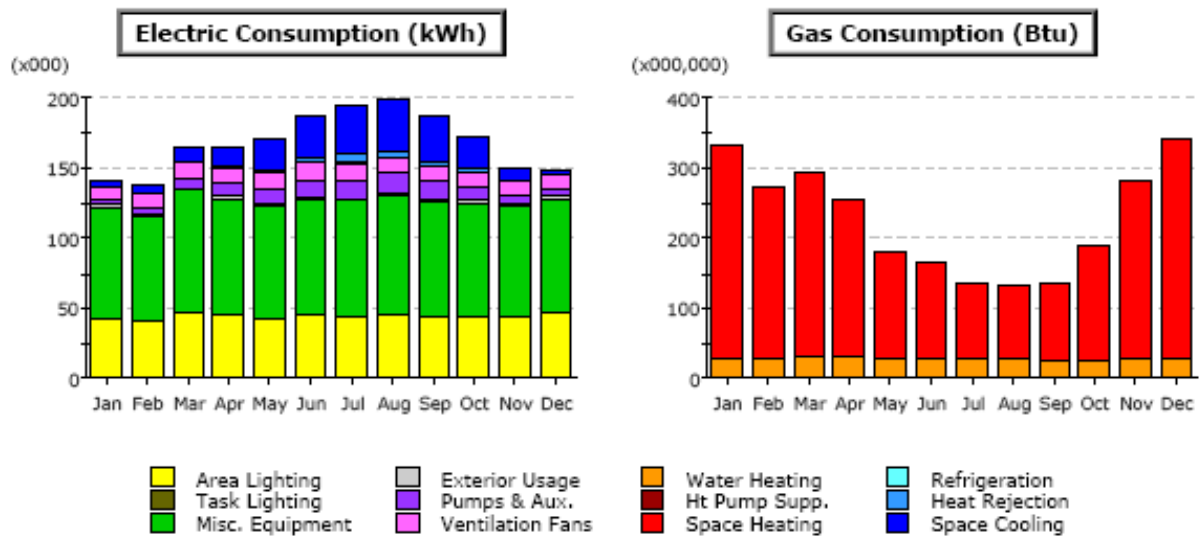
	T24 Proposed			T24 Baseline			
End Use	Electricity kWh (x000)	Natural Gas MBtu	Total Energy kBtu/yr	Electricity kWh (x000)	Natural Gas MBtu	Total Energy kBtu/yr	Savings
Space Cool	222.1	0	757,805	335.2	0	1,143,702	34%
Heat Reject.	27.1	0	92,465	37.7	0	128,632	28%
Space Heat	1.6	2,391.90	2,397,359	0	4,040.90	4,040,900	41%
Hot Water	0	331.1	331,100	0	351.7	351,700	6%
Vent. Fans	128.2	0	437,418	154.3	0	526,472	17%
Pumps & Aux.	109.1	0	372,249	212.4	0	724,709	49%
Ext. Usage	20	0	68,240	20	0	68,240	0%
Misc. Equip.	976.20	0	3,330,794	976.20	0	3,330,794	0%
Area Lights	532.4	0	1,816,549	634.7	0	2,165,596	16%
Total	2,016.70	2,723.00	9,603,980	2,370.50	4,392.60	12,480,746	



Constitution without cafe

Proposed Design eQuest Output

Project/Run: MG Constit wo cafe- Proposed - Baseline Design Run Date/Time: 02/16/10 @ 14:20



Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	2.9	5.8	10.0	14.1	22.6	30.0	35.8	35.7	32.4	21.5	7.8	3.7	222.1
Heat Reject.	0.1	0.4	0.7	1.1	2.4	3.5	6.4	5.5	3.7	2.6	0.4	0.2	27.1
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	1.6
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	10.0	9.7	11.4	11.0	10.5	11.2	11.2	11.4	10.8	10.5	10.1	10.5	128.2
Pumps & Aux.	2.8	4.7	7.4	8.8	10.7	13.0	13.8	13.9	13.1	10.8	6.3	3.8	109.1
Ext. Usage	2.0	1.5	1.7	1.6	1.2	1.1	1.2	1.9	1.9	1.9	1.9	2.0	20.0
Misc. Equip.	78.8	74.5	86.2	82.9	80.6	82.9	82.5	84.3	81.1	80.6	79.2	82.4	976.2
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	43.1	41.1	47.5	45.3	42.8	44.9	44.2	45.7	44.0	43.7	43.7	46.2	532.4
Total	139.8	137.8	165.1	165.0	171.0	186.8	195.3	198.4	187.1	171.8	149.5	149.0	2,016.7

Gas Consumption (Btu x000,000)

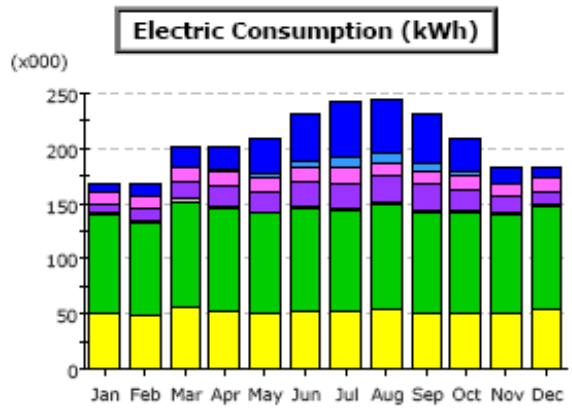
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	303.2	245.8	262.5	225.2	153.9	137.5	110.8	106.0	112.2	163.7	257.6	313.6	2,391.9
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	27.8	27.6	32.6	30.9	27.8	28.0	26.1	26.1	24.9	25.0	25.8	28.4	331.1
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	331.0	273.4	295.1	256.1	181.7	165.4	136.9	132.1	137.1	188.7	283.4	342.0	2,723.0

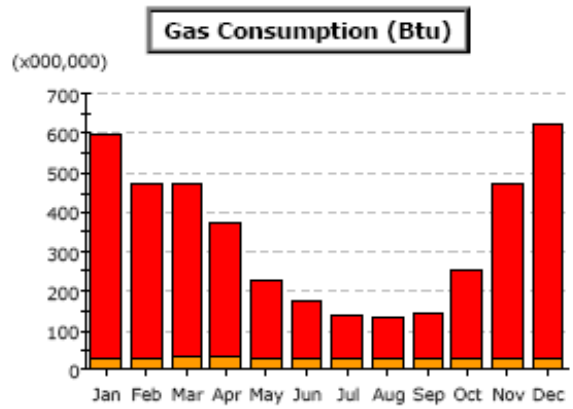
eQUEST 3.63.6510 Monthly Energy Consumption by Enduse Page 1

Constitution without cafe

Baseline Design eQuest Output

Project/Run: MG Constit wo cafe- Baseline - Baseline Design Run Date/Time: 02/16/10 @ 14:17





Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	6.6	11.5	17.2	22.6	32.9	42.3	49.9	49.3	44.6	31.5	14.2	9.1	331.7
Heat Reject.	0.0	0.2	0.3	0.7	3.4	5.3	8.8	8.6	6.6	3.2	0.2	0.1	37.4
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	11.8	11.5	13.6	13.1	12.5	13.5	13.4	13.6	13.1	12.6	12.0	12.5	153.4
Pumps & Aux.	8.5	11.9	16.3	18.4	19.3	22.6	23.7	23.9	22.0	19.2	14.2	12.0	211.9
Ext. Usage	2.0	1.5	1.7	1.6	1.2	1.1	1.2	1.9	1.9	1.9	1.9	2.0	20.0
Misc. Equip.	88.2	83.5	96.5	92.8	90.3	92.8	92.4	94.4	90.7	90.3	88.6	92.3	1,092.7
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	51.5	49.0	56.6	53.9	51.0	53.5	52.7	54.4	52.5	52.2	52.2	55.3	634.7
Total	168.6	169.0	202.3	203.3	210.5	231.1	242.1	246.1	231.4	210.9	183.3	183.3	2,481.8

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	566.7	443.8	434.0	340.1	195.3	144.8	108.4	103.3	117.0	227.2	444.7	592.0	3,717.5
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	29.5	29.3	34.6	32.9	29.6	29.7	27.8	27.7	26.5	26.6	27.5	30.2	351.7
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	596.2	473.1	468.6	373.0	224.9	174.5	136.2	131.0	143.5	253.8	472.2	622.2	4,069.2

eQUEST 3.63.6510 Monthly Energy Consumption by Enduse Page 1

Parking Garage Energy Summary

	SF	Proposed w/sf	T24 w/sf	Hours/yr.	Proposed kWh/yr	Baseline kWh/yr	Total Energy (kBtu/yr)	Baseline Energy (kBtu/yr)
Garage A	207,814	0.10	0.20	8,760	182,045	364,090	621,138	1,242,276
Garage B	238,418	0.10	0.20	8,760	208,854	417,708	712,610	1,425,221
Garage C	377,840	0.10	0.20	8,760	330,988	661,976	1,129,331	2,258,661

MEMORANDUM

Date: June 17, 2009

To: Justin Murphy, City of Menlo Park

From: Amy Rider, KEMA Services, Inc.

Copies to: Jennifer Renk, Luce, Forward, Hamilton & Scripps
Sue Chan, Community Design + Architecture

RE: Menlo Gateway: Indoor Plumbing Fixture Water Savings

1. Overview

Menlo Gateway will employ highly efficient water use and management techniques with the goal of reducing overall potable water needs of the site. This document maps the differential water savings for indoor plumbing fixtures between the proposed Menlo Gateway design and a baseline case for a project of similar size and scope established by KEMA using industry standards and averages.

The values herein are limited to indoor plumbing fixtures for the Menlo Gateway project. Additional, not included, water consuming equipment and amenities include the cooling towers, swimming pools, and landscaping.

Ave. Daily Water Consumption			
	Baseline Daily Usage (gallons)	*Installed Daily Usage (gallons)*	*Percent Savings*
Hotel	20,225	13,067	35%
Office	21,955	8,132	63%
R&D	5,384	5,384	0%
Restaurant/Café	204	201	2%
Retail/Community Facilities	1,042	1,042	0%
Health Club	10,294	6,912	33%
	59,104	34,736	**41%**

While the daily use figures shown above are estimates based on the assumptions listed in Section 4 of this document, the percentage of savings accurately reflect relative fixture efficiencies which have been identified to date, showing a savings of 41% project wide.

2. Water Saving Calculations

All of the water savings listed in Table 3-1 and 3-2 are a result of fixture efficiency and not behavioral changes. Additional savings are expected from the "water saving guest" option that allows hotel visitors to opt out of the daily linen service. The baseline water use rates are the based on the regulatory maximum water consumption per fixture type as required by the Energy Policy Act of 1992 where applicable or referenced "typical" equipment water use rates where available.

As tenants for the R&D (research and development) and retail spaces are not yet identified, no accurate fixture counts, calculations, or resulting savings are available. Using the baseline water demand provided by the Water Supply Assessment and the proposed space allocations for these spaces, the overall daily water use was estimated.

Table 2-1. Independence Daily Water Use

Ave. Daily Water Consumption			
	Baseline Daily Usage (gallons)	*Installed Daily Usage (gallons)*	*Percent Savings*
Hotel	20,225	13,067	35%
Office	6,177	2,360	62%
R&D	1,550	1,550	0%
Restaurant/Café	204	201	2%
Retail/Community Facilities	300	300	0%
Health Club	10,294	6,912	33%
	38,750	*24,389*	***37%***

Table 2-2. Constitution Daily Water Use

Ave. Daily Water Consumption			
	Baseline Daily Usage (gallons)	*Installed Daily Usage (gallons)*	*Percent Savings*
Office	15,778	5,772	63%
R&D	3,834	3,834	0%
Retail/Community Facilities	742	742	0%
	20,354	*10,347*	***49%***

Water use patterns, unlike energy use, are dependent on a project's occupancy and the behavior of those occupants. A project is assumed to consume water differently based on each use type. Fixture specific assumptions are listed in Section 4.

3. Water Using Fixtures

The following is a list of the water efficient indoor plumbing fixtures that are planned for the Menlo Gateway project, broken down by site and use type.

The manufacturer and/or model number of specific products have been provided for most fixture types. Those listed as TBD (to be determined) may result in water savings once selected, but generally no relative savings is expected due to the nature of the application. For example, no matter the rate at which water fills a bath tub, the bath tub still has the same total capacity, therefore needs the same volume of water to fill it.

Since the project is in the early stages of the interior design, not all fixture selection has been finalized. While dual-flush water closets have been selected for all of the regular hotel guest rooms, it has yet to be determined if they will also be used in the suites. As such, a more conservative water savings option (a single flush 1.4 gpf model) has been used for these calculations.

Table 3-1. Independence Site Plumbing Fixtures

Independence						
Type of Fixture	Quantity	Model	Baseline Flow/Flush Rate	Proposed Ave. Flow Rate	Units*	% Savings
HOTEL						
Guestroom Lavatories	209	Kohler or equal	2.5	0.5	gpm	80%
Guestroom Showers	209	Delta, Bricor or equal	2.5	1.5	gpm	40%
Guestroom Water Closets	209	Zurn EcoVantage or equal	1.6	1.28	gpf	20%
Suite Lavatories	20	Delta or equal	2.5	1.0	gpm	60%
Suite Showers	20	Delta, Bricor or equal	2.5	1.5	gpm	40%
Suite Bath Tubs**	20	TBD	40	40	gal/use	0%
Suite Water Closets	20	Kohler or equal	1.6	1.4	gpf	13%
Wet Bar Sink	20	Delta or equal	2.5	1.0	gpm	60%
Other Lavatories/Hand Sinks	15	Kohler or equal	2.5	0.5	gpm	80%
Other Water Closets	10	Zurn EcoVantage or equal	1.6	1.28	gpf	20%
Urinals	2	Zurn Z5798 "the pint" or equal	1	0.13	gpf	88%
Ice Machines	15	Energy Star Rated Manitowoc or equal	25	19.0	gal/100 lbs ice	24%
Janitor's Mop Sink**	2	TBD	2.5	2.5	gpm	0%
Drinking Fountains**	2	TBD	2.0	2.0	gpm	0%
Large Washer/Extractor***	2	Milnor 100# or equal	300	208	gpl	31%
Small Washer/Extractor***	1	Milnor 60# or equal	180	123	gpl	32%
COMMERCIAL KITCHEN & BAR						
Coffee/Espresso Maker**	2	Delta or equal	2.2	2.2	gpm	0%
3 Compartment Sink	2	Delta or equal	2.2	2.2	gpm	0%
Dishwasher	1	TBD	1.2	0.9	gal/rack	25%
Water/Pot Filler**	2	Delta or equal	2.5	2.5	gpm	0%
Hand sink	10	Delta or equal	2.2	2.2	gpm	0%
Pre-Rinse Spray Valve	1	TBD	4	1.6	gpm	60%
CLUBSPORT & SPA						
Water Closets	25	Zurn EcoVantage or equal	1.6	1.28	gpf	20%
Urinals	6	Zurn Z5798 "the pint" or equal	1	0.13	gpf	88%
Lavatories and Hand Sinks	40	Delta or equal	2.5	1.0	gpm	60%
Showers	35	Delta, Bricor or equal	2.5	1.5	gpm	40%
Tub**	1	TBD	40	40	gal/use	0%
Vichy Wash****	1	TBD	1	1	gal/use	0%
Drinking Fountains**	8	TBD	2	2.0	gpm	0%
Deluge Shower		Bricor or equal	2.5	1.5	gpm	40%
Janitor's Mop Sink**	4	TBD	2.5	2.5	gpm	0%
Steam Room****	2	TBD	4	4.0	gal/use	0%
Ice Machines	1	Energy Star Rated Manitowoc or equal	25	19.0	gal/100 lbs ice	24%
Jacuzzi Spa (use doesn't vary)	2	TBD	50	50.0	gal/day	0%
Misc Sinks.	2	Delta or equal	2.5	1.0	gpm	60%

Table 3-1. Independence Site Plumbing Fixtures (continued)

Independence						
Type of Fixture	Quantity	Model	Baseline Flow/Flush Rate	Proposed Ave. Flow Rate	Units*	% Savings
OFFICE						
Water Closets	56	Sloan WES111 or equal	1.6	1.28	gpf	20%
Urinals	16	Zurn Z5798 "the pint" or equal	1	0.13	gpf	88%
Lavatories	32	Kohler or equal	2.5	0.5	gpm	80%
Showers	4	Bricor or equal	2.5	1.0	gpm	60%
Drinking Fountains**	16	TBD	2	2.0	gpm	0%

Site-wide Total % Savings 31%

*gpf: gallons per flush; gpm: gallons per minute; gpl: gallons per load
**Water consumption constant for this application. No relative savings.
***Water savings based on manufacturer's assumptions and capture of high level rinse and extracted water.
****Water use unknown. No relative savings.

Table 3-2. Constitution Site Plumbing Fixtures

Constitution						
Type of Fixture	Quantity	Model	Baseline Flow/Flush Rate	Proposed Ave. Flow Rate	Units*	% Savings
OFFICE						
Water Closets	112	Sloan WES111 or equal	1.6	1.28	gpf	20%
Urinals	32	Zurn Z5798 "the pint" or equal	1	0.13	gpf	88%
Lavatories	64	Kohler or equal	2.5	0.5	gpm	80%
Showers	8	Bricor or equal	2.5	1.0	gpm	60%
Drinking Fountains**	32	TBD	1	1.0	gpm	0%

Site-wide Total % Savings 50%

**Water consumption constant for this application. Flow rate irrelevent.

4. Assumptions

The following details the occupancy assumptions made for each site and space use type.

Table 4-1. Independence Occupancy Assumptions

Independence Project Data and Daily Occupancy			
Space Type	Sq. Footage	Visitors	FTEs
Hotel	173,667	145	7
Office	190,000	48	475
R&D	10,000	26	3
Restaurant/Café	4,245	35	7
Retail/Community Facilities	3,000	6	1
Health Club	68,519	274	14
	449,431	534	506

Table 4-2. Constitution Occupancy Assumptions

Constitution Project Data and Daily Occupancy			
Space Type	Sq. Footage	Visitors	FTEs
Office	469,935	117	1175
R&D	24,733	6	65
Retail/Community Facilities	7,420	16	2
	502,088	140	1241

The assumptions listed in Table 4-1 and 4-2 are based on the Energy Information Administration's 1995 Commercial Buildings Energy Consumption Survey which provides an area per person for various building types. The hotel figure assumes 1.5 people per room at 75% occupancy. Further, for the purpose of calculating savings, a 50:50 male: female occupancy is assumed throughout.

A single FTE (full-time equivalent) refers to one employee for an 8 hours shift. Visitors include hotel guests, health club members, restaurant patrons, etc.

Table 4-3 details the plumbing fixture usage assumptions by fixture and user type.

4-3. Daily Usage Assumptions

Type of Fixture	Average Duration of Use (min)	FTE	Hotel Guests	Club Guest	Restaurant Patrons	Other Visitors
		Estimated Daily Uses / person				
Lavatories	1	3	4	2	0.2	0.5
Showers	10	0.1	1.1	0.8	0	0
Guestroom Water Closets	n/a		3			
Other Water Closets (Female)	n/a	3	0.5		0.2	0.5
Other Water Closets (Male)	n/a	1	0.15		0.1	0.1
Other Urinals (Male)	n/a	2	0.35		0.1	0.4
Other Sinks	0.5	1	0.05			
Ice Machines (100s of gallons)	n/a		0.2		0.5	
Drinking Fountains	0.25	0.5	0.1	2		
Coffee/Espresso Maker	n/a		0.6		0.2	
Kitchen/Cafe Sinks	0.5				2	
Water/Pot Filler**	0.5				0.5	
Dishwasher	n/a				0.2	
Pre-Rinse Spray Valve	0.1				0.15	
Washer/Extractor	n/a		0.3	0.01	0.1	
Vichy Wash	n/a		0.05	0.01		
Tub	n/a		0.1			
Deluge Shower	2		0.1	0.02		
Steam Room	5		0.2	0.1		
Jacuzzi Spa	10		0.2	0.1		
Janitor's Mop Sink	n/a	0.1				

Renaissance Hotel and Clubsport

KEMA

LEED™ NC v2.2 Annotated Scorecard 03/02/10

Menlo Park, CA

Preliminary

Note: This scorecard has been developed during conceptual design and project application phase for purposes of identifying the most likely credits and scoring to ultimately be achieved by the project. Specific measures and strategies will be validated in design development and during construction.

35	23	11	**Total Project Score**

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

8	5	1	**Sustainable Sites**		Possible Points **14**	
Y	?	N				
Y			Prereq 1	**Construction Activity Pollution Prevention**	Req.	Will be achieved by using: Dandy bags at inlets and catch basins, silt fencing along perimeter of earthwork, Temporary construction driveway, tarps to cover stockpiles, regular routine sweeping and maintenance.
1			Credit 1	**Site Selection**	1	Qualifies by virtue of the project location.
	1		Credit 2	**Development Density and Community Connectivity**	1	May qualify by virtue of the project location.
		1	Credit 3	**Brownfield Redevelopment**	1	n/a
	1		Credit 4.1	**Alt. Transportation,** Public Transportation Access	1	Should qualify by virtue of the project location. Dependent on final location of all bus and shuttle stops.
1			Credit 4.2	**Alt. Transportation,** Bicycle Storage & Changing Rooms	1	Bicycle Storage and changing rooms and showers will be provided on site.
1			Credit 4.3	**Alt. Transportation,** Low Emit and Fuel Effic. Vehicles	1	This point will be achieved by providing prefered parking for low emitting vehicles on-site. See the Transportation Management Plan for more detail.
1			Credit 4.4	**Alt. Transportation,** Parking Capacity	1	Number of parking spaces required does not exceed minimum zoning requirements and preferred parking for car/van pool will be provided for 5% of the See the Transportation Management Plan for more detail.
	1		Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Habitat	1	Dependent on final plant selection and quantities of species that are native/adapted to the region.
	1		Credit 5.2	**Reduced Site Disturbance**, Maximize Open Space	1	Should qualify based on quantity of open space being provided in design. Verification and calculations still needed.
1			Credit 6.1	**Stormwater Management**, Quantity Control	1	Designed to reduce stormwater discharge rates and quantities. See hydrology report for more details.
1			Credit 6.2	**Stormwater Management**, Quality Control	1	Designed to treat stormwater prior to discharge. See hydrology report for more details.
1			Credit 7.1	**Heat Island Effect**, Non-Roof	1	Roughly 80% of all paved site area will be light-colored concrete. Shading over non-roof impervious surfaces will also be achieved by planting trees with broad spreading canopies in landscape fingers of the new parking areas and adjacent to flatwork paving.
1			Credit 7.2	**Heat Island Effect,** Roof	1	Use roofing materials having Solar Reflectance Index (SRI) equal to or greater than 78 for low sloped roof (≤2:12) or 29 for steep-sloped roof (≥2:12)
	1		Credit 8	**Light Pollution Reduction**	1	Site lighting may be designed to meet IESNA lighting power densities and utilize cut-off fixtures.

3	2		**Water Efficiency**		Possible Points **5**	
Y	?	N				
1			Credit 1.1	**Water Effic. Landscaping,** Reduce by 50%	1	Reduction in water consumption achieved by utilizing an underground drip delivery system and weather-based controller, coupled with low-water consuming plant palette.
	1		Credit 1.2	**Water Effic. Landscaping,** No Potable Use or No Irrig.	1	Although unlikely, municipally supplied reclaimed water may become available prior to LEED Submittal.
	1		Credit 2	**Innovative Wastewater Technologies**	1	Reduction in water consumption achieved by use of high efficiency fixtures. Calculations are dependent on occupancy data not yet available.
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1	Reduction in water consumption achieved by use of high efficiency fixtures. Final calculations are dependent on occupancy data not yet available. Additional water efficiency technologies and measures will be investigated in project design. Project team is confident of meeting these levels of efficiency based on LEED calculation standards.
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1	

Renaissance Hotel and Clubsport

KEMA

LEED™ NC v2.2 Annotated Scorecard 03/02/10

Menlo Park, CA

Preliminary

Note: This scorecard has been developed during conceptual design and project application phase for purposes of identifying the most likely credits and scoring to ultimately be achieved by the project. Specific measures and strategies will be validated in design development and during construction.

35	23	11	**Total Project Score**

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

7	5	5		**Energy & Atmosphere** Possible Points 17		
Y	?	N				
Y			Prereq 1	**Fundamental Commissioning**	Req.	Services will be contracted.
Y			Prereq 2	**Minimum Energy Performance**	Req.	Per State law, project must meet Title 24 Energy Code requirements.
Y			Prereq 3	**Fundamental Refrigerant Management**	Req.	No CFC refrigerants in HVAC &R systems.
4	2	4	Credit 1	**Optimize Energy Performance**	10	Based on the current building model, the project is 23% more energy efficient than required by the Title 24 Energy Code. See the Energy and Water Estimates memo for more information. LEED scoring for this credit is based on margin better than the standard. At 22% margin, the project solidly meets 4 points (Y). We anticipate a higher margin when the building systems are actually designed, and our target is a 28% margin yielding 2 additional points (?). In addition, if renewable energy such as PV or solar thermal is included in the project we expect an additional 3-10% margin, which could lead to an additional 1-4 points (N). We have conservatively differentiated the renewable energy contribution in the N column.
	2	1	Credit 2.1	**On -Site Renewable Energy**, 2.5% / 7.5% / 12.5%	3	Multiple technologies still being considered including photovoltaics and solar hot water. On the hotel, there is less opportunity for PV, but good opportunity for solar thermal. This credit is based on amount of electrical or gas energy the PV or solar thermal offset of total building energy use. The two points shown in the ? column indicate a conservative estimate of renewable energy generation in the range of 7.5%. If we are able to achieve 12.5% the project would also receive the 1 point in N column. These numbers will not be known until the system is designed.
1			Credit 3	**Enhanced Commissioning**	1	Services will be contracted.
	1		Credit 4	**Enhanced Refrigerant Management**	1	HVAC equipment and fire suppression will not contain HCFCs or Halons.
1			Credit 5	**Measurement & Verification**	1	An energy and water management system will be put in place.
1			Credit 6	**Green Power**, 35% for 2 years	1	Tradeable renewable certificates will be purchased for the project.

3	5	5		**Materials & Resources** Possible Points 13		
Y	?	N				
Y			Prereq 1	**Storage & Collection of Recyclables**	Req.	Easily accessible areas for the separation, collection and storage of materials for recycling including (at a minimum) paper, glass, plastics, and metals, will be provided.
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors and Roof	1	n/a
		1	Credit 1.2	**Building Reuse**, Maintain 95% of Existing Walls, Floors and Roof	1	
		1	Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1	
1			Credit 2.1	**Construction Waste Management**, Divert 50%	1	The general contractor will be contracted to recycle and/or salvage and document a minimum of 75% (by weight) of construction, demolition, and land clearing waste.
1			Credit 2.2	**Construction Waste Management**, Divert 75%	1	
	1		Credit 3.1	**Materials Reuse**, Specify 5%	1	This credit will be assessed during demolition of the existing site. At a minimum it is expected that the existing AC paving and concrete from the floors and tilt-up buildings will be crushed and ground for reuse as base material under new paved areas.
		1	Credit 3.2	**Materials Reuse**, Specify 10%	1	
1			Credit 4.1	**Recycled Content**: 10% (post-consumer + 1/2 post-industrial)	1	10% threshold should be achieved with concrete and steel as designed. Remainder is dependent on material selection most of which is not yet determined.
	1		Credit 4.2	**Recycled Content**: 20% (post-consumer + 1/2 post-industrial)	1	
	1		Credit 5.1	**Regional Materials**, 10% Extracted and Mfd Regionally	1	Many project materials will be regionally (within 500 mile radius) sourced, but it remains to be seen if the cost of those materials will be 10% or more of the total material cost.
		1	Credit 5.2	**Regional Materials**, 20% Extracted and Mfd Regionally	1	

Note: This scorecard has been developed during conceptual design and project application phase for purposes of identifying the most likely credits and scoring to ultimately be achieved by the project. Specific measures and strategies will be validated in design development and during construction.

35	23	11	**Total Project Score**

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

	1		Credit 6	**Rapidly Renewable Materials**, 2.5%	1	Dependent on material selection most of which is not yet determined.
	1		Credit 7	**Certified Wood,** 50%	1	Specify Forest Stewardship Council wood

10	5		**Indoor Environmental Quality**	Possible Points 15		
Y	?	N				
Y			Prereq 1	**Minimum IAQ Performance**	Req.	HVAC system designed to meet ASHRAE 62.1-2004.
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Req.	Smoking area will be provided outside the building and away from entrances and air intakes.
	1		Credit 1	**Outdoor Air Delivery Monitoring**	1	A CO2 monitoring system may be used.
	1		Credit 2	**Increased Ventilation**	1	30% more outside air than ASHRAE 62.1 requires may be provided. documents. There are energy efficiency impacts associated with increased ventilation and this requirement will be further investigated in design development/construction documents.
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1	An indoor air quality management plan will be implemented during construction.
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1	An indoor air quality management plan will be implemented after construction, but prior to occupancy.
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1	Materials will be selected based on compliance.
1			Credit 4.2	**Low-Emitting Materials**, Paints and Coatings	1	Materials will be selected based on compliance.
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1	Materials will be selected based on compliance.
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood and Agrifiber	1	Materials will be selected based on compliance.
	1		Credit 5	**Indoor Chemical & Pollutant Source Control**	1	Recessed grating pedimat system may be provided at building entries.
1			Credit 6.1	**Controllability of Systems**, Lighting	1	Hotel occupants will have control over lighting.
1			Credit 6.2	**Controllability of Systems,** Thermal Comfort	1	Hotel occupants will have control over thermal comfort.
1			Credit 7.1	**Thermal Comfort**, Design	1	Designed to comply with ASHRAE Standard 55-2004, Addenda 1995, for thermal comfort standards.
1			Credit 7.2	**Thermal Comfort**, Verification	1	Space temperature and humidity will be monitored. A thermal comfort survey of building occupants will be given within 6-18 months of occupancy. A corrective action plan if more than 20% of occupants are dissatisfied will be implemented.
	1		Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1	Depends entirely on interior design and layout. Guest rooms will achieve daylighting requirements, clubsport and amenities areas may not. Compliance will be evaluated in design development/construction documents.
	1		Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1	Depends entirely on interior design and layout.

4	1		**Innovation & Design Process**	Possible Points 5		
Y	?	N				
1			Credit 1.1	**Innovation in Design**: Green Building Education	1	Owner will provide elements of signage illustrating LEED and green building strategies, case study, informational pamphlets.
1			Credit 1.2	**Innovation in Design**: Green Hotel operations	1	Owner will use a green cleaning protocol and specify acceptable cleaning products.
1			Credit 1.3	**Innovation in Design**: Biodiesel Site Equipment	1	Contractor must use biodiesel powered construction equipment and generators
	1		Credit 1.4	**Innovation in Design**: TBD	1	Additional opportunities for innovation are currently being assessed.
1			Credit 2	**LEED™ Accredited Professional**	1	Several members of the design team are LEED Accredited Professionals.

Menlo Gateway Mixed Use Offices

Menlo Park, CA

KEMA

LEED™ 2.2 Annotated Scorecard 03/02/10

Preliminary

Note: This scorecard has been developed during conceptual design and project application phase for purposes of identifying the most likely credits and scoring to ultimately be achieved by the project. Specific measures and strategies will be validated in design development and during construction.

41	19	9	**Total Project Score**

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

9	5		**Sustainable Sites**		Possible Points 14	
Y	?	N				
Y			Prereq 1	**Construction Activity Pollution Prevention**	Req.	Will be achieved by using: Dandy bags at inlets and catch basins, silt fencing along perimeter of earthwork, Temporary construction driveway, tarps to cover stockpiles, regular routine sweeping and maintenance.
1			Credit 1	**Site Selection**	1	Qualifies by virtue of the project location.
	1		Credit 2	**Development Density and Community Connectivity**	1	May qualify by virtue of the project location.
	1		Credit 3	**Brownfield Redevelopment**	1	May qualify if buildings to demolish contain asbestos or lead.
	1		Credit 4.1	**Alt. Transportation,** Public Transportation Access	1	Should qualify by virtue of the project location. Dependent on final location of all bus and shuttle stops.
1			Credit 4.2	**Alt. Transportation,** Bicycle Storage & Changing Rooms	1	Bicycle Storage and changing rooms and showers will be provided on site.
1			Credit 4.3	**Alt. Transportation,** Low Emit and Fuel Effic. Vehicles	1	This point will be achieved by providing prefered parking for low emitting vehicles on-site. See the Transportation Management Plan for more detail.
1			Credit 4.4	**Alt. Transportation,** Parking Capacity	1	Number of parking spaces required does not exceed minimum zoning requirements and preferred parking for car/van pool will be provided for 5% of the See the Transportation Management Plan for more detail.
	1		Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Habitat	1	Dependent on final plant selection and quantities of species that are native/adapted to the region.
	1		Credit 5.2	**Reduced Site Disturbance**, Maximize Open Space	1	Should qualify based on quantity of open space being provided in design. Verification and calculations still needed.
1			Credit 6.1	**Stormwater Management**, Quantity Control	1	Designed to reduce stormwater discharge rates and quantities. See hydrology report for more details.
1			Credit 6.2	**Stormwater Management**, Quality Control	1	Designed to treat stormwater prior to discharge. See hydrology report for more details.
1			Credit 7.1	**Heat Island Effect**, Non-Roof	1	Roughly 80% of all paved site area will be light-colored concrete. Shading over non-roof impervious surfaces will also be achieved by planting trees with broad spreading canopies in landscape fingers of the new parking areas and adjacent to flatwork paving.
1			Credit 7.2	**Heat Island Effect,** Roof	1	Use roofing materials having Solar Reflectance Index (SRI) equal to or greater than 78 for low sloped roof (≤2:12) or 29 for steep-sloped roof (≥2:12)
1			Credit 8	**Light Pollution Reduction**	1	Site lighting is designed to meet IESNA lighting power densities and utilize cut-off fixtures.

3	2		**Water Efficiency**		Possible Points 5	
Y	?	N				
1			Credit 1.1	**Water Effic. Landscaping,** Reduce by 50%	1	Reduction in water consumption achieved by utilizing an underground drip delivery system and weather-based controller, coupled with low-water consuming plant palette.
	1		Credit 1.2	**Water Effic. Landscaping,** No Potable Use or No Irrig.	1	Although unlikely, municipally supplied reclaimed water may become available prior to LEED Submittal.
	1		Credit 2	**Innovative Wastewater Technologies**	1	Reduction in water consumption achieved by use of high efficiency fixtures. Calculations are dependent on occupancy data not yet available.
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1	Reduction in water consumption achieved by use of high efficiency fixtures. Final calculations are dependent on occupancy data not yet available. Additional water efficiency technologies and measures will be investigated in project design. Project team is confident of meeting these levels of efficiency based on LEED calculation standards.
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1	

Menlo Gateway Mixed Use Offices

Menlo Park, CA

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Preliminary

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41	19	9	**Total Project Score**

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

8	5	4	**Energy & Atmosphere**		Possible Points **17**	
Y	?	N				
Y			Prereq 1	**Fundamental Commissioning**	Req.	Services will be contracted.
Y			Prereq 2	**Minimum Energy Performance**	Req.	Per State law, project must meet Title 24 Energy Code requirements.
Y			Prereq 3	**Fundamental Refrigerant Management**	Req.	No CFC refrigerants in HVAC &R systems.
4	3	3	Credit 1	**Optimize Energy Performance**	10	Based on the current building model, the project is 23% more energy efficient than required by the Title 24 Energy Code. See the Energy and Water Estimates memo for more information. LEED scoring for this credit is based on margin better than the standard. At 23% margin, the project solidly meets 4 points (Y). We anticipate a higher margin when the building systems are actually designed, and our target is a 31.5% margin yielding 3 additional points (?). In addition, if renewable energy such as PV or solar thermal is included in the project we expect an additional 3-10% margin, which could lead to an additional 1-3 points (N). We have conservatively differentiated the renewable energy contribution in the N column.
	2	1	Credit 2.1	**On -Site Renewable Energy**, 2.5% / 7.5% / 12.5%	3	Multiple technologies still being considered including photovoltaics and solar hot water. There is opportunity for PV if it can be shown to be cost effective. There is also opportunity for but solar thermal for fixture hot water use, though hot water use is not a high demand at the office buildings. This credit is based on amount of electrical or gas energy the PV or solar thermal offset of total building energy use. The 2 points shown in the ? column indicate the estimate of renewable energy generation of the PV system under consideration, though not proven to be cost effective.
1			Credit 3	**Enhanced Commissioning**	1	Services will be contracted.
1			Credit 4	**Enhanced Refrigerant Management**	1	HVAC equipment and fire suppression will not contain HCFCs or Halons.
1			Credit 5	**Measurement & Verification**	1	An energy and water management system will be put in place.
1			Credit 6	**Green Power**, 35% for 2 years	1	Tradeable renewable certificates will be purchased for the project.

4	4	5	**Materials & Resources**		Possible Points **13**	
Y	?	N				
Y			Prereq 1	**Storage & Collection of Recyclables**	Req.	Easily accessible areas for the separation, collection and storage of materials for recycling including (at a minimum) paper, glass, plastics, and metals, will be provided.
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors and Roof	1	n/a
		1	Credit 1.2	**Building Reuse**, Maintain 95% of Existing Walls, Floors and Roof	1	
		1	Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1	
1			Credit 2.1	**Construction Waste Management**, Divert 50%	1	The general contractor will be contracted to recycle and/or salvage and document a minimum of 75% (by weight) of construction, demolition, and land clearing waste.
1			Credit 2.2	**Construction Waste Management**, Divert 75%	1	
	1		Credit 3.1	**Materials Reuse**, Specify 5%	1	This credit will be assessed during demolition of the existing site. At a minimum it is expected that the existing AC paving and concrete from the floors and tilt-up buildings will be crushed and ground for reuse as base material under new paved areas.
		1	Credit 3.2	**Materials Reuse**, Specify 10%	1	
1			Credit 4.1	**Recycled Content**: 10% (post-consumer + 1/2 post-industrial)	1	10% threshold should be achieved with concrete and steel as designed. Remainder is dependent on material selection most of which is not yet determined.
	1		Credit 4.2	**Recycled Content**: 20% (post-consumer + 1/2 post-industrial)	1	

Menlo Gateway Mixed Use Offices

Menlo Park, CA

KEMA

LEED™ 2.2 Annotated Scorecard 03/02/10

Preliminary

Note: This scorecard has been developed during conceptual design and project application phase for purposes of identifying the most likely credits and scoring to ultimately be achieved by the project. Specific measures and strategies will be validated in design development and during construction.

41	19	9	**Total Project Score**

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

	1		Credit 5.1	**Regional Materials**, 10% Extracted and Mfd Regionally	1	Many project materials will be regionally (within 500 mile radius) sourced, but it remains to be seen if the cost of those materials will be 10% or more of the total material cost.
		1	Credit 5.2	**Regional Materials**, 20% Extracted and Mfd Regionally	1	
	1		Credit 6	**Rapidly Renewable Materials**, 2.5%	1	Dependent on material selection most of which is not yet determined.
1			Credit 7	**Certified Wood,** 50%	1	Specify Forest Stewardship Council wood

13	2		**Indoor Environmental Quality**		Possible Points	**15**
Y	?	N				
Y			Prereq 1	**Minimum IAQ Performance**	Req.	HVAC system designed to meet ASHRAE 62.1-2004.
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Req.	Smoking area will be provided outside the building and away from entrances and air intakes.
1			Credit 1	**Outdoor Air Delivery Monitoring**	1	A CO2 monitoring system will be used.
1			Credit 2	**Increased Ventilation**	1	30% more outside air than ASHRAE 62.1 requires will be provided.
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1	An indoor air quality management plan will be implemented during construction.
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1	An indoor air quality management plan will be implemented after construction, but prior to occupancy.
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1	Materials will be selected based on compliance.
1			Credit 4.2	**Low-Emitting Materials**, Paints and Coatings	1	Materials will be selected based on compliance.
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1	Materials will be selected based on compliance.
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood and Agrifiber	1	Materials will be selected based on compliance.
1			Credit 5	**Indoor Chemical & Pollutant Source Control**	1	Recessed grating pedimat system will be provided at all building entries; tenant specifications will require janitor's closets to be constructed with full height partitions, independently exhausted, and are provided with floor drains.
1			Credit 6.1	**Controllability of Systems**, Lighting	1	Overhead lighting controls and/or task lights will be available to most occupants.
	1		Credit 6.2	**Controllability of Systems,** Thermal Comfort	1	If feasible once interior design is finalized, thermal controls will be provided.
1			Credit 7.1	**Thermal Comfort**, Design	1	Designed to comply with ASHRAE Standard 55-2004, Addenda 1995, for thermal comfort standards.
1			Credit 7.2	**Thermal Comfort**, Verification	1	Space temperature and humidity will be monitored. A thermal comfort survey of building occupants will be given within 6-18 months of occupancy. A corrective action plan if more than 20% of occupants are dissatisfied will be implemented.
1			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1	Depends entirely on interior office layouts.
	1		Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1	Depends entirely on interior office layouts.

4	1		**Innovation & Design Process**		Possible Points	**5**
Y	?	N				
1			Credit 1.1	**Innovation in Design**: Green Building Education	1	Owner will provide elements of signage illustrating LEED and green building strategies, case study, informational pamphlets.
1			Credit 1.2	**Innovation in Design**: Green Cleaning	1	Owner will use a green cleaning protocol and specify acceptable cleaning products.
1			Credit 1.3	**Innovation in Design**: Biodiesel Site Equipment	1	Contractor must use biodiesel powered construction equipment and generators
	1		Credit 1.4	**Innovation in Design**: TBD	1	Additional opportunities for innovation are currently being assessed.
1			Credit 2	**LEED™ Accredited Professional**	1	Several members of the design team are LEED Accredited Professionals.

Water Efficient Landscaping Calculations
Menlo Gateway

TPWA = A x [ET(0) x k(s) x k(d) x k(mc)] / IE K(l) = k(s) x k(d) x k(mc) ET(l) = ET(0) x K(l) TPWA = A x [ET(l) / IE]

K(l) = Landscape Coefficient: Volume of water lost via evapotranspiration
k(s) = Species Factor: Variation of water needs by different plant species. This factor is subjective and should be approved by the LA. A species that does not require irrigation once established has a species factor of 0. The resulting K(l) is 0.
k(d) = Density Factor: Number of plants and total leaf area of a landscape. An average density factor has ground level shading of 60-100%. A low density factor has a 25% ground shading from trees.
k(mc) = Microclimate Factor: Environmental conditions specific to the landscape, including temperature, wind and humidity. An ave. k(mc) refers to conditions where land is unaffected by building, pavement, reflective surfaces & slope. Wind screens reduce k(mc).
ET(l) = Evapotranspiration Rate: A measurement of the total amount of water needed to grow plants and crops specific to the designed landscape. ET(0) is an average rate in inches for reference. July: San Jose = 7.4, Santa Rosa = 6.5, San Francisco = 4.9

Vegetation Type	Species Factor			Density Factor			Microclimate Factor		
	low	average	high	low	average	high	low	average	high
Trees	0.2	0.5	0.9	0.5	1.0	1.3	0.5	1.0	1.4
Shrubs	0.2	0.5	0.7	0.5	1.0	1.1	0.5	1.0	1.3
Groundcovers	0.2	0.5	0.7	0.5	1.0	1.1	0.5	1.0	1.2
Mixed: trees, shrubs, grdcr	0.2	0.5	0.9	0.6	1.1	1.3	0.5	1.0	1.4
Turfgrass	0.6	0.7	0.8	0.6	1.0	1.0	0.5	1.0	1.2

Design Case Calculation (July)

Vegetation Type	Area (acres)	ET(0)* (inches)	Species Factor^	Microclimate Factor	Density Factor	Irrigation Efficiency		TPWA (gal)
Independence Mixed Landscaping	2.8	6.74	0.4	1	1	0.9		586,173.46
Constitution Mixed Landscaping	4	6.74	0.4	1	1	0.9		837,390.66
							Total Potable Water Applied (gal)	**1,423,564**

Baseline Case Calculation (July)

Vegetation Type	Area (acres)	ET(0)* (inches)	Species Factor	Microclimate Factor	Density Factor	Irrigation Efficiency		TPWA (gal)	Percent Water Saved with Design
IndependenceTurfgrass	2.8	6.74	0.7	1	1	0.62		1,489,069.69	
Constitution Turfgrass	4	6.74	0.7	1	1	0.62		2,127,242.41	61%
							Total Potable Water Applied (gal)	**3,616,312**	

Conversion Factor 0.6233 gal/sf/in
*San Mateo Evapotranspiration Rate 6.74 per CIMIS station 171 Union City
^At least 20% of species will be low water consuming plants per Water Use Coefficient of Landscape Species listing.

Appendix E: Water Feature Calculations

Menlo Gateway Water Features

	Area (s.f.)	Depth (ft)	Volume (c.f.)	Volume (gal)	Fill per Year	Total Demand (gal/yr)	Total Demand (gal/day)
Lap Pool	3,750	5	18,750	140,250	3	420,750	1,153
Exercise Pool	1,875	5	9,375	70,125	3	210,375	576
Fountain Jets	9	4	36	269	1	269	1
Recirculating Fountains	9	2	18	135	1	135	0
Splash Yard	200	1	200	1,496	1	1,496	4
			28,379	210,572		633,025	1,734

Water Feature Demand Factor	0.061

A T T A C H M E N T B

Kimley-Horn Memo

Kimley-Horn and Associates, Inc.

Memorandum

Suite 370
6130 Stoneridge Mall Road
Pleasanton, California
94588

Ph. 925-398-4840
Fax 925-398-4849

To: David Bohannon
David D. Bohannon Organization
60 31st Avenue
San Mateo, CA 94403-3497
CC: Jennifer Renk and Tim Tosta (Luce, Forward, Hamilton & Scripps LLP)
From: Michael Mowery and Jim West
Date: 3 March 2010
Re: Menlo Gateway Project – TDM Program
Recommended Program Implementation and URBEMIS Application

C/CAG TDM COMPLIANCE PLAN

The Menlo Gateway project ("Project") will replace nearly 220,000 square feet of existing office uses with a new office, hotel, fitness club, restaurant, and retail uses.

Per the requirement of City/County Association of Governments of San Mateo County (C/CAG), development projects that generate 100 or more peak hour trips in San Mateo County must implement Transportation Demand Management (TDM) measures to reduce the net number of trips that the project is anticipated to generate. Furthermore, C/CAG requires that "local jurisdictions must ensure that the developer and/or tenants will reduce the demand for all new peak hour trips (including the first 100 trips) projected to be generated by the development." [1] Guidelines prepared by C/CAG identify a combination of measures that can be employed to satisfy this requirement. These measures represent the base minimum that must be implemented for the Project and are outlined in the Preliminary TDM Plan, which was an appendix to the Draft Environmental Impact Report ("DEIR")[2]. Additional or supplemental TDM program elements may be deployed to further reduce the percentage of overall project trips.

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[1] Revised C/CAG guidelines for the Implementation of the Land Use Component of the Congestion Management Program, September 21, 2004.
[2] PBS&J, *Draft Environmental Impact Report, Menlo Gateway Project Environmental Impact Report*, July 2009.

It is important to note that the Menlo Gateway DEIR conservatively calculated project trips as if the Project is comprised of free-standing single uses, rather than a project comprised of complementary land uses that result in internally captured project trips within the site. According to the Institute of Transportation Engineers, "This capture of trips internal to the site has the net effect of reducing vehicle trip generation between the overall development site and the external street system."[3] For Menlo Gateway, internally captured trips will principally occur between the office, health club, hotel, and restaurant uses. This internal capture, based on the ITE methodology contained in *Trip Generation Handbook*, results in a trip reduction of 9.6% in daily trips, which is unaccounted for in the Menlo Gateway DEIR. The associated ITE worksheet for the calculated trip reduction is included as an attachment to this memorandum.

The C/CAG minimum threshold that must be implemented by the Project corresponds with the number of expected peak project trips calculated in the Menlo Gateway DEIR (minus the project internal capture, and minus trips generated by the existing office development that will be displaced by the Menlo Gateway project).

In the 7 July 2009 Preliminary TDM memorandum, Kimley-Horn outlined TDM measures that could be implemented at Menlo Gateway to meet the minimum C/CAG requirement. Measures included:

- Bike lockers and racks
- Showers and changing rooms
- Shuttle service to Caltrans stations
- Subsidized public transit passes
- Subsidies for walking and bicycling
- Preferential parking for vanpool and carpool vehicles
- Vanpool program
- Commute assistance center
- Employee commute surveys
- Alternative work schedules
- On-site amenities
- Guaranteed ride home

[3] *Trip Generation Handbook, 2nd Edition*, Institute of Transportation Engineers, 2004.

- Improved infrastructure for walking, cycling, and transit use
- Information kiosks

A summary of the measures listed in the Preliminary TDM memorandum is included as an attachment to this memorandum and was included as an Appendix to the DEIR.

SUPPLEMENTAL TDM MEASURES

Implementation of the measures listed above in conjunction with additional TDM measures increases the opportunity for and likelihood of employees and visitors choosing alternative travel options, rather than driving alone. Some of these additional measures include:

- Increased Transit Subsidies – Subsidizing transit passes reduces the number of single-occupant vehicles on the road by encouraging employees to use transit for getting to and from work. Menlo Gateway could increase the financial incentives for transit riders from the minimum C/CAG level of $1 per day.
- Increased Subsidies for Walking and Bicycling – Bike and walk subsidies help to encourage alternative modes of commuting while also helping to defray costs for clothing, shoes, bike tires, lights, helmets, etc. Menlo Gateway could increase the financial incentives to pedestrians and cyclists from the minimum C/CAG level of $1 per day.
- TransLink - TransLink is a transit fare payment system that utilizes a reloadable debit-type card that can be used for paying fares on multiple transit systems such as AC Transit, BART, Caltrain, Golden Gate Transit, and San Francisco Muni. TransLink can also be used to pay for parking at BART stations. Menlo Gateway could provide TransLink cards to site employees that wish to ride transit.
- Commuter Check – Commuter Check is a program allowing tax free dollars to be used for purchasing transit tickets, tokens or passes, paying vanpool expenses, and commercial parking costs. Menlo Gateway could set up a Commuter Check program to allow employees and/or employers to benefit from the tax-free commuter benefits.

- Car Share - Carsharing is an urban car rental service where program members can reserve a rental vehicle, pick it up at a designated location, and return the vehicle when done. Reservations are typically for short periods of time, often by the hour. Carsharing at Menlo Gateway would allow employees to take transit or other alternative mode of transportation to work, but have access to a Car Share vehicle for errands, meetings, emergencies, etc. during the workday if needed.
- Electric Vehicle Charging Stations - A charging station is a facility that supplies electricity for recharging electric vehicles (including plug-in hybrids). Menlo Gateway could provide charging stations at the site. (The stations would encourage wider use of electric vehicles resulting in an air quality benefit but would not necessarily reduce the number of overall Project trips.)
- Paid Parking – Menlo Gateway could charge for parking for employees and visitors, which would reduce both Project trips and Greenhouse Gas emissions. The price charged for parking at the site would have a corresponding effect on the percentage of trip reduction but could generate an undesirable side effect by pushing parking demand into nearby unregulated areas.

RECOMMENDED TDM PLAN AND EFFECTIVENESS

An effective TDM program "provides alternatives to the traveler and then reinforces the TDM travel decision by implementing incentives and disincentives that are clearly perceived by the individual making the decision to travel."[4]

The effectiveness of potential TDM measures was evaluated using the COMMUTER software available through the U.S. EPA. One of several functions contained in the spreadsheet-based computer model is the ability to "assess the likely effectiveness of various commuter benefit packages and other measures to facilitate the use of commute alternatives."[5] In other words, the software was used to quantify the expected change in commuter

[4] *Implementing Effective Travel demand Management Measures: Inventory of Measures and Synthesis of Experience*, U.S. Department of Transportation, 1993.
[5] *COMMUTER Model v2.0User Manual*, United States Environmental Protection Agency (EPA), October 2005.

mode share for various TDM programs that could be implemented at Menlo Gateway, including the minimum needed to satisfy C/CAG requirements. Specific TDM elements that were evaluated within this COMMUTER program included:

- Transit fare subsidies and other incentives that reduce the cost of using transit;
- Transit service improvements (faster or more frequent service);
- Ridesharing programs, in which employers support carpooling and/or vanpooling through on-site programs, financial incentives, or preferential parking;
- Other actions that change the time and/or cost of traveling by any particular mode;
- Non-motorized (e.g., bicycle and pedestrian) commuting incentive programs;
- Alternative work schedules, including flex-time, compressed work weeks, and staggered work hours.[6]

The COMMUTER model is based on a robust sample of empirical data across the U.S. and evaluates travel impact components using a logit mode-choice model. This allows the user to analyze the effects of several strategies simultaneously. In addition, model adjustment coefficients for the San Francisco Bay Area are included in the software and were further refined for Menlo Park conditions as data was readily available. Results of the software are reported as the change in vehicle trips to the project site by transportation mode.

TDM programs (i.e. groups of strategies/measures) that were evaluated included the following:

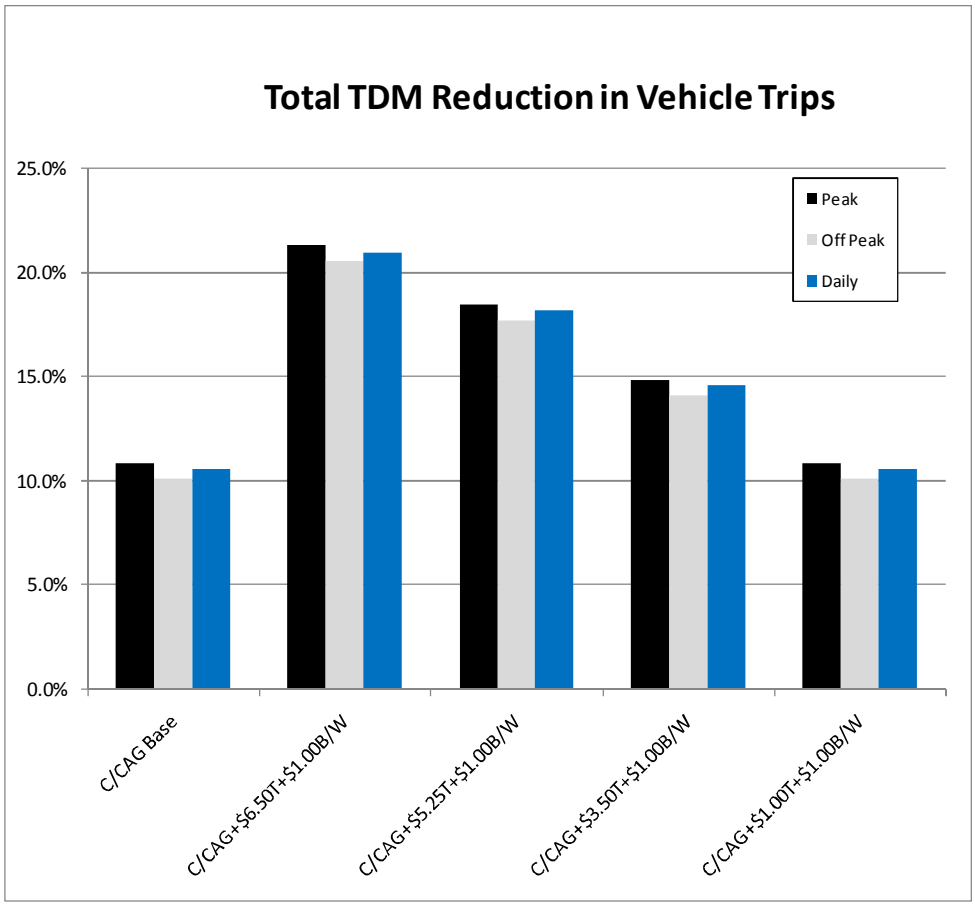
- C/CAG Base – Program elements include bike lockers and racks, showers and changing rooms, shuttle service to Caltrans stations, subsidized public transit passes ($1/day), subsidies for walking and bicycling $1/day), vanpool program, preferential parking for vanpool and carpool vehicles, commute assistance center, employee commute surveys, alternative work schedules, on-site amenities, and guaranteed ride home.

[6] Ibid.

- C/CAG + $6.50 Transit + $1.00 Bike/Walk – C/CAG base plus $6.50 per day (total) for transit and $1.00 per day (total) for bike and walk subsidy.
- C/CAG + $5.25 Transit + $1.00 Bike/Walk – C/CAG base plus $5.25 per day (total) for transit and $1.00 per day (total) for bike and walk subsidy.
- C/CAG + $3.50 Transit + $1.00 Bike/Walk – C/CAG base plus $3.50 per day (total) for transit and $1.00 per day (total) for bike and walk subsidy.
- C/CAG + $1.00 Transit + $1.00 Bike/Walk – C/CAG base plus $1.00 per day (total) for transit and $1.00 per day (total) for bike and walk subsidy.

The effect of each TDM program is summarized in the table and chart below:

Scenario	TDM Elements	Trip Reduction		
		Peak	Off Peak	Daily
C/CAG Base + $1.00 Transit + $1.00 Bike, Walk	Bike Lockers and Racks Showers and Changing Areas Enhanced Shuttles to Menlo Park Station New Shuttles to Redwood City Station Subsidized Transit Passes ($1/day) Subsidized Walk/Bike ($1/day) Preferential Car/Van Pool Parking Van Pool Program Guaranteed Ride Home Commute Assistance Center Compressed Work Week Flexible Work Hours	10.9%	10.1%	10.6%
C/CAG Base + $6.50 Transit + $1.00 Bike, Walk	C/CAG base plus $6.50 per day (total) for transit and $1.00 per day (total) for bike and walk subsidy.	21.3%	20.6%	21.0%
C/CAG Base + $5.25 Transit + $1.00 Bike, Walk	C/CAG base plus $5.25 per day (total) for transit and $1.00 per day (total) for bike and walk subsidy.	18.5%	17.7%	18.2%
C/CAG Base + $3.50 Transit + $1.00 Bike, Walk	C/CAG base plus $3.50 per day (total) for transit and $1.00 per day (total) for bike and walk subsidy.	14.9%	14.1%	14.6%
C/CAG Base + $1.00 Transit + $1.00 Bike, Walk	C/CAG base plus $1.00 per day (total) for transit and $1.00 per day (total) for bike and walk subsidy.	10.9%	10.1%	10.6%



As shown in the table and chart, the C/CAG base TDM implementation is expected to reduce vehicle trips to the site by approximately 10.6%. Other more robust TDM programs are expected to reduce vehicle trips to the site up to an additional 10.4 %, depending on the program. Each program provides a strong transit subsidy and also offers financial incentives for employees to walk or bicycle to work.

USING TDM PLAN RESULTS FOR ENVIRONMENTAL EVALUATION IN URBEMIS

The results of the TDM effectiveness evaluation in the COMMUTER software and other traffic evaluations are to be utilized for an evaluation of the forecasted Green House Gas (GHG) emissions in the URBEMIS air quality model. The effect of transportation on GHG evaluations is categorized in the mobile sources category of the evaluation. For this evaluation in URBEMIS, the following information was provided for use in the URBEMIS model:

- Menlo Gateway ITE Internal Capture Worksheet
- URBEMIS Primary and Diverted Link Recommended Usage
- URBEMIS Trip Type Recommended TDM Application
- TDM Program Employee Trip Reduction

Each of these URBEMIS inputs is discussed below.

Menlo Gateway ITE Internal Capture Worksheet

As noted previously, the design of the Menlo Gateway project includes complimentary land uses such as office, hotel, health club, restaurant, and retail. The URBEMIS model evaluation utilized the DEIR daily trip information and incorporated the trip reduction associated with these complimentary land uses as “internally captured” at the site. The respective trip reductions are as follows:

- Office: Internal capture trip reduction of 1.8%
- Hotel: Internal capture trip reduction of 18.1%
- Health Club: Internal capture trip reduction of 20.7%
- Restaurant: Internal capture trip reduction of 42.5%

Each of these internal capture percentages was applied to the associated land use to reduce the quantity of new total daily trips for the URBEMIS mobile emissions evaluation. It should be noted that no internal capture trip reduction was calculated nor applied for the Retail land use, which is the smallest trip generation land use of the Menlo Gateway project. This omission provides an overall conservative total of internal capture trip

reduction. The vehicular trips generated by the Retail land use and the potential impact of those trips is retained in all other evaluation measures, and only omitted from the internal capture evaluation.

URBEMIS Primary and Diverted Link Recommended Usage

The Menlo Gateway DEIR conservatively calculated project trips as if no project-generated trips would come from pass-by or diverted link trips. Pass-by trips represent trips already on the road which stop as they pass by the site as a matter of convenience on their path to another destination. These are trips to and from the project site but are not new trips. Diverted link trips account for trips already on the road that are attracted from nearby roadways but require a diversion from that primary roadway to another roadway to access the site. Like pass-by, diverted link trips are not new trips. Pass-by and diverted link trips are considered to be "secondary trips" since they are not the ultimate destination of the trip.

Only some land uses attract pass-by or diverted link trips. In some instances, the pass-by or diverted link trips occur but the volume is nominal making it inconsequential to the analysis. Commercial and retail uses typically attract the greatest volumes of these trip types.

Location of the project site also influences the amount of pass-by and diverted link trips. If the project is located along a major roadway where drivers can conveniently turn from the roadway into the site driveway, then pass-by is generally greater and diverted link is lower. Conversely, if the project is located in a somewhat isolated location without direct access to a major roadway, then pass-by is often lower and diverted link is greater.

In preparation of the air quality analysis, the question was raised of whether it was appropriate to assume pass-by or diverted link trips in the analysis using URBEMIS software. Although we concur that the location of the project (just off U.S. 101 and Bayfront Expressway) limits the number of pass-by trips per ITE some will occur for selected uses. The majority of the secondary trips, however, will be diverted from other nearby roadways such as U.S. 101 and Bayfront Expressway and are therefore appropriately classified as diverted link trips.

Kimley-Horn conducted a more detailed review of the appropriate settings to be used in the URBEMIS air quality model with regard to diverted link and pass-by trips. It should be noted that our guidance in this memorandum is strictly for use in the evaluation of air quality impacts and not trip generation related traffic congestion impacts. Currently the City's Traffic Impact requirements and the specific DEIR for this project do no incorporate internal capture, pass-by, or diverted link analysis into its congestion evaluation.

According to the URBEMIS software User's Guide, pass-by trips are assumed to increase their trip length by 0.1 miles. This accounts for turning off the primary roadway into the site and later returning to the roadway after completing the stop. Anything over 0.1 miles in the model essentially falls into the diverted link category. The increased travel distance of diverted link trips is assumed to be equal to 25 percent of the original trip length. This accounts for the diversion from the nearby primary roadway to another roadway to reach the site and then return to the original route after completing the stop. Because the Menlo Gateway site is directly adjacent to U.S. 101 and Bayfront Expressway, nearly all secondary trips (i.e. diverted link and pass-by) are more than 0.1 miles but less than 1.0 miles from the primary roadway. Therefore, in URBEMIS, it is most appropriate to consider both as diverted link trips.

Our direction is that the URBEMIS model should include primary and diverted link percentage data for each of the land uses. Our direction is to combine the pass-by percentage with the diverted link percentage thereby translating the incorrect definition and short distance of 0.1 mile to 25% of the primary trip or approximately 2.4 miles in this case. A summary of our suggested inputs is below:

Land Use	URBEMIS DEFAULT (w/pass-by) (Primary %: Diverted Link %: Pass-by %)	URBEMIS DEFAULT (pass-by combined) (Primary %: Diverted Link %: Pass-by %)
Office	80:15:05	80:20:00
Hotel	60:35:05	60:40:00
Health Club	50:40:10	50:50:00
Restaurant	50:40:10	50:50:00
Retail	45:40:15	45:55:00

URBEMIS Trip Type Recommended TDM Application

The URBEMIS model evaluates three types of trips to each commercial land use that it includes in the model programming. These three types of trips are: Commercial Commute; Commercial Non-work; and, Commercial Customer. Each trip type value represents the percentage of worker commute trips attracted to that land use as a percentage of all trips generated by that land use. For example, an office land use has a higher percentage of commercial commute trip type than a retail store where customers rather than employees generate the higher quantity of trips. The trip type percentages for the Menlo Gateway project are shown below:

Land Use	Trip Type	% of Trip Type
Hotel	Commercial Commute	5.0%
	Commercial Non-work	2.5%
	Commercial Customer	92.5%
Racquet/Health Club	Commercial Commute	5.0%
	Commercial Non-work	2.5%
	Commercial Customer	92.5%
Office Park	Commercial Commute	48.0%
	Commercial Non-work	24.0%
	Commercial Customer	28.0%
Quality Restaurant	Commercial Commute	8.0%
	Commercial Non-work	4.0%
	Commercial Customer	88.0%
Retail	Commercial Commute	2.0%
	Commercial Non-work	1.0%
	Commercial Customer	97.0%

Review of the trip type percentages shows a direct correlation between daily commute trips and non-work trips. Non-work trips are listed as half of the daily percentage of daily commute trips. This relationship is supported by available transportation research that approximately half of the employees at a given site would also complete a midday trip for personal reasons such as lunch or errands or professional reasons such as a midday meeting. Therefore, application of an employee-based TDM program

should be applied to both the commute and non-work trip type percentages of daily traffic. This application assumes that if an employee has made an alternative mode trip during the commute period then a personal vehicle is not available for a midday trip and therefore they will again choose an alternative mode or decide to eliminate their midday trip creating the same trip reduction percentage.

Although it is assumed that some Commercial Customer trips to the Menlo Gateway project may be completed using alternate transportation modes, those trips are not subject to the associated TDM subsidies and therefore were not studied in the TDM trip reduction evaluation. Therefore, our direction is that the URBEMIS model should apply the selected TDM program and its corresponding daily trip reduction percentage to both the Commute and Non-work trip type categories. The Commercial Customer trip type would be excluded from a TDM trip reduction.

TDM Program Employee Trip Reduction

Based on the application of the transportation elements discussed above and other non-transportation related elements in the URBEMIS model, varying TDM trip reduction levels were reported to Kimley-Horn by ENVIRON. Kimley-Horn utilized these trip reduction levels to enhance the Preliminary C/CAG TDM Program to develop the three additional TDM Program options presented earlier. The four total TDM Program options may be applied in different calendar year evaluations in the URBEMIS model, corresponding to changing model inputs and their impacts on the overall air quality evaluation. Kimley-Horn has concluded that the following TDM program would achieve the greatest target trip reduction assuming the Project is completed in 2017:

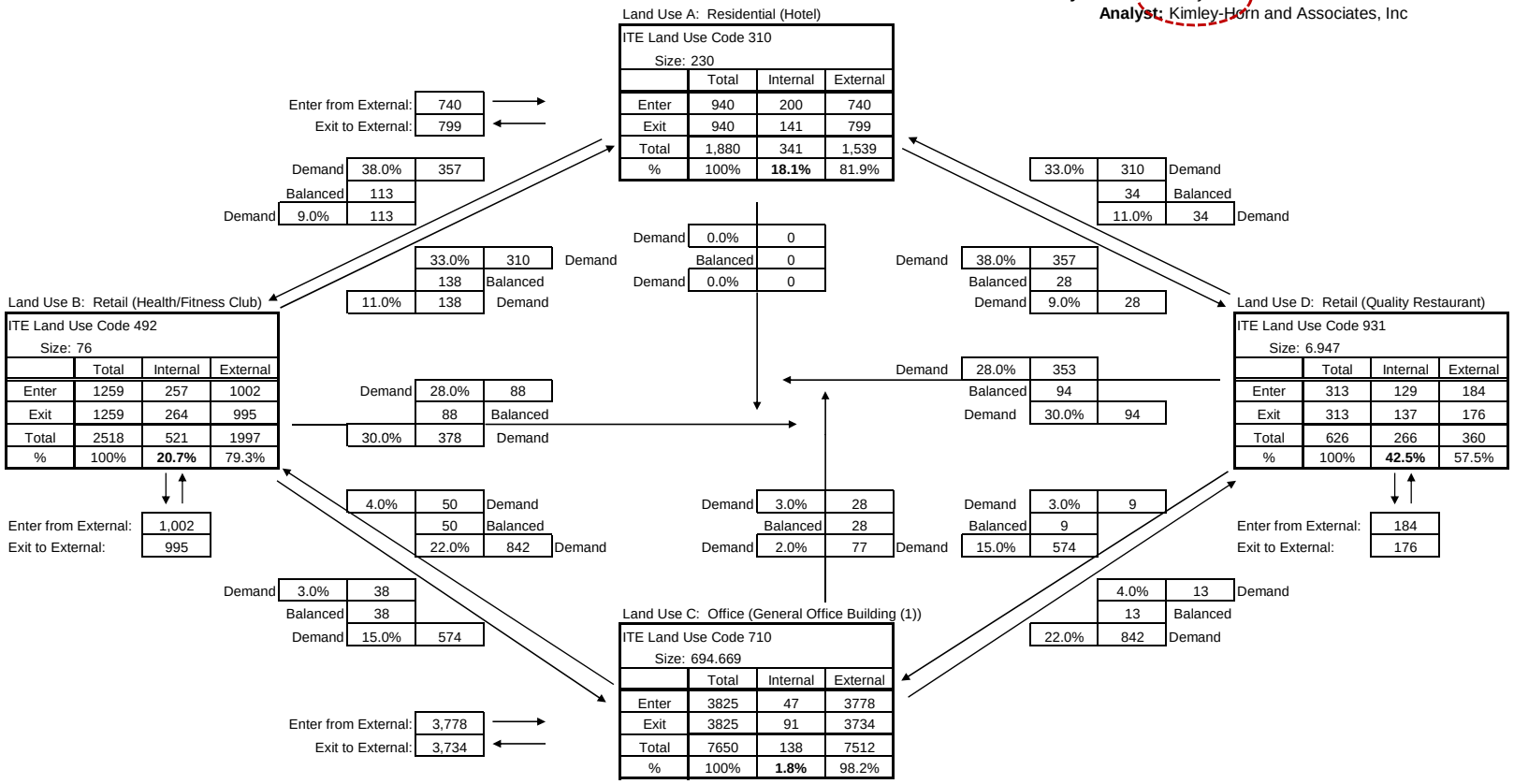
- <u>C/CAG + $3.50 Transit + $1.00 Bike/Walk</u> – C/CAG base plus $3.50 per day (total) for transit and $1.00 per day (total) for bike and walk subsidy.

<u>ATTACHMENTS:</u>
Menlo Gateway ITE Internal Capture Worksheet
Menlo Gateway Preliminary TDM C/CAG Base Program Table

ITE MULTI-USE PROJECT INTERNAL CAPTURE WORKSHEET

(Source: Chapter 7, ITE *Trip Generation Handbook*, June 2004)

Project Number: 097711000
Project Name: Menlo Gateway
Scenario:
Analysis Period: Daily
Analyst: Kimley-Horn and Associates, Inc



NET EXTERNAL TRIPS FOR MULTI-USE DEVELOPMENT

Category	Land Use A	Land Use B	Land Use C	Land Use D	Total
Enter	740	1,002	3,778	184	5,704
Exit	799	995	3,734	176	5,704
Total	1,539	1,997	7,512	360	**11,408**
Single Use Trip Gen Estimate	1,880	2,518	7,650	626	**12,674**

Menlo Gateway Transportation Demand Management Program

Measure	Rate	Notes	Peak Trip Credit Rate	Program Elements	Trip Credits
Bicycle Storage - Class 1 Bike Lockers	one credit per 3 bike lockers/racks		1/3	6	2
Bicycle Storage - Class 2 Bike Racks	one credit per 3 bike lockers/racks		1/3	24	8
Showers/Changing Room	ten credits per 1 shower/changing room	A	10	12	120
Additional credits for combination w/ 5 bike lockers	five credits for 5 or more bike lockers		5	1	5
Shuttle Service AM/PM to Menlo Park Station (fund new 20 pass shuttle in peak hour)	one credit per 1 peak hour round trip seat	B	1	20	20
Shuttle Service AM/PM to Redwood City Station (fund new 20 pass shuttle in peak hour)	one credit per 1 peak hour round trip seat	B	1	20	20
Additional credits with guaranteed ride home program	one credit per 1 shuttle credit		1	40	40
Subsidize transit tickets	one trip credit for each transit pass subsidized at $20/month/one year	C	1	100	100
Subsidize pedestrians/bicyclists who commute to work	one trip credit for each employee subsidized at $20/month/one year	D	1	125	125
Preferential carpool parking	two credits per 1 space reserved	E	2	208	416
Preferential vanpool parking	seven credits per 1 space reserved	E	7	4	28
Implement vanpool program	seven credits per vanpool formed		7	4	28
Additional credits with guaranteed ride home program	three credits per vanpool		3	4	12
Operation of a commute assistance center	one credit per program feature	F	1	5	5
Additional credits for staffing the center	one credit for each hour staffed (up to 20 trips/200 tenants)	F	1	5	5
Employee commute survey	three credits for survey administered twice yearly		3	1	3
Compressed work week	one credit for every 5 employees offered the opportunity for four-day work week	G	1/5	44	9
Flexible hours	one credit for every 1 employee offered flex time	H	1	44	44
Provision of on-site amenities	five credits per feature	I	5	3	15
Join Alliance's guaranteed ride home program	two credits for every 100 employees enrolled in program w/ Alliance	J	0.01	2500	25
Combination of ten TDM elements	five credits for combination of 10 elements		5	1	5
Create connections for non-motorized travel	five credits per each connection	K	5	3	15
Install/maintain alternative transportation kiosks	five credits for each kiosk implemented	L	5	5	25

Total	**1075**
Trip Credit Goal	**1068**
Trip Credits Needed	**-7**

Notes:

A Assumed 2 showers per 2 genders per 3 office buildings.
B Assumed project will operate/fund equivalent of 20 round trip seats during peak hour.
C Assumed 4% of ~2500 employees. (Consistent percent as transit mode share for Menlo Park)
D Assumed 5% of ~2500 employees. (Consistent percent as bike/walk mode share for Menlo Park)
E Assumed that 8% of 2667 site parking is devoted to a combination of carpool and vanpool spaces. (Consistent percent as carpool mode share for Menlo Park)
F Assumed features include: transit information brochure rack; computer kiosk connected to Internet; telephone; staffed 5 hr/wk (with commute and transit information numbers); desk and chairs (for personalized trips planning); and, transit pass sales.
G Assumed 2% of ~2200 office employees. (Compressed work week assumed to not be available to other site employees.)
H Assumed 2% of ~2200 office employees. (Flexible hours assumed to not be available to other site employees.)
I Assumed site amenities include on-site fitness center, restaurant, and retail services
J Assumed full enrollment of all projected project employees. Credit based on 1% of total enrolled per C/CAG.
K Assumed sidewalk connection between north end of project to Marsh Road; sidewalk on Chrysler between Constitution and Independence; and, sidewalk on Independence between Constitution and NW corner of project site.
L Assumed that kiosks are located in 3 office buildings, heath club, and hotel.

Other Assumptions:

Existing alternate mode split in Menlo Park is 4% transit; 9% combined bike, walk, other; 8% carpool per US Census data.
Total employees at 3 office buildings projected to be approximately 2200.
Total employees for hotel, restaurant, and fitness center projected to be approximately 300.
Alliance will pay 50% of per unit costs for bike racks/lockers, up to $500/unit.
Alliance will provide free gas cards, bus passes, and other funding startup incentives.

A T T A C H M E N T C

URBEMIS Output

URBEMIS Output
Project - 2020

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: U:\Menlo Gateway Project\Calculations\traffic\URBEMIS\Vehicular_Baseline_2020.urb924

Project Name: Menlo Park GPA-ZOA, Proposed Project

Project Location: San Mateo County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO2
Racquetball/health	1,379.32
Quality resturant	249.32
Hotel	1,186.25
Strip mall	299.40
Office park	7,374.19
TOTALS (tons/year, unmitigated)	10,488.48

Includes correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Racquetball/health		28.52	1000 sq ft	69.47	1,981.28	9,221.33

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Quality resturant		51.08	1000 sq ft	6.95	355.01	1,665.16
Hotel		6.64	rooms	230.00	1,527.20	7,960.87
Strip mall		44.20	1000 sq ft	10.42	460.56	1,999.24
Office park		9.99	1000 sq ft	694.67	6,939.75	49,253.42
					11,263.80	70,100.02

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	56.3	0.0	100.0	0.0
Light Truck < 3750 lbs	11.7	0.0	99.1	0.9
Light Truck 3751-5750 lbs	20.0	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.7	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	66.7	33.3
Med-Heavy Truck 14,001-33,000 lbs	0.9	0.0	22.2	77.8
Heavy-Heavy Truck 33,001-60,000 lbs	0.1	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.8	39.3	60.7	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.4	0.0	100.0	0.0

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Racquetball/health				4.5	2.3	93.3
Quality resturant				7.2	3.6	89.2
Hotel				4.5	2.3	93.3
Strip mall				1.8	0.9	97.3
Office park				46.5	23.3	30.3

Operational Changes to Defaults

Ambient summer temperature changed from 85 degrees F to 60 degrees F

Ambient winter temperature changed from 40 degrees F to 50 degrees F

URBEMIS Output
Project - 2017

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: U:\Menlo Gateway Project\Calculations\traffic\URBEMIS\Vehicular_Baseline_2017.urb924

Project Name: Menlo Park GPA-ZOA, Proposed Project

Project Location: San Mateo County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO2
Racquetball/health	1,380.31
Quality resturant	249.50
Hotel	1,187.11
Strip mall	299.61
Office park	7,379.41
TOTALS (tons/year, unmitigated)	10,495.94

Includes correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2017 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Racquetball/health		28.52	1000 sq ft	69.47	1,981.28	9,221.33

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Quality resturant		51.08	1000 sq ft	6.95	355.01	1,665.16
Hotel		6.64	rooms	230.00	1,527.20	7,960.87
Strip mall		44.20	1000 sq ft	10.42	460.56	1,999.24
Office park		9.99	1000 sq ft	694.67	6,939.75	49,253.42
					11,263.80	70,100.02

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	56.2	0.0	99.8	0.2
Light Truck < 3750 lbs	11.7	0.0	98.3	1.7
Light Truck 3751-5750 lbs	20.1	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.7	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	66.7	33.3
Med-Heavy Truck 14,001-33,000 lbs	0.9	0.0	22.2	77.8
Heavy-Heavy Truck 33,001-60,000 lbs	0.1	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.8	42.9	57.1	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.4	0.0	100.0	0.0

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Racquetball/health				4.5	2.3	93.3
Quality resturant				7.2	3.6	89.2
Hotel				4.5	2.3	93.3
Strip mall				1.8	0.9	97.3
Office park				46.5	23.3	30.3

Operational Changes to Defaults

Ambient summer temperature changed from 85 degrees F to 60 degrees F

Ambient winter temperature changed from 40 degrees F to 50 degrees F

URBEMIS Output
Mitigated Project - 2017

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: U:\Menlo Gateway Project\Calculations\traffic\URBEMIS\Mitigated\Vehicular_Mitigated_14.6%_2017.urb924

Project Name: Menlo Park GPA-ZOA, Proposed Project

Project Location: San Mateo County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO2
Racquetball/health	1,375.55
Quality resturant	248.12
Hotel	1,182.77
Strip mall	299.11
Office park	7,136.44
TOTALS (tons/year, unmitigated)	10,241.99

Includes correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2017 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Racquetball/health		28.44	1000 sq ft	69.47	1,975.73	9,190.16

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Quality resturant		50.83	1000 sq ft	6.95	353.27	1,656.06
Hotel		6.62	rooms	230.00	1,522.60	7,932.31
Strip mall		44.14	1000 sq ft	10.42	459.94	1,995.95
Office park		9.68	1000 sq ft	694.67	6,724.41	47,639.02
					11,035.95	68,413.50

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	56.2	0.0	99.8	0.2
Light Truck < 3750 lbs	11.7	0.0	98.3	1.7
Light Truck 3751-5750 lbs	20.1	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.7	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	66.7	33.3
Med-Heavy Truck 14,001-33,000 lbs	0.9	0.0	22.2	77.8
Heavy-Heavy Truck 33,001-60,000 lbs	0.1	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.8	42.9	57.1	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.4	0.0	100.0	0.0

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Racquetball/health				4.3	2.2	93.6
Quality resturant				7.0	3.5	89.5
Hotel				4.3	2.2	93.6
Strip mall				1.7	0.9	97.5
Office park				45.8	22.9	31.3

Operational Changes to Defaults

Ambient summer temperature changed from 85 degrees F to 60 degrees F

Ambient winter temperature changed from 40 degrees F to 50 degrees F

URBEMIS Output

"Hotel" Scenario - 2020

Hotel, Fitness, Restaurant, and Retail

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: U:\Menlo Gateway Project\Calculations\traffic\URBEMIS\Office_Hotel\Vehicular_Baseline_HOTEL_2020.urb924

Project Name: Menlo Park GPA-ZOA, Proposed Project

Project Location: San Mateo County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO2
Racquetball/health	1,379.32
Quality resturant	249.32
Hotel	1,186.25
Strip mall	299.40
TOTALS (tons/year, unmitigated)	3,114.29

Includes correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Racquetball/health		28.52	1000 sq ft	69.47	1,981.28	9,221.33
Quality resturant		51.08	1000 sq ft	6.95	355.01	1,665.16

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Hotel		6.64	rooms	230.00	1,527.20	7,960.87
Strip mall		44.20	1000 sq ft	10.42	460.56	1,999.24
					4,324.05	20,846.60

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	56.3	0.0	100.0	0.0
Light Truck < 3750 lbs	11.7	0.0	99.1	0.9
Light Truck 3751-5750 lbs	20.0	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.7	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	66.7	33.3
Med-Heavy Truck 14,001-33,000 lbs	0.9	0.0	22.2	77.8
Heavy-Heavy Truck 33,001-60,000 lbs	0.1	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.8	39.3	60.7	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.4	0.0	100.0	0.0

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Racquetball/health				4.5	2.3	93.3
Quality resturant				7.2	3.6	89.2
Hotel				4.5	2.3	93.3
Strip mall				1.8	0.9	97.3

Operational Changes to Defaults

Ambient summer temperature changed from 85 degrees F to 60 degrees F

Ambient winter temperature changed from 40 degrees F to 50 degrees F

URBEMIS Output
"Office" Scenario - 2020
Office

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: U:\Menlo Gateway Project\Calculations\traffic\URBEMIS\Office_Hotel\Vehicular_Baseline_OFFICE_2020.urb924

Project Name: Menlo Park GPA-ZOA, Proposed Project

Project Location: San Mateo County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	CO2
Office park	7,374.19
TOTALS (tons/year, unmitigated)	7,374.19

Includes correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Office park		9.99	1000 sq ft	694.67	6,939.75	49,253.42
					6,939.75	49,253.42

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	56.3	0.0	100.0	0.0

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Truck < 3750 lbs	11.7	0.0	99.1	0.9
Light Truck 3751-5750 lbs	20.0	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.7	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	66.7	33.3
Med-Heavy Truck 14,001-33,000 lbs	0.9	0.0	22.2	77.8
Heavy-Heavy Truck 33,001-60,000 lbs	0.1	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.8	39.3	60.7	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.4	0.0	100.0	0.0

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

% of Trips - Commercial (by land use)

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Office park				46.5	23.3	30.3

Operational Changes to Defaults

Ambient summer temperature changed from 85 degrees F to 60 degrees F

Ambient winter temperature changed from 40 degrees F to 50 degrees F

A T T A C H M E N T D

EMFAC Output

Title : San Mateo County Avg Annual CYr 2020 - Group A
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2009/12/09 17:38:53
Scen Year: 2020 -- All model years in the range 1976 to 2020 selected
Season : Annual
Area : San Mateo
****
Year: 2020 -- Model Years 1976 to 2020 Inclusive -- Annual
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Mateo County Average

Table 1: Running Exhaust Emissions (grams/mile)

Pollutant Name: Total Organic Gases Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
25	3.72	0.032	0.183	0.032	3.379	0.064	0.109	0.065	3.605	0.052	0.109	0.053	11.91	0.073	0.095	0.077	4.986	0.085	0.177	0.106	4.986	0.086	0.16	0.117	7.474	0.207	0.194	0.197	23.846	3.921	0.561	0.788	7.474	0.301	0.174	0.203	0	1.083	0.674	0.766	3.538	1.772	0	2.406	0	1.743	0.415	0.697	7.474	0.148	0.114	0.148	3.601	0.055	0.276	0.071
30	3.178	0.025	0.157	0.026	2.887	0.052	0.094	0.053	3.08	0.042	0.094	0.043	10.172	0.059	0.081	0.062	3.86	0.066	0.152	0.085	3.86	0.066	0.137	0.096	5.784	0.161	0.166	0.166	18.449	3.035	0.476	0.649	5.784	0.233	0.149	0.169	0	0.838	0.563	0.625	3.351	1.61	0	2.235	0	1.35	0.356	0.567	5.784	0.114	0.098	0.116	3.394	0.045	0.234	0.06
35	2.841	0.022	0.138	0.022	2.581	0.045	0.082	0.046	2.753	0.036	0.082	0.036	9.091	0.05	0.071	0.053	3.114	0.053	0.133	0.071	3.114	0.054	0.12	0.081	4.666	0.13	0.146	0.143	14.878	2.449	0.408	0.546	4.666	0.188	0.13	0.144	0	0.676	0.486	0.529	3.321	1.542	0	2.18	0	1.09	0.312	0.477	4.666	0.092	0.086	0.094	3.348	0.039	0.203	0.053
60	3.197	0.02	0.099	0.02	2.904	0.041	0.059	0.042	3.098	0.034	0.059	0.034	10.233	0.047	0.051	0.05	1.982	0.034	0.096	0.047	1.982	0.034	0.086	0.056	2.968	0.083	0.105	0.101	9.455	1.559	0.312	0.396	2.968	0.12	0.094	0.1	0	0.43	0.396	0.404	6.264	2.728	0	3.997	0	0.694	0.224	0.324	2.968	0.059	0.062	0.061	6.21	0.042	0.153	0.063
65	3.75	0.023	0.099	0.023	3.406	0.046	0.059	0.047	3.634	0.038	0.059	0.039	12.005	0.054	0.051	0.058	2.05	0.035	0.096	0.048	2.05	0.035	0.086	0.057	3.07	0.086	0.105	0.102	9.779	1.612	0.342	0.428	3.07	0.124	0.094	0.101	0	0.444	0.422	0.427	8.148	3.58	0	5.22	0	0.718	0.224	0.329	3.07	0.061	0.062	0.063	8.058	0.051	0.159	0.076

Pollutant Name: Carbon Monoxide Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
25	29.971	0.986	0.788	0.987	46.001	1.969	0.668	1.969	46.722	1.655	0.665	1.658	155.001	2.047	0.628	2.093	102.888	0.863	0.894	0.884	102.888	0.947	0.76	0.876	154.332	2.611	1.744	1.905	690.122	52.924	1.844	5.299	154.332	3.982	1.631	2.18	0	6.748	2.359	3.345	29.968	9.394	0	16.778	0	17.723	3.032	6.154	154.332	2.645	0.936	2.549	31.248	1.39	1.614	1.481
30	26.869	0.906	0.651	0.907	41.239	1.799	0.553	1.799	41.886	1.521	0.55	1.523	138.957	1.882	0.519	1.924	85.297	0.715	0.739	0.732	85.297	0.785	0.628	0.725	127.946	2.165	1.442	1.576	572.132	43.875	1.694	4.547	127.946	3.301	1.349	1.805	0	5.595	1.888	2.72	30.23	8.841	0	16.517	0	14.693	2.508	5.097	127.946	2.193	0.774	2.113	31.257	1.273	1.347	1.361
35	25.367	0.837	0.564	0.838	38.934	1.66	0.479	1.66	39.545	1.404	0.477	1.406	131.191	1.738	0.45	1.778	74.712	0.627	0.64	0.64	74.712	0.688	0.544	0.633	112.068	1.896	1.249	1.368	501.132	38.43	1.585	4.077	112.068	2.891	1.168	1.57	0	4.9	1.604	2.344	32.115	8.431	0	16.931	0	12.87	2.171	4.445	112.068	1.921	0.67	1.85	32.958	1.175	1.175	1.266
60	41.353	0.61	0.542	0.612	63.469	1.313	0.46	1.321	64.464	1.027	0.458	1.031	213.861	1.266	0.433	1.332	87.895	0.737	0.615	0.724	87.895	0.809	0.523	0.696	131.842	2.231	1.201	1.388	589.556	45.212	1.672	4.617	131.842	3.402	1.124	1.653	0	5.765	1.746	2.648	94.438	9.826	0	40.192	0	15.14	2.089	4.862	131.842	2.26	0.645	2.161	94.389	0.902	1.167	1.176
65	53.256	0.586	0.617	0.588	81.74	1.317	0.524	1.331	83.021	0.988	0.521	0.993	275.424	1.214	0.492	1.3	107.087	0.898	0.7	0.871	107.087	0.986	0.595	0.83	160.63	2.718	1.366	1.611	718.287	55.084	1.815	5.418	160.63	4.144	1.278	1.944	0	7.024	2.126	3.226	136.854	11.773	0	56.663	0	18.446	2.376	5.791	160.63	2.753	0.733	2.627	136.287	0.894	1.333	1.293

Pollutant Name: Oxides of Nitrogen Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
25	2.569	0.081	1.211	0.082	2.314	0.175	1.223	0.184	2.575	0.175	1.225	0.176	8.168	0.238	1.239	0.242	1.922	0.256	2.284	0.687	1.922	0.294	1.847	0.941	2.883	0.76	2.576	2.265	19.458	10.129	5.126	5.464	2.883	1.276	2.161	1.962	0	2.373	13.22	10.784	1.309	1.04	0	1.136	0	3.122	7.742	6.761	2.883	0.532	4.816	1.005	1.386	0.137	3.841	0.238
30	2.686	0.076	1.158	0.077	2.42	0.163	1.169	0.172	2.693	0.163	1.172	0.164	8.542	0.222	1.185	0.226	2.003	0.267	2.184	0.674	2.003	0.306	1.766	0.914	3.004	0.792	2.464	2.177	20.278	10.556	4.756	5.148	3.004	1.33	2.066	1.901	0	2.473	12.351	10.133	1.364	1.017	0	1.141	0	3.254	7.403	6.522	3.004	0.554	4.605	1.002	1.446	0.13	3.627	0.225
35	2.806	0.072	1.148	0.073	2.528	0.156	1.159	0.164	2.813	0.155	1.161	0.156	8.922	0.211	1.174	0.215	2.084	0.278	2.164	0.678	2.084	0.318	1.75	0.915	3.126	0.824	2.441	2.164	21.099	10.982	4.461	4.902	3.126	1.383	2.047	1.898	0	2.573	12.13	9.985	1.421	1.008	0	1.156	0	3.386	7.335	6.496	3.126	0.577	4.562	1.018	1.506	0.124	3.556	0.218
60	3.417	0.074	1.866	0.075	3.078	0.17	1.884	0.184	3.425	0.16	1.888	0.161	10.865	0.219	1.909	0.224	2.489	0.332	3.519	1.008	2.489	0.38	2.845	1.407	3.733	0.984	3.97	3.457	25.199	13.117	4.116	4.725	3.733	1.652	3.329	2.952	0	3.072	23.47	18.89	1.704	1.187	0	1.372	0	4.044	11.929	10.253	3.733	0.689	7.419	1.432	1.808	0.132	5.841	0.286
65	3.54	0.078	2.288	0.079	3.189	0.185	2.31	0.203	3.548	0.171	2.314	0.172	11.256	0.234	2.34	0.24	2.57	0.343	4.314	1.186	2.57	0.393	3.488	1.682	3.854	1.016	4.867	4.206	26.019	13.544	4.273	4.9	3.854	1.706	4.081	3.547	0	3.172	31.115	24.842	1.759	1.277	0	1.45	0	4.175	14.624	12.404	3.854	0.711	9.096	1.637	1.868	0.141	7.324	0.334

Pollutant Name: Carbon Dioxide Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
	LDA-NCAT	LDA-CAT	LDA-DSL	LDA-ALL	LDT1-NCA	LDT1-CAT	LDT1-DSL	LDT1-ALL	LDT2-NCA	LDT2-CAT	LDT2-DSL	LDT2-ALL	MDV-NCA	MDV-CAT	MDV-DSL	MDV-ALL	LHD1-NCA	LHD1-CAT	LHD1-DSL	LHD1-ALL	LHD2-NCA	LHD2-CAT	LHD2-DSL	LHD2-ALL	MHD-NCA	MHD-CAT	MHD-DSL	MHD-ALL	HHD-NCA	HHD-CAT	HHD-DSL	HHD-ALL	OBUS-NC	OBUS-CAT	OBUS-DSL	OBUS-ALL	UBUS-NC	UBUS-CAT	UBUS-DSL	UBUS-ALL	MCY-NCA	MCY-CAT	MCY-DSL	MCY-ALL	SBUS-NC	SBUS-CAT	SBUS-DSL	SBUS-ALL	MH-NCAT	MH-CAT	MH-DSL	MH-ALL	ALL-NCAT	ALL-CAT	ALL-DSL	ALL-ALL
25	535.572	380.422	355.254	380.418	550.899	478.658	347.032	477.647	550.905	484.966	347.047	484.916	751.091	660.514	346.383	660.219	685.012	685.012	519.739	649.951	685.012	685.012	523.113	617.574	685.012	685.012	1505	1364.279	685.012	685.012	2042.685	1950.865	685.012	685.012	1505	1320.433	0	685.012	2533.083	2118.183	136.193	161.711	0	152.553	0	685.012	1505	1330.751	685.012	685.012	1505	775.364	151.114	437.33	1447.448	463.021
30	469.639	333.589	355.254	333.603	483.079	419.731	347.032	419.179	483.084	425.263	347.047	425.236	658.627	579.2	346.383	578.985	567.895	567.895	519.739	557.679	567.895	567.895	523.113	549.241	567.895	567.895	1505	1344.181	567.895	567.894	1924.234	1832.504	567.895	567.895	1505	1294.072	0	567.895	2533.083	2091.89	123.946	153.788	0	143.078	0	567.895	1505	1305.864	567.895	567.895	1505	671.152	136.839	383.031	1434.921	409.933
35	427.432	303.608	355.254	303.634	439.664	382.009	347.032	381.75	439.668	387.043	347.047	387.031	599.434	527.145	346.383	526.982	497.421	497.421	519.739	502.155	497.421	497.421	523.113	508.123	497.421	497.421	1505	1332.086	497.421	497.421	1827.808	1737.833	497.421	497.421	1505	1278.209	0	497.421	2533.082	2076.068	114.557	151.586	0	138.296	0	497.421	1505	1290.888	497.421	497.421	1505	608.444	126.208	348.357	1424.723	375.97
60	466.351	331.253	355.254	331.269	479.697	416.793	347.032	416.263	479.702	422.286	347.047	422.26	654.015	575.145	346.383	574.934	585.19	585.19	519.739	571.305	585.19	585.19	523.113	559.332	585.19	585.19	1505	1347.149	585.19	585.19	1676.049	1602.274	585.19	585.19	1505	1297.964	0	585.19	2533.083	2095.773	97.412	243.983	0	191.38	0	585.19	1505	1309.539	585.19	585.19	1505	686.542	111.076	381.152	1408.673	407.346
65	530.579	376.874	355.254	376.872	545.763	474.195	347.032	473.218	545.768	480.444	347.047	480.396	744.088	654.355	346.383	654.067	712.968	712.968	519.739	671.976	712.968	712.968	523.113	633.885	712.968	712.968	1505	1369.077	712.968	712.968	1711.772	1644.222	712.968	712.968	1505	1326.725	0	712.968	2533.083	2124.46	98.778	300.109	0	227.854	0	712.968	1505	1336.692	712.968	712.968	1505	800.24	114.778	434.51	1412.451	459.261

Pollutant Name: Sulfur Dioxide Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
25	0.006	0.004	0.003	0.004	0.006	0.005	0.003	0.005	0.006	0.005	0.003	0.005	0.01	0.006	0.003	0.006	0.008	0.007	0.005	0.006	0.008	0.007	0.005	0.006	0.009	0.007	0.014	0.013	0.018	0.007	0.02	0.019	0.009	0.007	0.014	0.013	0	0.007	0.024	0.02	0.002	0.002	0	0.002	0	0.007	0.014	0.013	0.009	0.007	0.014	0.007	0.002	0.004	0.014	0.004
30	0.005	0.003	0.003	0.003	0.005	0.004	0.003	0.004	0.005	0.004	0.003	0.004	0.009	0.006	0.003	0.006	0.007	0.005	0.005	0.005	0.007	0.005	0.005	0.005	0.008	0.005	0.014	0.013	0.015	0.006	0.018	0.018	0.008	0.006	0.014	0.012	0	0.006	0.024	0.02	0.002	0.002	0	0.002	0	0.006	0.014	0.013	0.008	0.005	0.014	0.006	0.002	0.004	0.014	0.004
35	0.005	0.003	0.003	0.003	0.005	0.004	0.003	0.004	0.005	0.004	0.003	0.004	0.008	0.005	0.003	0.005	0.006	0.005	0.005	0.005	0.006	0.005	0.005	0.005	0.007	0.005	0.014	0.013	0.013	0.005	0.017	0.017	0.007	0.005	0.014	0.012	0	0.005	0.024	0.02	0.002	0.002	0	0.002	0	0.005	0.014	0.012	0.007	0.005	0.014	0.006	0.002	0.003	0.014	0.004
60	0.005	0.003	0.003	0.003	0.006	0.004	0.003	0.004	0.006	0.004	0.003	0.004	0.01	0.006	0.003	0.006	0.007	0.006	0.005	0.005	0.007	0.006	0.005	0.005	0.008	0.006	0.014	0.013	0.015	0.006	0.016	0.015	0.008	0.006	0.014	0.012	0	0.006	0.024	0.02	0.003	0.003	0	0.003	0	0.006	0.014	0.013	0.008	0.006	0.014	0.007	0.003	0.004	0.013	0.004
65	0.006	0.004	0.003	0.004	0.007	0.005	0.003	0.005	0.007	0.005	0.003	0.005	0.012	0.006	0.003	0.006	0.009	0.007	0.005	0.006	0.009	0.007	0.005	0.006	0.009	0.007	0.014	0.013	0.018	0.008	0.016	0.016	0.009	0.007	0.014	0.013	0	0.007	0.024	0.02	0.003	0.003	0	0.003	0	0.007	0.014	0.013	0.009	0.007	0.014	0.008	0.003	0.004	0.013	0.004

Pollutant Name: PM10 Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
25	0.035	0.012	0.119	0.012	0.026	0.016	0.063	0.016	0.04	0.033	0.062	0.033	0.037	0.034	0.053	0.034	0.024	0.011	0.037	0.016	0.024	0.01	0.033	0.02	0.024	0.013	0.196	0.165	0.024	0.025	0.15	0.141	0.024	0.016	0.18	0.143	0	0.021	0.263	0.208	0.041	0.002	0	0.016	0	0.02	0.419	0.334	0.024	0.004	0.155	0.02	0.041	0.018	0.167	0.022
30	0.03	0.01	0.102	0.01	0.022	0.013	0.054	0.013	0.034	0.026	0.054	0.026	0.031	0.027	0.046	0.027	0.019	0.008	0.032	0.013	0.019	0.008	0.028	0.016	0.019	0.01	0.168	0.141	0.019	0.019	0.14	0.132	0.019	0.012	0.154	0.122	0	0.016	0.219	0.174	0.039	0.002	0	0.015	0	0.015	0.359	0.286	0.019	0.003	0.133	0.017	0.038	0.015	0.143	0.018
35	0.027	0.008	0.089	0.008	0.02	0.011	0.047	0.011	0.031	0.022	0.047	0.022	0.028	0.023	0.04	0.023	0.015	0.007	0.028	0.011	0.015	0.006	0.025	0.014	0.015	0.008	0.147	0.123	0.015	0.016	0.137	0.129	0.015	0.01	0.135	0.107	0	0.013	0.189	0.15	0.038	0.002	0	0.015	0	0.012	0.315	0.25	0.015	0.002	0.117	0.015	0.038	0.013	0.127	0.016
60	0.03	0.008	0.064	0.008	0.022	0.01	0.034	0.01	0.034	0.021	0.034	0.021	0.031	0.022	0.029	0.022	0.009	0.004	0.02	0.008	0.009	0.004	0.018	0.01	0.009	0.005	0.106	0.089	0.009	0.01	0.232	0.217	0.009	0.006	0.097	0.077	0	0.008	0.154	0.122	0.073	0.003	0	0.028	0	0.008	0.226	0.18	0.009	0.001	0.084	0.01	0.071	0.012	0.107	0.015
65	0.035	0.009	0.064	0.009	0.026	0.012	0.034	0.012	0.04	0.025	0.034	0.025	0.037	0.026	0.029	0.026	0.01	0.004	0.02	0.008	0.01	0.004	0.018	0.01	0.01	0.005	0.106	0.089	0.01	0.01	0.273	0.255	0.01	0.007	0.097	0.077	0	0.008	0.165	0.13	0.095	0.005	0	0.037	0	0.008	0.226	0.18	0.01	0.001	0.084	0.011	0.093	0.014	0.113	0.017

Pollutant Name: PM10 - Tire Wear Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
25	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.036	0.034	0.012	0.012	0.012	0.012	0	0.012	0.008	0.009	0.004	0.004	0	0.004	0	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.004	0.008	0.014	0.008
30	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.036	0.034	0.012	0.012	0.012	0.012	0	0.012	0.008	0.009	0.004	0.004	0	0.004	0	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.004	0.008	0.014	0.008
35	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.036	0.034	0.012	0.012	0.012	0.012	0	0.012	0.008	0.009	0.004	0.004	0	0.004	0	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.004	0.008	0.014	0.008
60	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.036	0.034	0.012	0.012	0.012	0.012	0	0.012	0.008	0.009	0.004	0.004	0	0.004	0	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.004	0.008	0.014	0.008
65	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.036	0.034	0.012	0.012	0.012	0.012	0	0.012	0.008	0.009	0.004	0.004	0	0.004	0	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.004	0.008	0.014	0.008

Pollutant Name: PM10 - Brake Wear Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
25	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.028	0.028	0.028	0.028	0.013	0.013	0.013	0.013	0	0.013	0.013	0.013	0.006	0.006	0	0.006	0	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.006	0.013	0.014	0.013
30	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.028	0.028	0.028	0.028	0.013	0.013	0.013	0.013	0	0.013	0.013	0.013	0.006	0.006	0	0.006	0	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.006	0.013	0.014	0.013
35	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.028	0.028	0.028	0.028	0.013	0.013	0.013	0.013	0	0.013	0.013	0.013	0.006	0.006	0	0.006	0	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.006	0.013	0.014	0.013
60	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.028	0.028	0.028	0.028	0.013	0.013	0.013	0.013	0	0.013	0.013	0.013	0.006	0.006	0	0.006	0	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.006	0.013	0.014	0.013
65	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.028	0.028	0.028	0.028	0.013	0.013	0.013	0.013	0	0.013	0.013	0.013	0.006	0.006	0	0.006	0	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.006	0.013	0.014	0.013

Pollutant Name: Gasoline - mi/gal Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
25	14.924	23.193	0	23.193	13.993	18.387	0	18.386	13.953	18.169	0	18.169	8.601	13.347	0	13.345	10.285	12.906	0	12.905	10.285	12.903	0	12.903	9.329	12.848	0	12.846	4.814	11.362	0	11.362	9.329	12.802	0	12.8	0	12.68	0	12.68	45.713	48.756	0	47.664	0	12.341	0	12.341	9.329	12.85	0	12.847	44.648	20.832	0	20.902
30	16.997	26.445	0	26.445	15.923	20.963	0	20.962	15.878	20.715	0	20.715	9.765	15.217	0	15.215	12.42	15.568	0	15.567	12.42	15.565	0	15.564	11.27	15.498	0	15.496	5.821	13.719	0	13.719	11.27	15.444	0	15.442	0	15.3	0	15.3	48.835	51.379	0	50.466	0	14.893	0	14.893	11.27	15.501	0	15.498	47.727	23.744	0	23.815
35	18.625	29.055	0	29.054	17.425	23.032	0	23.03	17.374	22.759	0	22.759	10.641	16.719	0	16.717	14.198	17.774	0	17.773	14.198	17.77	0	17.77	12.89	17.695	0	17.693	6.665	15.681	0	15.68	12.89	17.634	0	17.631	0	17.473	0	17.473	50.654	52.304	0	51.712	0	17.012	0	17.012	12.89	17.698	0	17.694	49.533	26.077	0	26.146
60	16.383	26.669	0	26.669	15.068	21.15	0	21.149	15.013	20.9	0	20.899	8.682	15.35	0	15.348	12.152	15.11	0	15.11	12.152	15.107	0	15.107	11.06	15.046	0	15.044	5.754	13.408	0	13.408	11.06	14.997	0	14.994	0	14.88	0	14.88	33.497	33.119	0	33.254	0	14.502	0	14.502	11.06	15.047	0	15.044	32.86	23.845	0	23.871
65	14.168	23.451	0	23.451	12.948	18.601	0	18.599	12.897	18.38	0	18.38	7.306	13.5	0	13.498	9.986	12.402	0	12.402	9.986	12.4	0	12.4	9.093	12.35	0	12.349	4.736	11.017	0	11.017	9.093	12.31	0	12.308	0	12.217	0	12.217	26.201	26.91	0	26.655	0	11.909	0	11.909	9.093	12.351	0	12.349	25.736	20.943	0	20.957

Pollutant Name: Diesel - mi/gal Temperature: 55F Relative Humidity: 74%

Speed MPH	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
25	0	0	28.373	28.373	0	0	29.046	29.046	0	0	29.044	29.044	0	0	29.1	29.1	0	0	19.394	19.394	0	0	19.269	19.269	0	0	6.698	6.698	0	0	4.935	4.935	0	0	6.698	6.698	0	0	3.979	3.979	0	0	0	0	0	0	6.698	6.698	0	0	6.698	6.698	0	0	9.455	9.455
30	0	0	28.373	28.373	0	0	29.046	29.046	0	0	29.044	29.044	0	0	29.1	29.1	0	0	19.394	19.394	0	0	19.269	19.269	0	0	6.698	6.698	0	0	5.238	5.238	0	0	6.698	6.698	0	0	3.979	3.979	0	0	0	0	0	0	6.698	6.698	0	0	6.698	6.698	0	0	9.487	9.487
35	0	0	28.373	28.373	0	0	29.046	29.046	0	0	29.044	29.044	0	0	29.1	29.1	0	0	19.394	19.394	0	0	19.269	19.269	0	0	6.698	6.698	0	0	5.515	5.515	0	0	6.698	6.698	0	0	3.979	3.979	0	0	0	0	0	0	6.698	6.698	0	0	6.698	6.698	0	0	9.516	9.516
60	0	0	28.373	28.373	0	0	29.046	29.046	0	0	29.044	29.044	0	0	29.1	29.1	0	0	19.394	19.394	0	0	19.269	19.269	0	0	6.698	6.698	0	0	6.014	6.014	0	0	6.698	6.698	0	0	3.979	3.979	0	0	0	0	0	0	6.698	6.698	0	0	6.698	6.698	0	0	9.569	9.569
65	0	0	28.373	28.373	0	0	29.046	29.046	0	0	29.044	29.044	0	0	29.1	29.1	0	0	19.394	19.394	0	0	19.269	19.269	0	0	6.698	6.698	0	0	5.889	5.889	0	0	6.698	6.698	0	0	3.979	3.979	0	0	0	0	0	0	6.698	6.698	0	0	6.698	6.698	0	0	9.556	9.556

Title : San Mateo County Avg Annual CYr 2020 - Group A
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2009/12/09 17:38:53
Scen Year: 2020 -- All model years in the range 1976 to 2020 selected
Season : Annual
Area : San Mateo
****

Year: 2020 -- Model Years 1976 to 2020 Inclusive -- Annual
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Mateo County Average

Table 2: Starting Emissions (grams/trip)

Pollutant Name: Total Organic Gases Temperature: 55F Relative Humidity: ALL

Time	LDA	LDA	LDA	LDA	LDT1	LDT1	LDT1	LDT1	LDT2	LDT2	LDT2	LDT2	MDV	MDV	MDV	MDV	LHD1	LHD1	LHD1	LHD1	LHD2	LHD2	LHD2	LHD2	MHD	MHD	MHD	MHD	HHD	HHD	HHD	HHD	OBUS	OBUS	OBUS	OBUS	UBUS	UBUS	UBUS	UBUS	MCY	MCY	MCY	MCY	SBUS	SBUS	SBUS	SBUS	MH	MH	MH	MH	ALL	ALL	ALL	ALL
min	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL
5	2.234	0.019	0	0.02	1.821	0.036	0	0.036	1.945	0.027	0	0.027	7.505	0.048	0	0.051	8.204	0.139	0	0.128	8.204	0.164	0	0.131	12.306	0.415	0	0.132	23.053	1.853	0	1.266	12.306	0.455	0	0.201	0	0.587	0	0.132	2.486	0.377	0	1.206	0	0.805	0	0.171	12.306	0.249	0	0.231	2.645	0.04	0	0.047
10	2.215	0.038	0	0.038	1.806	0.07	0	0.07	1.929	0.053	0	0.053	7.441	0.095	0	0.097	8.134	0.273	0	0.249	8.134	0.322	0	0.255	12.2	0.809	0	0.248	22.856	3.613	0	2.467	12.2	0.887	0	0.378	0	1.145	0	0.257	2.465	0.735	0	1.415	0	1.569	0	0.334	12.2	0.485	0	0.44	2.622	0.078	0	0.083
20	2.236	0.073	0	0.073	1.823	0.134	0	0.133	1.947	0.102	0	0.102	7.512	0.184	0	0.186	8.211	0.525	0	0.478	8.211	0.616	0	0.487	12.317	1.533	0	0.461	23.074	6.849	0	4.678	12.317	1.682	0	0.703	0	2.171	0	0.487	2.488	1.394	0	1.824	0	2.975	0	0.632	12.317	0.92	0	0.824	2.647	0.149	0	0.151
30	2.337	0.106	0	0.106	1.905	0.192	0	0.191	2.035	0.148	0	0.148	7.85	0.266	0	0.268	8.58	0.758	0	0.688	8.58	0.884	0	0.698	12.87	2.173	0	0.651	24.111	9.709	0	6.631	12.87	2.384	0	0.99	0	3.077	0	0.691	2.6	1.976	0	2.221	0	4.218	0	0.896	12.87	1.304	0	1.165	2.766	0.213	0	0.213
40	2.516	0.135	0	0.135	2.051	0.244	0	0.243	2.191	0.19	0	0.19	8.454	0.342	0	0.344	9.241	0.97	0	0.88	9.241	1.125	0	0.888	13.861	2.729	0	0.815	25.966	12.192	0	8.327	13.861	2.994	0	1.241	0	3.864	0	0.868	2.8	2.482	0	2.607	0	5.297	0	1.126	13.861	1.638	0	1.461	2.979	0.272	0	0.27
50	2.775	0.161	0	0.161	2.263	0.29	0	0.288	2.417	0.229	0	0.229	9.324	0.411	0	0.414	10.192	1.161	0	1.054	10.192	1.339	0	1.057	15.288	3.201	0	0.955	28.64	14.299	0	9.766	15.288	3.511	0	1.454	0	4.532	0	1.017	3.089	2.911	0	2.981	0	6.212	0	1.32	15.288	1.921	0	1.713	3.286	0.324	0	0.32
60	2.885	0.185	0	0.185	2.352	0.33	0	0.328	2.513	0.264	0	0.264	9.694	0.475	0	0.477	10.596	1.333	0	1.209	10.596	1.527	0	1.204	15.894	3.588	0	1.07	29.776	16.03	0	10.948	15.894	3.937	0	1.628	0	5.08	0	1.141	3.211	3.263	0	3.243	0	6.964	0	1.48	15.894	2.154	0	1.919	3.416	0.369	0	0.364
120	2.09	0.255	0	0.255	1.704	0.407	0	0.404	1.82	0.384	0	0.384	7.02	0.693	0	0.694	7.674	1.665	0	1.509	7.674	1.747	0	1.378	11.511	3.004	0	0.895	21.563	13.772	0	9.406	11.511	3.408	0	1.407	0	4.28	0	0.961	2.325	3.511	0	3.045	0	5.534	0	1.176	11.511	1.686	0	1.501	2.474	0.457	0	0.445
180	2.275	0.177	0	0.177	1.854	0.298	0	0.296	1.981	0.267	0	0.267	7.642	0.481	0	0.483	8.353	1.473	0	1.336	8.353	1.615	0	1.273	12.53	3.188	0	0.95	23.473	14.613	0	9.98	12.53	3.616	0	1.493	0	4.542	0	1.02	2.531	2.76	0	2.67	0	5.872	0	1.248	12.53	1.788	0	1.593	2.693	0.358	0	0.351
240	2.46	0.188	0	0.188	2.005	0.316	0	0.313	2.142	0.283	0	0.283	8.264	0.51	0	0.512	9.033	1.563	0	1.417	9.033	1.711	0	1.349	13.549	3.366	0	1.003	25.383	15.427	0	10.536	13.549	3.817	0	1.577	0	4.795	0	1.076	2.737	2.913	0	2.844	0	6.199	0	1.317	13.549	1.888	0	1.682	2.912	0.379	0	0.372
300	2.645	0.198	0	0.198	2.156	0.333	0	0.331	2.303	0.299	0	0.299	8.885	0.539	0	0.542	9.713	1.651	0	1.497	9.713	1.805	0	1.423	14.569	3.537	0	1.054	27.292	16.215	0	11.074	14.569	4.012	0	1.658	0	5.04	0	1.131	2.943	3.062	0	3.015	0	6.516	0	1.385	14.569	1.985	0	1.768	3.131	0.4	0	0.392
360	2.83	0.208	0	0.208	2.307	0.35	0	0.347	2.464	0.315	0	0.315	9.507	0.568	0	0.571	10.392	1.738	0	1.576	10.392	1.897	0	1.496	15.588	3.703	0	1.104	29.202	16.975	0	11.594	15.588	4.2	0	1.736	0	5.276	0	1.185	3.149	3.206	0	3.184	0	6.822	0	1.45	15.588	2.078	0	1.851	3.35	0.42	0	0.413
420	3.015	0.219	0	0.219	2.458	0.366	0	0.364	2.625	0.331	0	0.331	10.129	0.597	0	0.6	11.072	1.824	0	1.653	11.072	1.988	0	1.568	16.608	3.864	0	1.152	31.112	17.71	0	12.095	16.608	4.382	0	1.811	0	5.504	0	1.236	3.355	3.345	0	3.349	0	7.117	0	1.512	16.608	2.168	0	1.931	3.569	0.44	0	0.433
480	3.2	0.229	0	0.229	2.609	0.383	0	0.38	2.787	0.347	0	0.347	10.751	0.625	0	0.628	11.751	1.908	0	1.73	11.751	2.077	0	1.638	17.627	4.018	0	1.198	33.021	18.417	0	12.579	17.627	4.557	0	1.884	0	5.724	0	1.285	3.561	3.478	0	3.511	0	7.401	0	1.573	17.627	2.254	0	2.009	3.788	0.46	0	0.452
540	3.385	0.238	0	0.238	2.76	0.398	0	0.396	2.948	0.362	0	0.362	11.372	0.653	0	0.656	12.431	1.991	0	1.805	12.431	2.164	0	1.707	18.646	4.166	0	1.243	34.931	19.098	0	13.044	18.646	4.726	0	1.954	0	5.936	0	1.333	3.767	3.607	0	3.67	0	7.675	0	1.631	18.646	2.337	0	2.084	4.007	0.479	0	0.471
600	3.57	0.248	0	0.248	2.911	0.414	0	0.411	3.109	0.377	0	0.377	11.994	0.68	0	0.684	13.111	2.073	0	1.88	13.111	2.249	0	1.774	19.666	4.309	0	1.286	36.841	19.752	0	13.49	19.666	4.888	0	2.022	0	6.139	0	1.378	3.973	3.73	0	3.826	0	7.938	0	1.687	19.666	2.418	0	2.155	4.226	0.498	0	0.49
660	3.755	0.257	0	0.258	3.061	0.429	0	0.426	3.27	0.392	0	0.392	12.616	0.708	0	0.711	13.79	2.154	0	1.953	13.79	2.333	0	1.84	20.685	4.446	0	1.327	38.751	20.38	0	13.919	20.685	5.043	0	2.086	0	6.334	0	1.422	4.179	3.849	0	3.979	0	8.19	0	1.74	20.685	2.494	0	2.224	4.445	0.517	0	0.508
720	3.94	0.267	0	0.267	3.212	0.444	0	0.441	3.431	0.407	0	0.407	13.238	0.734	0	0.738	14.47	2.233	0	2.025	14.47	2.414	0	1.904	21.705	4.577	0	1.366	40.66	20.981	0	14.329	21.705	5.191	0	2.149	0	6.521	0	1.464	4.385	3.962	0	4.128	0	8.431	0	1.792	21.705	2.568	0	2.29	4.664	0.535	0	0.526

Pollutant Name: Carbon Monoxide Temperature: 55F Relative Humidity: ALL

Time	LDA	LDA	LDA	LDA	LDT1	LDT1	LDT1	LDT1	LDT2	LDT2	LDT2	LDT2	MDV	MDV	MDV	MDV	LHD1	LHD1	LHD1	LHD1	LHD2	LHD2	LHD2	LHD2	MHD	MHD	MHD	MHD	HHD	HHD	HHD	HHD	OBUS	OBUS	OBUS	OBUS	UBUS	UBUS	UBUS	UBUS	MCY	MCY	MCY	MCY	SBUS	SBUS	SBUS	SBUS	MH	MH	MH	MH	ALL	ALL	ALL	ALL
min	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL
5	10.945	0.255	0	0.255	16.724	0.486	0	0.485	16.986	0.386	0	0.387	57.972	0.606	0	0.625	39.388	1.732	0	1.58	39.388	1.946	0	1.54	59.082	7.279	0	2.192	274.191	29.497	0	20.147	59.082	8.112	0	3.388	0	7.571	0	1.7	6.271	2.319	0	3.872	0	13.384	0	2.844	59.082	4.698	0	4.205	7.458	0.539	0	0.539
10	9.692	0.502	0	0.503	14.809	0.956	0	0.951	15.041	0.762	0	0.762	51.336	1.194	0	1.21	34.879	3.411	0	3.098	34.879	3.829	0	3.022	52.318	14.262	0	4.245	242.803	57.795	0	39.474	52.318	15.893	0	6.56	0	14.833	0	3.33	5.553	4.543	0	4.94	0	26.224	0	5.573	52.318	9.205	0	8.187	6.604	1.06	0	1.034
20	7.482	0.975	0	0.975	11.432	1.848	0	1.835	11.611	1.481	0	1.481	39.628	2.319	0	2.329	26.924	6.611	0	5.99	26.924	7.405	0	5.838	40.387	27.341	0	8.092	187.429	110.796	0	75.671	40.387	30.469	0	12.501	0	28.437	0	6.384	4.287	8.709	0	6.971	0	50.272	0	10.683	40.387	17.646	0	15.645	5.098	2.049	0	1.975
30	5.665	1.419	0	1.418	8.657	2.676	0	2.655	8.792	2.159	0	2.158	30.008	3.376	0	3.381	20.388	9.598	0	8.691	20.388	10.729	0	8.455	30.582	39.237	0	11.591	141.929	159.003	0	108.594	30.582	43.725	0	17.906	0	40.809	0	9.162	3.246	12.499	0	8.863	0	72.146	0	15.331	30.582	25.324	0	22.429	3.86	2.968	0	2.849
40	4.243	1.832	0	1.832	6.484	3.44	0	3.412	6.585	2.795	0	2.794	22.475	4.364	0	4.364	15.27	12.373	0	11.2	15.27	13.801	0	10.873	22.905	49.95	0	14.744	106.3	202.416	0	138.243	22.905	55.664	0	22.776	0	51.951	0	11.663	2.431	15.911	0	10.614	0	91.844	0	19.517	22.905	32.238	0	28.54	2.891	3.816	0	3.657
50	3.215	2.217	0	2.216	4.913	4.139	0	4.105	4.99	3.388	0	3.387	17.029	5.283	0	5.28	11.57	14.936	0	13.518	11.57	16.62	0	13.093	17.355	59.48	0	17.549	80.544	241.035	0	164.618	17.355	66.284	0	27.108	0	61.863	0	13.889	1.842	18.947	0	12.226	0	109.367	0	23.241	17.355	38.389	0	33.977	2.191	4.595	0	4.398
60	2.581	2.571	0	2.57	3.944	4.774	0	4.735	4.006	3.94	0	3.939	13.671	6.134	0	6.128	9.288	17.287	0	15.644	9.288	19.187	0	15.114	13.933	67.827	0	20.007	64.659	274.86	0	187.719	13.933	75.586	0	30.905	0	70.545	0	15.838	1.479	21.606	0	13.697	0	124.715	0	26.502	13.933	43.776	0	38.74	1.759	5.303	0	5.073
120	8.735	3.738	0	3.736	13.347	6.207	0	6.158	13.556	5.842	0	5.84	46.267	8.991	0	8.993	31.435	20.068	0	18.168	31.435	20.932	0	16.493	47.153	46.88	0	13.858	218.831	193.292	0	132.012	47.153	53.859	0	22.068	0	48.751	0	10.945	5.005	25.665	0	17.547	0	81.859	0	17.395	47.153	28.621	0	25.361	5.952	6.404	0	6.14
180	13.802	2.395	0	2.394	21.089	4.205	0	4.174	21.42	3.753	0	3.752	73.106	5.759	0	5.776	49.67	14.379	0	13.026	49.67	15.77	0	12.43	74.505	48.251	0	14.283	345.77	198.942	0	135.872	74.505	55.433	0	22.745	0	50.176	0	11.265	7.908	14.781	0	12.08	0	84.252	0	17.904	74.505	29.458	0	26.124	9.405	4.546	0	4.375
240	18.332	2.567	0	2.567	28.011	4.455	0	4.424	28.45	4.042	0	4.042	97.1	6.185	0	6.209	65.973	15.365	0	13.923	65.973	16.751	0	13.206	98.959	49.667	0	14.719	459.255	204.779	0	139.86	98.959	57.059	0	23.44	0	51.648	0	11.595	10.503	15.215	0	13.364	0	86.724	0	18.429	98.959	30.322	0	26.908	12.492	4.826	0	4.653
300	22.325	2.722	0	2.721	34.112	4.685	0	4.653	34.647	4.3	0	4.3	118.25	6.566	0	6.597	80.342	16.253	0	14.732	80.342	17.646	0	13.914	120.513	51.127	0	15.167	559.288	210.802	0	143.974	120.513	58.738	0	24.153	0	53.167	0	11.936	12.791	15.663	0	14.534	0	89.275	0	18.971	120.513	31.214	0	27.715	15.212	5.082	0	4.906
360	25.781	2.859	0	2.859	39.393	4.894	0	4.861	40.01	4.526	0	4.526	136.556	6.902	0	6.939	92.779	17.045	0	15.452	92.779	18.454	0	14.552	139.169	52.633	0	15.625	645.867	217.011	0	148.215	139.169	60.468	0	24.883	0	54.733	0	12.288	14.771	16.124	0	15.592	0	91.904	0	19.53	139.169	32.133	0	28.544	17.567	5.313	0	5.135
420	28.7	2.978	0	2.978	43.853	5.081	0	5.048	44.54	4.721	0	4.721	152.017	7.193	0	7.235	103.284	17.74	0	16.084	103.284	19.175	0	15.122	154.926	54.184	0	16.095	718.992	223.406	0	152.584	154.926	62.25	0	25.631	0	56.346	0	12.65	16.444	16.599	0	16.538	0	94.613	0	20.105	154.926	33.08	0	29.395	19.556	5.519	0	5.339
480	31.082	3.079	0	3.079	47.493	5.248	0	5.214	48.237	4.884	0	4.884	164.633	7.439	0	7.485	111.856	18.338	0	16.628	111.856	19.809	0	15.623	167.784	55.781	0	16.575	778.664	229.988	0	157.079	167.784	64.084	0	26.397	0	58.006	0	13.023	17.809	17.088	0	17.371	0	97.4	0	20.698	167.784	34.055	0	30.268	21.179	5.702	0	5.518
540	32.926	3.163	0	3.163	50.312	5.394	0	5.359	51.1	5.015	0	5.016	174.405	7.64	0	7.69	118.495	18.839	0	17.083	118.495	20.356	0	16.056	177.743	57.422	0	17.067	824.883	236.756	0	161.702	177.743	65.969	0	27.18	0	59.713	0	13.406	18.866	17.591	0	18.092	0	100.266	0	21.307	177.743	35.057	0	31.163	22.437	5.859	0	5.673
600	34.234	3.229	0	3.229	52.31	5.518	0	5.483	53.13	5.115	0	5.116	181.333	7.797	0	7.848	123.202	19.243	0	17.45	123.202	20.817	0	16.419	184.803	59.109	0	17.569	857.648	243.71	0	166.452	184.803	67.907	0	27.98	0	61.467	0	13.8	19.615	18.108	0	18.7	0	103.211	0	21.933	184.803	36.087	0	32.08	23.328	5.993	0	5.803
660	35.005	3.277	0	3.277	53.488	5.622	0	5.586	54.326	5.183	0	5.184	185.416	7.908	0	7.961	125.976	19.551	0	17.729	125.976	21.191	0	16.714	188.964	60.841	0	18.083	876.96	250.851	0	171.328	188.964	69.897	0	28.799	0	63.268	0	14.204	20.057	18.638	0	19.196	0	106.235	0	22.575	188.964	37.144	0	33.019	23.853	6.101	0	5.909
720	35.239	3.307	0	3.307	53.845	5.705	0	5.668	54.689	5.22	0	5.22	186.655	7.975	0	8.028	126.818	19.761	0	17.919	126.818	21.478	0	16.941	190.227	62.618	0	18.608	882.819	258.177	0	176.332	190.227	71.938	0	29.634	0	65.116	0	14.619	20.191	19.183	0	19.579	0	109.338	0	23.234	190.227	38.229	0	33.98	24.012	6.186	0	5.99

Pollutant Name: Oxides of Nitrogen Temperature: 55F Relative Humidity: ALL

Time	LDA	LDA	LDA	LDA	LDT1	LDT1	LDT1	LDT1	LDT2	LDT2	LDT2	LDT2	MDV	MDV	MDV	MDV	LHD1	LHD1	LHD1	LHD1	LHD2	LHD2	LHD2	LHD2	MHD	MHD	MHD	MHD	HHD	HHD	HHD	HHD	OBUS	OBUS	OBUS	OBUS	UBUS	UBUS	UBUS	UBUS	MCY	MCY	MCY	MCY	SBUS	SBUS	SBUS	SBUS	MH	MH	MH	MH	ALL	ALL	ALL	ALL
min	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL
5	0.763	0.075	0	0.075	0.686	0.113	0	0.113	0.765	0.175	0	0.175	2.427	0.3	0	0.3	0.554	1.398	0	1.265	0.554	1.276	0	1.005	0.831	1.124	0	0.332	3.784	4.756	0	3.248	0.831	1.416	0	0.58	0	1.863	0	0.418	0.305	0.1	0	0.181	0	1.885	0	0.401	0.831	0.598	0	0.53	0.332	0.19	0	0.182
10	0.829	0.083	0	0.083	0.746	0.129	0	0.129	0.831	0.189	0	0.189	2.638	0.323	0	0.324	0.602	1.534	0	1.388	0.602	1.469	0	1.157	0.903	1.694	0	0.5	4.113	7.166	0	4.894	0.903	2.133	0	0.873	0	2.806	0	0.63	0.332	0.151	0	0.222	0	2.84	0	0.603	0.903	0.901	0	0.798	0.361	0.218	0	0.21
20	0.95	0.096	0	0.096	0.854	0.158	0	0.157	0.952	0.213	0	0.213	3.022	0.366	0	0.366	0.69	1.776	0	1.607	0.69	1.81	0	1.426	1.035	2.694	0	0.795	4.711	11.398	0	7.784	1.035	3.393	0	1.388	0	4.464	0	1.002	0.38	0.24	0	0.295	0	4.517	0	0.96	1.035	1.433	0	1.269	0.414	0.268	0	0.258
30	1.055	0.108	0	0.108	0.948	0.181	0	0.18	1.057	0.234	0	0.234	3.355	0.402	0	0.402	0.766	1.979	0	1.791	0.766	2.093	0	1.649	1.149	3.509	0	1.035	5.23	14.846	0	10.14	1.149	4.42	0	1.807	0	5.815	0	1.305	0.422	0.313	0	0.356	0	5.884	0	1.25	1.149	1.867	0	1.652	0.46	0.31	0	0.298
40	1.143	0.117	0	0.117	1.028	0.2	0	0.198	1.146	0.251	0	0.251	3.637	0.431	0	0.432	0.83	2.144	0	1.94	0.83	2.317	0	1.825	1.245	4.139	0	1.221	5.669	17.511	0	11.96	1.245	5.213	0	2.132	0	6.858	0	1.54	0.457	0.369	0	0.404	0	6.94	0	1.475	1.245	2.202	0	1.949	0.498	0.343	0	0.329
50	1.216	0.124	0	0.124	1.093	0.214	0	0.212	1.218	0.264	0	0.264	3.867	0.454	0	0.454	0.883	2.269	0	2.053	0.883	2.482	0	1.955	1.324	4.584	0	1.352	6.027	19.393	0	13.245	1.324	5.773	0	2.361	0	7.595	0	1.705	0.486	0.408	0	0.439	0	7.686	0	1.633	1.324	2.438	0	2.158	0.53	0.367	0	0.353
60	1.272	0.129	0	0.129	1.144	0.223	0	0.221	1.274	0.273	0	0.273	4.046	0.47	0	0.471	0.923	2.355	0	2.131	0.923	2.589	0	2.04	1.385	4.843	0	1.429	6.306	20.491	0	13.994	1.385	6.1	0	2.494	0	8.025	0	1.802	0.509	0.432	0	0.462	0	8.121	0	1.726	1.385	2.576	0	2.28	0.554	0.383	0	0.368
120	1.311	0.138	0	0.138	1.179	0.237	0	0.235	1.314	0.295	0	0.295	4.17	0.508	0	0.509	0.952	2.528	0	2.287	0.952	2.74	0	2.158	1.428	4.935	0	1.456	6.5	20.877	0	14.258	1.428	6.215	0	2.541	0	8.177	0	1.836	0.525	0.433	0	0.469	0	8.275	0	1.759	1.428	2.625	0	2.324	0.571	0.405	0	0.389
180	1.28	0.145	0	0.145	1.15	0.248	0	0.247	1.282	0.311	0	0.311	4.07	0.535	0	0.536	0.929	2.543	0	2.302	0.929	2.75	0	2.166	1.394	4.917	0	1.451	6.344	20.801	0	14.206	1.394	6.192	0	2.532	0	8.147	0	1.829	0.512	0.438	0	0.467	0	8.245	0	1.752	1.394	2.616	0	2.315	0.558	0.416	0	0.4
240	1.238	0.144	0	0.144	1.113	0.247	0	0.245	1.241	0.309	0	0.309	3.938	0.531	0	0.532	0.899	2.525	0	2.285	0.899	2.731	0	2.151	1.348	4.889	0	1.442	6.139	20.683	0	14.126	1.348	6.157	0	2.518	0	8.101	0	1.819	0.495	0.436	0	0.459	0	8.199	0	1.742	1.348	2.601	0	2.302	0.539	0.413	0	0.397
300	1.186	0.143	0	0.143	1.067	0.244	0	0.242	1.189	0.305	0	0.305	3.774	0.525	0	0.525	0.861	2.496	0	2.259	0.861	2.703	0	2.129	1.292	4.852	0	1.431	5.883	20.526	0	14.018	1.292	6.11	0	2.498	0	8.039	0	1.805	0.475	0.432	0	0.449	0	8.136	0	1.729	1.292	2.581	0	2.285	0.517	0.409	0	0.393
360	1.125	0.141	0	0.14	1.011	0.241	0	0.239	1.127	0.3	0	0.3	3.578	0.516	0	0.517	0.817	2.456	0	2.223	0.817	2.664	0	2.099	1.225	4.805	0	1.418	5.577	20.327	0	13.883	1.225	6.051	0	2.474	0	7.961	0	1.787	0.45	0.428	0	0.437	0	8.058	0	1.712	1.225	2.556	0	2.263	0.49	0.403	0	0.387
420	1.053	0.138	0	0.138	0.947	0.236	0	0.234	1.055	0.294	0	0.294	3.349	0.505	0	0.506	0.764	2.406	0	2.177	0.764	2.616	0	2.06	1.147	4.749	0	1.401	5.221	20.089	0	13.72	1.147	5.98	0	2.445	0	7.868	0	1.766	0.421	0.423	0	0.422	0	7.963	0	1.692	1.147	2.526	0	2.236	0.459	0.396	0	0.38
480	0.971	0.134	0	0.134	0.873	0.231	0	0.229	0.973	0.286	0	0.286	3.088	0.492	0	0.492	0.705	2.345	0	2.122	0.705	2.558	0	2.015	1.057	4.683	0	1.381	4.814	19.81	0	13.529	1.057	5.897	0	2.411	0	7.758	0	1.742	0.389	0.417	0	0.406	0	7.852	0	1.669	1.057	2.491	0	2.205	0.423	0.387	0	0.371
540	0.879	0.13	0	0.13	0.79	0.224	0	0.223	0.881	0.277	0	0.277	2.795	0.476	0	0.476	0.638	2.274	0	2.057	0.638	2.49	0	1.961	0.957	4.607	0	1.359	4.357	19.49	0	13.311	0.957	5.802	0	2.372	0	7.633	0	1.714	0.352	0.411	0	0.387	0	7.726	0	1.642	0.957	2.451	0	2.169	0.383	0.377	0	0.361
600	0.776	0.126	0	0.126	0.698	0.217	0	0.216	0.778	0.266	0	0.266	2.47	0.458	0	0.458	0.564	2.191	0	1.983	0.564	2.412	0	1.9	0.846	4.522	0	1.334	3.85	19.13	0	13.065	0.846	5.695	0	2.328	0	7.492	0	1.682	0.311	0.403	0	0.367	0	7.583	0	1.611	0.846	2.406	0	2.129	0.338	0.365	0	0.35
660	0.664	0.12	0	0.12	0.597	0.209	0	0.207	0.665	0.254	0	0.254	2.112	0.437	0	0.437	0.482	2.098	0	1.899	0.482	2.324	0	1.83	0.723	4.427	0	1.306	3.292	18.729	0	12.791	0.723	5.575	0	2.279	0	7.335	0	1.647	0.266	0.394	0	0.344	0	7.424	0	1.578	0.723	2.355	0	2.084	0.289	0.351	0	0.337
720	0.541	0.114	0	0.114	0.487	0.2	0	0.198	0.543	0.241	0	0.241	1.722	0.414	0	0.414	0.393	1.995	0	1.805	0.393	2.226	0	1.753	0.59	4.323	0	1.275	2.685	18.288	0	12.49	0.59	5.444	0	2.225	0	7.162	0	1.608	0.217	0.385	0	0.319	0	7.249	0	1.54	0.59	2.3	0	2.035	0.236	0.336	0	0.322

Pollutant Name: Carbon Dioxide Temperature: 55F Relative Humidity: ALL

Time	LDA	LDA	LDA	LDA	LDT1	LDT1	LDT1	LDT1	LDT2	LDT2	LDT2	LDT2	MDV	MDV	MDV	MDV	LHD1	LHD1	LHD1	LHD1	LHD2	LHD2	LHD2	LHD2	MHD	MHD	MHD	MHD	HHD	HHD	HHD	HHD	OBUS	OBUS	OBUS	OBUS	UBUS	UBUS	UBUS	UBUS	MCY	MCY	MCY	MCY	SBUS	SBUS	SBUS	SBUS	MH	MH	MH	MH	ALL	ALL	ALL	ALL
min	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL
	LDA-NCAT	LDA-CAT	LDA-DSL	LDA-ALL	LDT1-NCA	LDT1-CAT	LDT1-DSL	LDT1-ALL	LDT2-NCA	LDT2-CAT	LDT2-DSL	LDT2-ALL	MDV-NCA	MDV-CAT	MDV-DSL	MDV-ALL	LHD1-NCA	LHD1-CAT	LHD1-DSL	LHD1-ALL	LHD2-NCA	LHD2-CAT	LHD2-DSL	LHD2-ALL	MHD-NCA	MHD-CAT	MHD-DSL	MHD-ALL	HHD-NCA	HHD-CAT	HHD-DSL	HHD-ALL	OBUS-NC	OBUS-CA	OBUS-DSL	OBUS-ALL	UBUS-NC	UBUS-CA	UBUS-DSL	UBUS-ALL	MCY-NCA	MCY-CAT	MCY-DSL	MCY-ALL	SBUS-NC	SBUS-CA	SBUS-DSL	SBUS-ALL	MH-NCAT	MH-CAT	MH-DSL	MH-ALL	ALL-NCAT	ALL-CAT	ALL-DSL	ALL-ALL
5	111.902	11.841	0	11.84	115.1	14.388	0	14.291	115.101	15.122	0	15.121	156.935	20.211	0	20.234	170.667	23.195	0	21.04	170.667	21.992	0	17.354	170.667	9.546	0	2.947	170.667	9.546	0	6.521	170.667	9.546	0	4.113	0	9.546	0	2.143	35.632	1.771	0	15.077	0	9.546	0	2.028	170.667	9.546	0	8.587	39.779	13.64	0	13.166
10	121.432	13.421	0	13.42	124.901	16.568	0	16.454	124.903	17.115	0	17.114	170.299	23.074	0	23.097	185.2	27.5	0	24.941	185.2	26.755	0	21.108	185.2	19.039	0	5.756	185.2	19.039	0	13.004	185.2	19.039	0	8.011	0	19.039	0	4.274	38.667	3.533	0	17.339	0	19.039	0	4.046	185.2	19.039	0	16.998	43.167	15.697	0	15.143
20	139.927	17.058	0	17.056	143.925	21.49	0	21.339	143.927	21.711	0	21.709	196.237	29.602	0	29.624	213.408	36.965	0	33.513	213.408	37.045	0	29.218	213.408	37.866	0	11.329	213.408	37.866	0	25.863	213.408	37.866	0	15.74	0	37.866	0	8.501	44.556	7.026	0	21.774	0	37.866	0	8.047	213.408	37.866	0	33.678	49.742	20.344	0	19.605
30	157.671	21.331	0	21.327	162.176	27.161	0	26.966	162.178	27.121	0	27.117	221.122	37.201	0	37.219	240.47	47.568	0	43.116	240.47	48.354	0	38.131	240.47	56.482	0	16.838	240.47	56.482	0	38.577	240.47	56.482	0	23.381	0	56.482	0	12.681	50.206	10.48	0	26.091	0	56.482	0	12.003	240.47	56.482	0	50.17	56.049	25.702	0	24.747
40	174.663	26.239	0	26.234	179.654	33.581	0	33.337	179.655	33.345	0	33.339	244.952	45.869	0	45.882	266.386	59.31	0	53.748	266.386	60.683	0	47.846	266.386	74.887	0	22.284	266.386	74.887	0	51.147	266.386	74.887	0	30.934	0	74.887	0	16.812	55.617	13.895	0	30.29	0	74.887	0	15.914	266.386	74.887	0	66.475	62.09	31.771	0	30.567
50	190.904	31.783	0	31.775	196.358	40.751	0	40.45	196.36	40.382	0	40.374	267.728	55.608	0	55.613	291.155	72.189	0	65.409	291.155	74.03	0	58.364	291.155	93.081	0	27.667	291.155	93.081	0	63.573	291.155	93.081	0	38.4	0	93.081	0	20.897	60.788	17.271	0	34.371	0	93.081	0	19.78	291.155	93.081	0	82.591	67.863	38.552	0	37.066
60	206.393	37.962	0	37.951	212.29	48.669	0	48.306	212.292	48.233	0	48.222	289.45	66.416	0	66.411	314.778	86.207	0	78.1	314.778	88.397	0	69.685	314.778	111.063	0	32.987	314.778	111.063	0	75.854	314.778	111.063	0	45.778	0	111.063	0	24.934	65.72	20.607	0	38.335	0	111.063	0	23.601	314.778	111.063	0	98.52	73.369	46.043	0	44.243
120	279.289	87.381	0	87.349	287.27	109.922	0	109.062	287.272	111.232	0	111.196	391.683	151.536	0	151.43	425.955	188.609	0	170.79	425.955	188.635	0	148.656	425.955	188.899	0	56.021	425.955	188.899	0	129.014	425.955	188.899	0	77.724	0	188.899	0	42.409	88.932	35.05	0	56.223	0	188.899	0	40.141	425.955	188.899	0	167.474	99.283	104.067	0	99.781
180	279.509	99.321	0	99.283	287.495	125.208	0	124.222	287.498	126.404	0	126.361	391.991	172.411	0	172.271	426.29	215.625	0	195.234	426.29	216.29	0	170.439	426.29	223.17	0	66.125	426.29	223.17	0	152.42	426.29	223.17	0	91.729	0	223.17	0	50.103	89.002	41.408	0	60.111	0	223.17	0	47.424	426.29	223.17	0	197.794	99.361	118.529	0	113.602
240	279.728	111.211	0	111.167	287.721	140.372	0	139.259	287.724	141.519	0	141.469	392.298	193.163	0	192.989	426.625	242.253	0	219.327	426.625	243.413	0	191.802	426.625	255.419	0	75.632	426.625	255.419	0	174.444	426.625	255.419	0	104.908	0	255.419	0	57.342	89.072	47.392	0	63.77	0	255.419	0	54.277	426.625	255.419	0	226.324	99.439	132.877	0	127.315
300	279.948	123.051	0	123.001	287.947	155.413	0	154.175	287.95	156.577	0	156.52	392.606	213.79	0	213.583	426.96	268.492	0	243.069	426.96	270.003	0	212.745	426.96	285.644	0	84.544	426.96	285.644	0	195.087	426.96	285.644	0	117.26	0	285.644	0	64.128	89.142	53	0	67.202	0	285.644	0	60.7	426.96	285.644	0	253.065	99.517	147.112	0	140.919
360	280.167	134.843	0	134.787	288.173	170.332	0	168.969	288.175	171.579	0	171.515	392.914	234.293	0	234.053	427.295	294.342	0	266.459	427.294	296.061	0	233.269	427.294	313.847	0	92.858	427.294	313.847	0	214.349	427.294	313.847	0	128.785	0	313.847	0	70.46	89.212	58.233	0	70.406	0	313.847	0	66.693	427.294	313.847	0	278.016	99.595	161.233	0	154.414
420	280.387	146.585	0	146.523	288.398	185.127	0	183.642	288.401	186.523	0	186.452	393.222	254.671	0	254.399	427.629	319.803	0	289.497	427.629	321.586	0	253.374	427.629	340.027	0	100.577	427.629	340.027	0	232.228	427.629	340.027	0	139.484	0	340.027	0	76.337	89.282	63.091	0	73.382	0	340.027	0	72.256	427.629	340.027	0	301.178	99.673	175.24	0	167.801
480	280.606	158.277	0	158.209	288.624	199.801	0	198.193	288.627	201.41	0	201.333	393.53	274.926	0	274.62	427.964	344.876	0	312.184	427.964	346.578	0	273.059	427.964	364.184	0	107.699	427.964	364.184	0	248.727	427.964	364.184	0	149.356	0	364.184	0	81.761	89.351	67.573	0	76.131	0	364.184	0	77.39	427.964	364.184	0	322.55	99.751	189.133	0	181.078
540	280.826	169.92	0	169.846	288.85	214.351	0	212.623	288.853	216.241	0	216.157	393.838	295.056	0	294.718	428.299	369.561	0	334.518	428.299	371.038	0	292.324	428.299	386.319	0	114.225	428.299	386.318	0	263.844	428.299	386.319	0	158.402	0	386.319	0	86.73	89.421	71.68	0	78.651	0	386.319	0	82.093	428.299	386.319	0	342.133	99.829	202.912	0	194.247
600	281.045	181.514	0	181.434	289.076	228.78	0	226.931	289.078	231.015	0	230.924	394.145	315.062	0	314.692	428.633	393.857	0	356.502	428.633	394.965	0	311.17	428.633	406.43	0	120.155	428.633	406.43	0	277.579	428.633	406.43	0	166.621	0	406.43	0	91.245	89.491	75.412	0	80.944	0	406.43	0	86.367	428.633	406.43	0	359.926	99.907	216.577	0	207.307
660	281.265	193.058	0	192.973	289.301	243.085	0	241.117	289.304	245.731	0	245.634	394.453	334.944	0	334.542	428.968	417.764	0	378.134	428.968	418.359	0	329.597	428.968	424.519	0	125.488	428.968	424.519	0	289.933	428.968	424.519	0	174.013	0	424.519	0	95.306	89.561	78.768	0	83.009	0	424.519	0	90.211	428.968	424.519	0	375.93	99.985	230.129	0	220.258
720	281.484	204.553	0	204.462	289.527	257.268	0	255.182	289.53	260.391	0	260.287	394.761	354.702	0	354.268	429.303	441.283	0	399.414	429.303	441.221	0	347.603	429.303	440.585	0	130.225	429.303	440.586	0	300.906	429.303	440.585	0	180.579	0	440.586	0	98.913	89.631	81.749	0	84.846	0	440.585	0	93.625	429.303	440.586	0	390.144	100.063	243.567	0	233.101
	4187.146	1769.349	0	1768.637	4306.786	2232.267	0	2214.518	4306.828	2251.651	0	2250.844	5872.164	3072.535	0	3069.645	6385.985	3849.399	0	3484.995	6385.984	3865.405	0	3045.744	6385.984	4031.007	0	1193.357	6385.984	4031.007	0	2753.07	6385.984	4031.007	0	1655.218	0	4031.008	0	904.976	1333.283	747.939	0	977.952	0	4031.007	0	856.596	6385.984	4031.008	0	3571.553	1488.462	2113.125	0	2024.36

Pollutant Name: Sulfur Dioxide Temperature: 55F Relative Humidity: ALL

Time	LDA	LDA	LDA	LDA	LDT1	LDT1	LDT1	LDT1	LDT2	LDT2	LDT2	LDT2	MDV	MDV	MDV	MDV	LHD1	LHD1	LHD1	LHD1	LHD2	LHD2	LHD2	LHD2	MHD	MHD	MHD	MHD	HHD	HHD	HHD	HHD	OBUS	OBUS	OBUS	OBUS	UBUS	UBUS	UBUS	UBUS	MCY	MCY	MCY	MCY	SBUS	SBUS	SBUS	SBUS	MH	MH	MH	MH	ALL	ALL	ALL	ALL
min	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL	NCAT	CAT	DSL	ALL
5	0.001	0	0	0	0.001	0	0	0	0.001	0	0	0	0.003	0	0	0	0.002	0	0	0	0.002	0	0	0	0.003	0	0	0	0.006	0.001	0	0	0.003	0	0	0	0.934	0	0	0	0.001	0	0.205	0	0	0	0	0	0.003	0	0	0	0.001	0	0	0
10	0.001	0	0	0	0.001	0	0	0	0.001	0	0	0	0.003	0	0	0	0.003	0	0	0	0.003	0	0	0	0.003	0	0	0	0.006	0.001	0	0.001	0.003	0	0	0	0.934	0	0	0	0.001	0	0.205	0	0	0.001	0	0	0.003	0	0	0	0.001	0	0	0
20	0.002	0	0	0	0.002	0	0	0	0.002	0	0	0	0.003	0	0	0	0.003	0	0	0	0.003	0	0	0	0.003	0.001	0	0	0.006	0.002	0	0.002	0.003	0.001	0	0	0.934	0.001	0	0	0.001	0	0.205	0	0	0.001	0	0	0.003	0.001	0	0.001	0.001	0	0	0
30	0.002	0	0	0	0.002	0	0	0	0.002	0	0	0	0.003	0	0	0	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.001	0	0	0.005	0.003	0	0.002	0.003	0.001	0	0.001	0.934	0.001	0	0	0.001	0	0.205	0	0	0.002	0	0	0.003	0.001	0	0.001	0.001	0	0	0
40	0.002	0	0	0	0.002	0	0	0	0.002	0	0	0	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.002	0	0	0.005	0.004	0	0.003	0.003	0.002	0	0.001	0.934	0.002	0	0	0.001	0	0.205	0.001	0	0.002	0	0	0.003	0.001	0	0.001	0.001	0	0	0
50	0.002	0	0	0	0.002	0	0	0	0.002	0	0	0	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.002	0	0.001	0.005	0.005	0	0.003	0.003	0.002	0	0.001	0.934	0.002	0	0	0.001	0.001	0.205	0.001	0	0.003	0	0.001	0.003	0.002	0	0.001	0.001	0	0	0
60	0.002	0	0	0	0.002	0.001	0	0.001	0.002	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.004	0.002	0	0.001	0.005	0.006	0	0.004	0.004	0.002	0	0.001	0.934	0.002	0	0.001	0.001	0.001	0.205	0.001	0	0.003	0	0.001	0.004	0.002	0	0.002	0.001	0.001	0	0.001
120	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.005	0.002	0	0.002	0.005	0.002	0	0.002	0.005	0.002	0	0.002	0.005	0.003	0	0.001	0.008	0.005	0	0.003	0.005	0.003	0	0.001	0.934	0.003	0	0.001	0.001	0.001	0.205	0.001	0	0.003	0	0.001	0.005	0.002	0	0.002	0.001	0.001	0	0.001
180	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.005	0.002	0	0.002	0.005	0.002	0	0.002	0.005	0.002	0	0.002	0.006	0.003	0	0.001	0.01	0.006	0	0.004	0.006	0.003	0	0.001	0.934	0.003	0	0.001	0.001	0.001	0.205	0.001	0	0.004	0	0.001	0.006	0.003	0	0.002	0.001	0.001	0	0.001
240	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.003	0.001	0	0.001	0.005	0.002	0	0.002	0.005	0.003	0	0.002	0.005	0.003	0	0.002	0.006	0.003	0	0.001	0.012	0.006	0	0.004	0.006	0.003	0	0.001	0.934	0.003	0	0.001	0.001	0.001	0.205	0.001	0	0.004	0	0.001	0.006	0.003	0	0.003	0.001	0.001	0	0.001
300	0.003	0.001	0	0.001	0.003	0.002	0	0.002	0.003	0.002	0	0.002	0.006	0.002	0	0.002	0.006	0.003	0	0.003	0.006	0.003	0	0.002	0.006	0.004	0	0.001	0.013	0.006	0	0.004	0.006	0.004	0	0.002	0.934	0.004	0	0.001	0.001	0.001	0.205	0.001	0	0.004	0	0.001	0.006	0.003	0	0.003	0.001	0.002	0	0.001
360	0.003	0.001	0	0.001	0.003	0.002	0	0.002	0.003	0.002	0	0.002	0.006	0.002	0	0.002	0.006	0.003	0	0.003	0.006	0.003	0	0.003	0.007	0.004	0	0.001	0.015	0.007	0	0.005	0.007	0.004	0	0.002	0.934	0.004	0	0.001	0.001	0.001	0.205	0.001	0	0.005	0	0.001	0.007	0.004	0	0.003	0.001	0.002	0	0.002
420	0.003	0.001	0	0.001	0.003	0.002	0	0.002	0.004	0.002	0	0.002	0.006	0.003	0	0.003	0.006	0.003	0	0.003	0.006	0.003	0	0.003	0.007	0.004	0	0.001	0.016	0.007	0	0.005	0.007	0.004	0	0.002	0.934	0.004	0	0.001	0.001	0.001	0.205	0.001	0	0.005	0	0.001	0.007	0.004	0	0.003	0.001	0.002	0	0.002
480	0.003	0.002	0	0.002	0.004	0.002	0	0.002	0.004	0.002	0	0.002	0.007	0.003	0	0.003	0.006	0.004	0	0.003	0.006	0.004	0	0.003	0.007	0.004	0	0.001	0.017	0.007	0	0.005	0.007	0.005	0	0.002	0.934	0.005	0	0.001	0.001	0.001	0.205	0.001	0	0.005	0	0.001	0.007	0.004	0	0.004	0.001	0.002	0	0.002
540	0.003	0.002	0	0.002	0.004	0.002	0	0.002	0.004	0.002	0	0.002	0.007	0.003	0	0.003	0.006	0.004	0	0.004	0.006	0.004	0	0.003	0.007	0.005	0	0.001	0.018	0.008	0	0.005	0.007	0.005	0	0.002	0.934	0.005	0	0.001	0.001	0.001	0.205	0.001	0	0.005	0	0.001	0.007	0.004	0	0.004	0.001	0.002	0	0.002
600	0.003	0.002	0	0.002	0.004	0.002	0	0.002	0.004	0.002	0	0.002	0.007	0.003	0	0.003	0.006	0.004	0	0.004	0.006	0.004	0	0.003	0.007	0.005	0	0.001	0.018	0.008	0	0.006	0.007	0.005	0	0.002	0.934	0.005	0	0.001	0.001	0.001	0.205	0.001	0	0.006	0	0.001	0.007	0.005	0	0.004	0.001	0.002	0	0.002
660	0.003	0.002	0	0.002	0.004	0.002	0	0.002	0.004	0.002	0	0.002	0.007	0.003	0	0.003	0.006	0.004	0	0.004	0.006	0.004	0	0.003	0.008	0.005	0	0.002	0.018	0.008	0	0.006	0.008	0.005	0	0.002	0.934	0.005	0	0.001	0.001	0.001	0.205	0.001	0	0.006	0	0.001	0.008	0.005	0	0.004	0.001	0.002	0	0.002

Time min	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
720	0.003	0.002	0	0.002	0.004	0.003	0	0.003	0.004	0.003	0	0.003	0.007	0.004	0	0.004	0.006	0.005	0	0.004	0.006	0.005	0	0.004	0.008	0.005	0	0.002	0.019	0.009	0	0.006	0.008	0.005	0	0.002	0.934	0.005	0	0.001	0.001	0.001	0.205	0.001	0	0.006	0	0.001	0.008	0.005	0	0.004	0.001	0.002	0	0.002

Pollutant Name: PM10 Temperature: 55F Relative Humidity: ALL

Time min	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
5	0.011	0	0	0	0.008	0.001	0	0.001	0.013	0.001	0	0.001	0.012	0.001	0	0.001	0.011	0.001	0	0.001	0.011	0.001	0	0.001	0.011	0.001	0	0	0.011	0.002	0	0.001	0.011	0.001	0	0.001	0	0.002	0	0	0.02	0	0	0.008	0	0.002	0	0	0.011	0	0	0	0.019	0.001	0	0.001
10	0.01	0.001	0	0.001	0.007	0.001	0	0.001	0.011	0.002	0	0.002	0.01	0.003	0	0.003	0.01	0.002	0	0.001	0.01	0.002	0	0.001	0.01	0.003	0	0.001	0.01	0.004	0	0.002	0.01	0.003	0	0.001	0	0.003	0	0.001	0.017	0	0	0.007	0	0.003	0	0.001	0.01	0.001	0	0.001	0.017	0.001	0	0.001
20	0.008	0.002	0	0.002	0.006	0.002	0	0.002	0.009	0.005	0	0.005	0.008	0.006	0	0.006	0.008	0.003	0	0.003	0.008	0.003	0	0.002	0.008	0.005	0	0.001	0.008	0.007	0	0.005	0.008	0.006	0	0.002	0	0.006	0	0.001	0.013	0.001	0	0.006	0	0.006	0	0.001	0.008	0.001	0	0.001	0.013	0.003	0	0.003
30	0.006	0.003	0	0.003	0.004	0.003	0	0.003	0.007	0.007	0	0.007	0.006	0.008	0	0.008	0.006	0.004	0	0.004	0.006	0.004	0	0.003	0.006	0.007	0	0.002	0.006	0.01	0	0.007	0.006	0.008	0	0.003	0	0.008	0	0.002	0.01	0.001	0	0.005	0	0.008	0	0.002	0.006	0.002	0	0.001	0.01	0.004	0	0.004
40	0.004	0.003	0	0.003	0.003	0.004	0	0.004	0.005	0.009	0	0.009	0.005	0.011	0	0.011	0.004	0.006	0	0.005	0.004	0.006	0	0.004	0.004	0.009	0	0.003	0.004	0.012	0	0.008	0.004	0.01	0	0.004	0	0.011	0	0.002	0.008	0.001	0	0.004	0	0.01	0	0.002	0.004	0.002	0	0.002	0.008	0.005	0	0.005
50	0.003	0.004	0	0.004	0.002	0.005	0	0.005	0.004	0.011	0	0.011	0.003	0.013	0	0.013	0.003	0.007	0	0.006	0.003	0.007	0	0.005	0.003	0.011	0	0.003	0.003	0.015	0	0.01	0.003	0.012	0	0.005	0	0.013	0	0.003	0.006	0.002	0	0.003	0	0.012	0	0.003	0.003	0.002	0	0.002	0.006	0.006	0	0.006
60	0.003	0.005	0	0.005	0.002	0.006	0	0.006	0.003	0.013	0	0.013	0.003	0.015	0	0.015	0.003	0.008	0	0.007	0.003	0.008	0	0.006	0.003	0.012	0	0.004	0.003	0.017	0	0.012	0.003	0.014	0	0.006	0	0.014	0	0.003	0.005	0.002	0	0.003	0	0.014	0	0.003	0.003	0.003	0	0.002	0.005	0.008	0	0.007
120	0.007	0.008	0	0.008	0.005	0.01	0	0.01	0.008	0.021	0	0.021	0.007	0.025	0	0.025	0.007	0.012	0	0.011	0.007	0.012	0	0.009	0.007	0.017	0	0.005	0.007	0.023	0	0.016	0.007	0.019	0	0.008	0	0.02	0	0.004	0.013	0.002	0	0.006	0	0.019	0	0.004	0.007	0.004	0	0.003	0.012	0.012	0	0.012
180	0.011	0.009	0	0.009	0.008	0.011	0	0.011	0.013	0.024	0	0.024	0.012	0.028	0	0.027	0.011	0.013	0	0.012	0.011	0.012	0	0.01	0.011	0.017	0	0.005	0.011	0.024	0	0.016	0.011	0.02	0	0.008	0	0.02	0	0.005	0.02	0.002	0	0.009	0	0.02	0	0.004	0.011	0.004	0	0.003	0.019	0.013	0	0.013
240	0.015	0.01	0	0.01	0.011	0.012	0	0.012	0.017	0.026	0	0.026	0.016	0.03	0	0.03	0.015	0.014	0	0.013	0.015	0.013	0	0.01	0.015	0.018	0	0.005	0.015	0.025	0	0.017	0.015	0.02	0	0.008	0	0.021	0	0.005	0.026	0.002	0	0.012	0	0.02	0	0.004	0.015	0.004	0	0.003	0.026	0.014	0	0.014
300	0.018	0.01	0	0.01	0.014	0.013	0	0.012	0.021	0.028	0	0.028	0.019	0.032	0	0.032	0.018	0.015	0	0.014	0.018	0.014	0	0.011	0.018	0.018	0	0.005	0.018	0.025	0	0.017	0.018	0.021	0	0.009	0	0.022	0	0.005	0.032	0.003	0	0.014	0	0.021	0	0.004	0.018	0.004	0	0.004	0.032	0.015	0	0.015
360	0.021	0.011	0	0.011	0.016	0.013	0	0.013	0.024	0.029	0	0.029	0.022	0.034	0	0.034	0.021	0.016	0	0.014	0.021	0.015	0	0.012	0.021	0.019	0	0.006	0.021	0.026	0	0.018	0.021	0.021	0	0.009	0	0.022	0	0.005	0.037	0.003	0	0.016	0	0.022	0	0.005	0.021	0.004	0	0.004	0.036	0.016	0	0.016
420	0.023	0.011	0	0.011	0.017	0.014	0	0.014	0.027	0.031	0	0.031	0.025	0.035	0	0.035	0.023	0.016	0	0.015	0.023	0.015	0	0.012	0.023	0.019	0	0.006	0.023	0.027	0	0.018	0.023	0.022	0	0.009	0	0.023	0	0.005	0.041	0.003	0	0.018	0	0.022	0	0.005	0.023	0.004	0	0.004	0.041	0.017	0	0.016
480	0.025	0.012	0	0.012	0.019	0.014	0	0.014	0.029	0.032	0	0.032	0.027	0.037	0	0.037	0.025	0.017	0	0.015	0.025	0.016	0	0.012	0.025	0.02	0	0.006	0.025	0.028	0	0.019	0.025	0.023	0	0.009	0	0.023	0	0.005	0.045	0.003	0	0.019	0	0.023	0	0.005	0.025	0.004	0	0.004	0.044	0.018	0	0.017
540	0.027	0.012	0	0.012	0.02	0.015	0	0.015	0.031	0.033	0	0.033	0.028	0.038	0	0.038	0.027	0.017	0	0.016	0.027	0.016	0	0.013	0.027	0.021	0	0.006	0.027	0.028	0	0.019	0.027	0.023	0	0.01	0	0.024	0	0.005	0.047	0.003	0	0.02	0	0.024	0	0.005	0.027	0.004	0	0.004	0.047	0.018	0	0.017
600	0.028	0.012	0	0.012	0.021	0.015	0	0.015	0.032	0.033	0	0.033	0.029	0.038	0	0.038	0.028	0.018	0	0.016	0.028	0.017	0	0.013	0.028	0.021	0	0.006	0.028	0.029	0	0.02	0.028	0.024	0	0.01	0	0.025	0	0.006	0.049	0.003	0	0.021	0	0.024	0	0.005	0.028	0.005	0	0.004	0.048	0.018	0	0.018
660	0.029	0.013	0	0.013	0.021	0.015	0	0.015	0.033	0.033	0	0.033	0.03	0.039	0	0.039	0.029	0.018	0	0.016	0.029	0.017	0	0.013	0.029	0.022	0	0.006	0.029	0.03	0	0.021	0.029	0.025	0	0.01	0	0.026	0	0.006	0.05	0.003	0	0.022	0	0.025	0	0.005	0.029	0.005	0	0.004	0.049	0.019	0	0.018
720	0.029	0.013	0	0.013	0.021	0.015	0	0.015	0.033	0.033	0	0.033	0.03	0.039	0	0.039	0.029	0.018	0	0.017	0.029	0.017	0	0.013	0.029	0.023	0	0.007	0.029	0.031	0	0.021	0.029	0.026	0	0.01	0	0.026	0	0.006	0.051	0.003	0	0.022	0	0.026	0	0.005	0.029	0.005	0	0.004	0.05	0.019	0	0.018

Title : San Mateo County Avg Annual CYr 2020 - Group A
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2009/12/09 17:38:53
Scen Year: 2020 -- All model years in the range 1976 to 2020 selected
Season : Annual
Area : San Mateo
****
Year: 2020 -- Model Years 1976 to 2020 Inclusive -- Annual
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Mateo County Average

Table 4: Hot Soak Emissions (grams/trip)

Pollutant Name: Total Organic Gases Temperature: 55F Relative Humidity: ALL

Time min	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
5	0.339	0.034	0	0.034	0.671	0.052	0	0.052	0.674	0.041	0	0.041	0.137	0.046	0	0.046	0.341	0.02	0	0.018	0.341	0.025	0	0.02	0.196	0.011	0	0.003	0.193	0.023	0	0.015	0.196	0.013	0	0.006	0	0.059	0	0.013	0.012	0.115	0	0.074	0	0.033	0	0.007	0.193	0.027	0	0.024	0.025	0.037	0	0.036
10	0.629	0.062	0	0.062	1.235	0.096	0	0.096	1.242	0.075	0	0.075	0.253	0.085	0	0.085	0.628	0.037	0	0.034	0.628	0.046	0	0.036	0.361	0.021	0	0.006	0.356	0.042	0	0.029	0.361	0.025	0	0.011	0	0.109	0	0.024	0.022	0.212	0	0.137	0	0.062	0	0.013	0.355	0.05	0	0.045	0.046	0.069	0	0.066
20	1.082	0.106	0	0.106	2.096	0.164	0	0.163	2.108	0.128	0	0.128	0.429	0.144	0	0.144	1.065	0.064	0	0.058	1.065	0.078	0	0.062	0.613	0.036	0	0.011	0.604	0.072	0	0.049	0.613	0.042	0	0.018	0	0.185	0	0.042	0.037	0.364	0	0.236	0	0.106	0	0.023	0.603	0.085	0	0.076	0.078	0.118	0	0.113
30	1.405	0.136	0	0.136	2.676	0.21	0	0.209	2.691	0.163	0	0.164	0.547	0.185	0	0.185	1.36	0.082	0	0.075	1.36	0.101	0	0.079	0.783	0.046	0	0.014	0.771	0.094	0	0.064	0.783	0.055	0	0.023	0	0.237	0	0.053	0.048	0.471	0	0.305	0	0.138	0	0.029	0.769	0.109	0	0.097	0.1	0.151	0	0.144
40	1.529	0.147	0	0.147	2.886	0.227	0	0.226	2.902	0.177	0	0.177	0.59	0.2	0	0.199	1.467	0.089	0	0.081	1.467	0.109	0	0.086	0.845	0.05	0	0.015	0.831	0.102	0	0.07	0.845	0.059	0	0.025	0	0.257	0	0.058	0.052	0.512	0	0.331	0	0.15	0	0.032	0.83	0.118	0	0.105	0.108	0.163	0	0.156

Hot soak results are scaled to reflect zero emissions for trip lengths of less than 5 minutes (about 25% of in-use trips).

Title : San Mateo County Avg Annual CYr 2020 - Group A
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2009/12/09 17:38:53
Scen Year: 2020 -- All model years in the range 1976 to 2020 selected
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****
Year: 2020 -- Model Years 1976 to 2020 Inclusive -- Annual
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Mateo County Average

Table 5a: Partial Day Diurnal Loss Emissions (grams/hour)

Pollutant Name: Total Organic Gases Temperature: ALL Relative Humidity: ALL

Temp degF	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
55	0.186	0.014	0	0.014	0.155	0.024	0	0.023	0.156	0.021	0	0.021	0.032	0.023	0	0.023	0.01	0.001	0	0.001	0.01	0.001	0	0.001	0.007	0.001	0	0	0.01	0.002	0	0	0.007	0.001	0	0	0	0.001	0	0	0.002	0.032	0	0.02	0	0.003	0	0.001	0.009	0.002	0	0.002	0.003	0.017	0	0.017

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Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2009/12/09 17:38:53
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Season : Annual
Area : San Mateo
****
Year: 2020 -- Model Years 1976 to 2020 Inclusive -- Annual
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Mateo County Average

Table 5b: Multi-Day Diurnal Loss Emissions (grams/hour)

Pollutant Name: Total Organic Gases Temperature: ALL Relative Humidity: ALL

Temp degF	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
55	0.011	0.001	0	0.001	0.009	0.002	0	0.002	0.009	0.001	0	0.001	0.002	0.002	0	0.002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.003	0	0.002	0	0	0	0	0	0	0	0	0	0.001	0	0.001

Title : San Mateo County Avg Annual CYr 2020 - Group A
Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2009/12/09 17:38:53
Scen Year: 2020 -- All model years in the range 1976 to 2020 selected
Season : Annual
Area : San Mateo
****
Year: 2020 -- Model Years 1976 to 2020 Inclusive -- Annual
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Mateo County Average

Table 6a: Partial Day Resting Loss Emissions (grams/hour)

Pollutant Name: Total Organic Gases Temperature: ALL Relative Humidity: ALL

Temp degF	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
55	0.149	0.011	0	0.011	0.124	0.019	0	0.019	0.125	0.017	0	0.017	0.025	0.019	0	0.019	0.008	0.001	0	0.001	0.008	0.001	0	0.001	0.006	0.001	0	0	0.008	0.002	0	0	0.006	0.001	0	0	0	0.001	0	0	0.001	0.026	0	0.016	0	0.003	0	0.001	0.008	0.002	0	0.001	0.003	0.014	0	0.014

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Scen Year: 2020 -- All model years in the range 1976 to 2020 selected
Season : Annual
Area : San Mateo
****
Year: 2020 -- Model Years 1976 to 2020 Inclusive -- Annual
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Mateo County Average

Table 6b: Multi-Day Resting Loss Emissions (grams/hour)

Pollutant Name: Total Organic Gases Temperature: ALL Relative Humidity: ALL

Temp degF	LDA NCAT	LDA CAT	LDA DSL	LDA ALL	LDT1 NCAT	LDT1 CAT	LDT1 DSL	LDT1 ALL	LDT2 NCAT	LDT2 CAT	LDT2 DSL	LDT2 ALL	MDV NCAT	MDV CAT	MDV DSL	MDV ALL	LHD1 NCAT	LHD1 CAT	LHD1 DSL	LHD1 ALL	LHD2 NCAT	LHD2 CAT	LHD2 DSL	LHD2 ALL	MHD NCAT	MHD CAT	MHD DSL	MHD ALL	HHD NCAT	HHD CAT	HHD DSL	HHD ALL	OBUS NCAT	OBUS CAT	OBUS DSL	OBUS ALL	UBUS NCAT	UBUS CAT	UBUS DSL	UBUS ALL	MCY NCAT	MCY CAT	MCY DSL	MCY ALL	SBUS NCAT	SBUS CAT	SBUS DSL	SBUS ALL	MH NCAT	MH CAT	MH DSL	MH ALL	ALL NCAT	ALL CAT	ALL DSL	ALL ALL
55	0.009	0.001	0	0.001	0.008	0.002	0	0.002	0.008	0.001	0	0.001	0.002	0.001	0	0.001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.003	0	0.002	0	0	0	0	0	0	0	0	0	0.001	0	0.001

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Version : Emfac2007 V2.3 Nov 1 2006
Run Date : 2009/12/09 17:38:53
Scen Year: 2020 -- All model years in the range 1976 to 2020 selected
Season : Annual
Area : San Mateo
****
Year: 2020 -- Model Years 1976 to 2020 Inclusive -- Annual
Emfac2007 Emission Factors: V2.3 Nov 1 2006

County Average San Mateo County Average

Table 7: Estimated Travel Fractions

Pollutant Name: Temperature: ALL Relative Humidity: ALL

	LDA NCAT LDA-NCAT	LDA CAT LDA-CAT	LDA DSL LDA-DSL	LDA ALL LDA-ALL	LDT1 NCAT LDT1-NCA	LDT1 CAT LDT1-CAT	LDT1 DSL LDT1-DSL	LDT1 ALL LDT1-ALL	LDT2 NCAT LDT2-NCA	LDT2 CAT LDT2-CAT	LDT2 DSL LDT2-DSL	LDT2 ALL LDT2-ALL	MDV NCAT MDV-NCA	MDV CAT MDV-CAT	MDV DSL MDV-DSL	MDV ALL MDV-ALL	LHD1 NCAT LHD1-NCA	LHD1 CAT LHD1-CAT	LHD1 DSL LHD1-DSL	LHD1 ALL LHD1-ALL	LHD2 NCAT LHD2-NCA	LHD2 CAT LHD2-CAT	LHD2 DSL LHD2-DSL	LHD2 ALL LHD2-ALL	MHD NCAT MHD-NCA	MHD CAT MHD-CAT	MHD DSL MHD-DSL	MHD ALL MHD-ALL	HHD NCAT HHD-NCA	HHD CAT HHD-CAT	HHD DSL HHD-DSL	HHD ALL HHD-ALL	OBUS NCAT OBUS-NC	OBUS CAT OBUS-CA	OBUS DSL OBUS-DS	OBUS ALL OBUS-ALL	UBUS NCAT UBUS-NC	UBUS CAT UBUS-CA	UBUS DSL UBUS-DS	UBUS ALL UBUS-ALL	MCY NCAT MCY-NCA	MCY CAT MCY-CAT	MCY DSL MCY-DSL	MCY ALL MCY-ALL	SBUS NCAT SBUS-NC	SBUS CAT SBUS-CA	SBUS DSL SBUS-DS	SBUS ALL SBUS-ALL	MH NCAT MH-NCAT	MH CAT MH-CAT	MH DSL MH-DSL	MH ALL MH-ALL	ALL NCAT ALL-NCAT	ALL CAT ALL-CAT	ALL DSL ALL-DSL	ALL ALL ALL-ALL
%VMT	0	0.557	0	0.558	0	0.125	0.001	0.126	0	0.204	0	0.204	0	0.064	0	0.065	0	0.007	0.002	0.008	0	0.004	0.003	0.006	0	0.003	0.013	0.016	0	0	0.003	0.003	0	0	0.001	0.002	0	0.001	0.003	0.004	0	0.003	0.005	0	0.008	0	0	0	0	0	0.001	0	0.001	0.003	0.971	0.026	1
%TRIP	0	0.549	0	0.55	0	0.108	0.001	0.109	0	0.179	0	0.179	0	0.056	0	0.056	0	0.028	0.003	0.031	0	0.016	0.004	0.02	0	0.012	0.029	0.041	0	0.001	0	0.001	0	0.002	0.003	0.004	0	0	0	0	0	0.003	0.005	0	0.008	0	0	0	0	0	0	0	0	0.003	0.956	0.041	1
%VEH	0	0.58	0	0.58	0	0.116	0.001	0.117	0	0.189	0	0.189	0	0.059	0	0.06	0	0.006	0.002	0.007	0	0.003	0.002	0.005	0	0.002	0.007	0.009	0	0	0.001	0.001	0	0	0.001	0.001	0	0	0.001	0.001	0.01	0.016	0	0.026	0	0	0	0	0	0.003	0	0.003	0.011	0.975	0.014	1