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Date:
October 4, 2019

To:
Jacqueline R. Onciano, Director of Planning & Development, County of Santa Clara
Sylvia Gallegos
Deputy County Executive, County of Santa Clara
Geoff Bradley, M-Group

Memo

Subject: Average Daily Traffic (ADT) Performance Standard Proposed for the Conditions of Approval of the proposed Stanford University General Use Permit (GUP)

1. Executive Summary

The proposed Stanford General Use Permit (GUP) includes as a condition of approval phased development of a maximum of 3,500,000 square feet of academic development and student beds to be considered for implementation in 25% increments and not more than once every five years with check ins at the end of each increment to ensure compliance with conditions of approval. AECOM has worked closely with the County of Santa Clara to help establish a three-tier system to ensure that development under the proposed GUP would not substantially worsen traffic congestion affecting the surrounding area or otherwise be detrimental to the public health, safety or general welfare:[1]

- Tier 1—no net new commute trips during peak hour/direction and 3-hour peak period;
- Tier 2—no exceedance of reverse commute trips baseline during peak hour and peak period; and,
- Tier 3—limit growth in average daily traffic. Average Daily Trips (ADT) are the total number of automobile trips, both inbound and outbound, within a 24-hour period on weekdays.

The purpose of the ADT metric is to determine if a particular land use development or change of use has increased or decreased total automobile trips on surrounding roadways. In addition to traffic congestion, auto trips impact energy consumption, air pollution, and public safety. Unlike peak hour or peak period traffic counts, ADT provides a comprehensive picture of the public health and safety impacts and overall impacts on congestion in the surrounding community that traffic makes based on land use context and the transportation choices of the people traveling to and from the development.

The County and AECOM are recommending a threshold of 3% over the baseline ADT for the Conditions of Approval of the proposed Stanford General Use Permit (GUP). This memo explains the importance of this metric and basis of the threshold. It provides a recommendation for how it can be applied to the Stanford campus development looking ahead to the next 20 years if the GUP is approved by the County.

The County's existing monitoring program for traffic under the 2000 GUP, apart from collecting peak hour traffic volumes per the 2000 GUP requirements, also collects the total daily number of trips crossing the established cordon. The raw ADT data has been tabulated from 2004 through 2016. Stanford in its memo "*Use of 2001 Baseline*

[1] County of Santa Clara Zoning Ordinance §§ 5.20.120, 5.65.030.

for 2018 General Use Permit Traffic Monitoring" dated September 19, 2018 (prepared by Fehr and Peers, see attached) acknowledges that ADT has remained stable over these years.

Based on Stanford's current ADT of 77,423, a 3% increase would equate to an additional 2,323 trips per day. Peak interval (hour or period) traffic can shift throughout the day and negatively impact the community. In order to make sure traffic reduction measures are successful, a measure of all-day traffic is necessary. Specifically, if Stanford is meeting its peak hour and period standards because additional traffic has shifted to other times of the day, the addition of the ADT threshold protects the community from being impacted by this additional of traffic which would otherwise have been missed. However, this metric must be applied carefully so that it is both enforceable and reinforces the University's success. This memo provides a detailed description of the data-driven proposal for the application of the ADT threshold. It includes the exclusion of community event days (up to three), the application of the parking-lot and cut-through adjustments, the phase in of the ADT counting, and the proposal that if the metric becomes associated with a penalty it will only be if traffic exceeds the threshold for two out of three monitoring years.

2. Local ADT Examples

The ADT trip cap metric is a newer addition to the traffic limitations that local jurisdictions are now imposing to make sure that traffic from a development does not negatively impact their communities. The County of Santa Clara's interest in using ADT as part of the GUP is already being used in local jurisdictions. For example, an ADT threshold has already been imposed by the City of Menlo Park on Facebook[2] and by the Town of Los Gatos[3] on any project that exceeds the threshold. The list below provides a brief description of each of these local examples for reference.

- Conditional Development Permit (CDP) for Facebook, City of Menlo Park, 2018
  - The City of Menlo Park's 2018 agreement[4] on mitigation measures for Facebook campus expansion involves a daily trip cap (which is functionally the same as an ADT threshold): an established maximum on the number of automobiles that can enter and exit Facebook's east and west campuses per day.
  - The City permits Facebook to exceed the trip cap 12 times per year for special events and allows three days every six months (18 days) when the cap can be exceeded without penalty.
  - The City of Menlo Park levies tiered financial penalties against the company for days the trip cap is exceeded based on the frequency of the exceedance days. Specifically, the city charges a penalty of $50 per trip per day over the threshold. Penalties increase based on the frequency of exceedance days: to $100 per trip per day if there have been penalties applied in the two previous months or in any four of the previous six months, and to $200 per trip per day if penalties were applied in each of the six previous months.
  - As a result of implementing the trip cap, Facebook has managed to reduce close to 90% of its ride-hailing trips from traveling on the campuses to support their compliance with the trip cap.
- Traffic Impact Policy, Town of Los Gatos, 2017
  - The Town of Los Gatos developed the Traffic Impact Policy as provisions for the Town's Traffic Impact Mitigation Fees, subjecting any project that generates one or more new net Average Daily Trip, after considering relevant trip credits, to traffic mitigation fees.

[2] https://almanacnews.com/print/story/print/2019/05/08/facing-trip-cap-slip-ups-facebook-restricted-uber-and-lyft-access-to-its-campuses May 8, 2019, "Facing trip cap slip-ups, Facebook restricted Uber and Lyft access to its campuses" by Kate Bradshaw and https://www.menlopark.org/DocumentCenter/View/15757/CDP---Exhibit-D-MMRP?bidId= Facebook Campus Expansion Project Mitigation Monitoring and Reporting Program

[3] Town of Los Gatos Town, Council Policy Manual, Traffic Impact Policy, POLICY NUMBER: 1-05, EFFECTIVE DATE: 3/22/2017

[4] Including approved "land use entitlements, environmental review, and agreements for the Facebook Campus Expansion Project located at 301-309 Constitution Drive, and introduced the ordinances rezoning the property and approving the Development Agreement. On November 15, 2016, the City Council adopted the Rezoning and Development Agreement Ordinances. These actions completed the land use entitlement and environmental review process for the project. In December 2016, the City issued permits for the construction of Building 21 (Phase 1) of the project. Building 21 is currently under construction and anticipated to be completed in the summer of 2018." https://www.menlopark.org/995/Facebook-Campus-Expansion accessed on 10/1/2019

3. Evaluation of Threshold Percentage

AECOM recommended a specific ADT threshold of 3% as part of the research that went into the composition of the Conditions of Approval. To determine a realistic threshold of the ADT limit, AECOM first looked at the level of fluctuation over the 13 years of data previously analyzed in the memo prepared by Fehr and Peers entitled "Use of 2001 Baseline for 2018 General Use Permit Traffic Monitoring" dated September 18, 2018 and attached. The Table below[5] presents the ADT crossing the Stanford cordon over the 13 years included in the F&P memo. This analysis is derived from the 13 years of available data collected under the 2000 GUP traffic monitoring program.

Year	ADT	Fluctuation from Average
2004	78,300	1.13%
2005	86,900	12.24%
2006	76,300	-1.45%
2007	75,800	-2.10%
2008	74,800	-3.39%
2009	72,700	-6.10%
2010	73,600	-4.94%
2011	76,700	-0.93%
2012	77,900	0.62%
2013	79,400	2.55%
2014	81,400	5.14%
2015	75,700	-2.23%
2016	77,000	-0.55%

The average number of trips for the 13 years is 77,423. During the 13- year interval, two years were outliers (years 2005 & 2014[6]) which were nine years apart. All years without the outliers had an ADT either below the average, or an ADT that was less than 3% above the average.

The purpose of the County's application of thresholds is to make sure development on the Stanford campus does not negatively impact the community or the environment, including during outside the peak commute hours. The zoning ordinance finding relating to this is "not substantially worsen traffic congestion". Even if Stanford is in compliance with the thresholds established for peak intervals (hour or period) traffic, traffic could still be increasing outside the peak. Trips can shift throughout the day in order to avoid traffic during the peak intervals and negatively impact the community. The addition of the ADT threshold protects the community from being impacted by this additional traffic which would otherwise have been missed with only the peak interval thresholds.

This standard is being applied to ensure traffic would not increase uncontrollably. The historical trends described in the previous paragraph provide guidance on what is the normal range of daily traffic fluctuations year-to-year. Imposing a 3% threshold means that if Stanford stays at or under this 3% ADT threshold, which is to say stays within normal historical fluctuations, traffic will remain constant in the future and would not lead to a substantial worsening of conditions over time. In other words, based on patterns in the historical data, it is reasonable to assume that ADT will continue to remain constant into the future if Stanford continues to remain diligent in managing its trips. Therefore, we believe a 3% cap from an establish baseline is appropriate because it is supported by the data.

[5] Source: F&P memo "Use of 2001 Baseline for 2018 GUP Traffic Monitoring" dated September 18, 2018
[6] According to Stanford's June 21, 2019 letter to the Planning Commission, "The ADT was abnormally high during these two years because of roadway construction outside the campus cordon on Sand Hill Road and Welch Road, respectively. That offsite construction activity caused more drivers to cut through the campus. These drivers were not traveling to or from a Stanford campus destination; they were simply using campus roads to bypass an offsite construction zone."

At a highly conceptual level, 3% of 77,423 average daily traffic is a total of 2,322 additional trips. If, theoretically, the additional trips were evenly spread out throughout the 24-hour day, they would represent an additional 97 trips per hour. This number is significantly more than the additional trips allowed during the peak hours: the 1% trigger represents 35 trips in the AM and 36 trips in the PM. Of course, it is highly unlikely that these additional 2,322 trips would be evenly spread out throughout the day; more likely they would add trips between 7 AM and midnight (a 19-hour interval). In this case, the threshold represents an average addition of 122 trips per hour which is almost three and a half times the peak hour threshold.

Data Verification

The peak-hour traffic monitoring under the 2000 GUP involves a rigorous data verification process where individual 15-minute intervals are replaced when they are 25% higher or lower than the average for that time and location. In this way, data is eliminate from any unusual events either on campus or in the data collection. This process, which has been conducted consistently since the launch of the 2000 GUP traffic monitoring, makes sure that unique events such as blocked roadways on- and off-campus, collisions, live performances, tour groups, and museum events do not throw-off the traffic averages.

In 2016, there was a question as to the effectiveness of AECOM's data verification processes in the context of community events occurring during the monitoring interval. Stanford staff wanted the day when the community event had taken place dropped from the averages. At that time, AECOM conducted a sensitivity analysis as described in the 2016 Annual Monitoring report. This analysis found that the data verification process was robust enough to result in differences of less than one percent to the results as compared with dropping the entire day when an event took place.

However, integrating this level of data verification of removing individual 15-minute intervals that exceed 25% above or below the average is not realistic when considering all-day traffic given the higher quantity of these 15-minute intervals. Instead, we believe it would be appropriate to exclude a fixed number of atypical weekdays. As a point of comparison, the City of Menlo Park allows Facebook to drop 18 weekdays per year or about 7% of all the monitored days. The County currently monitors Stanford traffic for 8 weeks or 40 weekdays. With this information in mind, this memo recommends dropping up to three atypical weekdays under the current system (higher or lower to be consistent with the current methodology) or 7%. When traffic is monitored continuously throughout the year, we propose the exclusion of up to 18 non typical days (7%).

Community Events

Stanford University has expressed concern regarding the inter-relationship between community events and the ADT threshold: "If Stanford was held to an ADT compliance threshold, it would have to limit community uses of Stanford's on-campus facilities and amenities, such as Stanford's live performances, tour groups, and museum visits. The Cantor Museum, for example, hosts roughly 200,000 visitors per year, which equates to over 180 trips per day, conservatively assuming three visitors per vehicle." (Letter dated June 21, 2019). The current eight weeks of traffic monitoring each year account for the ongoing visitors coming to Stanford's campus to attend live performance, take campus tours, or tour museums. Therefore, these types of trips referenced in Stanford June 21, 2019 are already being taken into consideration when evaluating the ADT. In addition, we are proposing the exclusion of up to three days per year (or 18 days per year if traffic monitoring is continuous) as described in the previous section of this memo.

Outlier Years

Stanford notes in its letter dated June 21, 2019 that "The ADT was abnormally high during these two years (2005 and 2014) because of roadway construction outside the campus cordon on Sand Hill Road and Welch Road, respectively. That offsite construction activity caused more drivers to cut through the campus. These drivers were not traveling to or from a Stanford campus destination; they were simply using campus roads to bypass an offsite construction zone." This observation is consistent with our rationale for calculating the threshold. It is also important to note that these outlier years were nine years apart, and neither event reoccurred in subsequent years, further emphasizing that these events were anomalies. Moreover, as explained below, cut-through trips such as these are excluded from the Stanford trip counts.

These events in the historical data shed light on the question of exactly how the ADT baseline and threshold should be referenced and applied. With these events and Stanford's concerns in mind, we are recommending that, if a penalty is associated with the ADT threshold, it should only apply after the ADT baseline is exceeded during two out of three years as this would represent a valid pattern and not an anomaly year.

Adjustments

The traffic monitoring methodology includes two adjustments to the raw traffic counts: a parking lot adjustment to account for commute trips associated with the hospital rather than campus, and cut-through traffic adjustment to account for automobiles crossing the cordon points but do not have an origin or destination on-campus.

Parking Lot Data Collection

Depending on construction and other roadway events, the Stanford campus traffic monitoring includes 20 parking lot and structure driveways. The driveways of each parking lot or garage are counted in the same way the cordon locations are counted, providing the total number of cars. Traffic is counted by direction into and out of these parking lots during the entire count interval.

Adjustments are made to identify campus and hospital trip vehicles by parking lot (inside or outside of the cordon) and separate them from trips generated by other adjacent land uses, particularly the medical complex. If campus parking permits are observed in lots outside the cordon area, they were added to the cordon count. If hospital-related vehicles are observed inside the cordon area, they are subtracted from the cordon count.

Cut-Through Data Collection

To determine the proportion of vehicles cutting through campus, the County's traffic monitoring subconsultant records licenses plates at the cordon locations by writing down the license plate number on a clip board. The purpose of the license plate survey is to identify vehicles that are only passing through the Stanford campus, not beginning or ending their trip there. License plate numbers are recorded for vehicles entering and leaving each cordon location. The surveys are performed one day each week for both AM and PM peak hours. Vehicles that entered the cordon and left through any gateway within an interval of 20 minutes are considered to be "cut-through" vehicles. The license plate matching process showed that, for example, during the 2019 spring counts, the average AM and PM cut-through percentages are 13.26 percent and 14.22 percent, respectively. The average percentages are used to adjust their respective vehicle counts.

Given the increased prevalence of commuters traveling to work using a Transportation Network Company (TNC) such as Uber or Lyft, the recommended Conditions of Approval require the cut-through adjustment methodology to verify that these vehicles are in fact "cutting through" and not dropping off or picking up passengers (thus, adding cars to the roadways as the result of Stanford campus commuters).

Stanford University's concerns regarding fluctuations in cut-through traffic as expressed in their June 21, 2019 letter may have merit[7]. With this in mind, we are recommending that the ADT requirements include these adjustments in the manner that will be applied to the peak-hour monitoring. This may require the addition of mid-day parking lot and license plate data collection under the monitoring process.

4. Recommendation

The recommendations explained in this memo are:

- ADT Trip counts should be monitored Monday through Friday only, and any fluctuations formally noted in the monitoring report.
- At the beginning of the Phase 2 development, the ADT trip baselines should be determined. A Stanford prepared ADT management plan should also be required by the County at this time. Traffic over the

[7] The letter states "Cut-through traffic at Stanford's campus ranges in the 15-17 percent range of all daily trips, during the peak hour and on a daily scale constitutes over 10,000 trips per day. Stanford has no control over cut-through traffic. These are drivers who are not going to any destination on the Stanford campus; they are simply passing through on their way somewhere else. The potential variation in the amount of cut-through traffic each year would easily surpass the three percent threshold proposed by the Administration."

defined standard during the remainder of the GUP should require a deficiency plan to provide an opportunity for refinements and improvements to the ADT trip reduction programs. Additional consequences should be as determined by the County.

- The data collection methodology for ADT should remain consistent with the traffic counting system established under the 2000 GUP, including the application of adjustments in the same manner that they will be applied to the peak hour data. Any methodological refinements to the data collection implemented over time should be carried through to ADT.
- Because the fine-grain data verification applied to the peak-hour data-collection methodology is not feasible with more data to verify, up to three days are proposed to be dropped from the 40-day count interval to account for community events, road closures and other traffic anomalies. This exact number of days should be reviewed and potentially revised if ADT becomes a concern and this threshold will be associated with penalties under the GUP.
- If a penalty is associated with exceeding the ADT threshold, it should only apply if the established baseline is exceeded in two out of three years as this would represent a valid pattern and not an anomaly year.
- Trip Credits may be used to offset traffic count overages and keep Stanford in compliance per this threshold.

FEHR PEERS

MEMORANDUM

Date: September 19, 2018

To: Lesley Lowe, Stanford University

From: Ellen Poling, Fehr & Peers

Subject: Use of 2001 Baseline for 2018 General Use Permit Traffic Monitoring

I. Introduction

This memorandum presents the basis for the continued use of the 2000 General Use Permit cordon count baseline, set in 2001, as the baseline for traffic monitoring under the 2018 General Use Permit, and presents the reasons that changing the baseline would result in less reliable and accurate monitoring of Stanford traffic.

Mitigation Measure 5.15-2 in the Draft EIR for the 2018 General Use Permit states at paragraph 3 on page 5.15-83:

> The baseline for measuring the no net new commute trips standard **shall be the count that was established in 2001.**

Mitigation Measure 5.15-2 also states at paragraph 1 on page 5.15-74 that the no net new commute trips standard is defined as no increase in trips during the peak hour in the peak commute direction. The measure cites the applicable policy in the County's adopted Stanford University Community Plan that establishes this definition:

> As specified on page 64 and Policy C-1 of the Stanford Community Plan, the no new commute trips standard is defined as no increase in automobile trips **during peak hour commute times in the peak commute direction**, as counted at defined cordon locations around the central campus. The peak commute period is defined as the one-hour period of time with the highest volume of traffic, as determined by the traffic counts.

Page 64 of the Stanford Community Plan states:

> The standard of "no net new commute trips," as articulated in this plan, establishes a goal that there be **no additional automobile trips over the calculated baseline in the peak**

commute direction during peak commute hours. This standard is at the core of the transportation approach expressed in this plan, and is the basis of its policies and implementation recommendations.

Consistent with the Stanford Community Plan, Mitigation Measure 5.15-2 in the Draft EIR addresses the potential impacts of the proposed Project through a tiered approach. First, the mitigation measure requires Stanford to fund County monitoring of the campus gateways. Second, the mitigation measure requires calculation of trip reduction credits approved by the County of Santa Clara for trips removed outside the campus within the local impact area, and requires a comparison of the number of vehicle trips at the campus gateways as modified by trip reduction credits to a baseline count established in 2001 to determine whether the baseline has been exceeded by more than one percent. Third, the mitigation measure requires a payment of a per trip fee if the comparison in step two is exceeded in two of three years. The per trip fee would be used by the County of Santa Clara to fund further trip reduction measures or to fund intersection improvements identified in the Draft EIR. The Recirculated Draft EIR applies this same mitigation approach to address impacts of Housing Alternatives A and B.

With the pending approval of the 2018 General Use Permit, it has been suggested that the baseline for trip monitoring should be re-set in a number of different ways, including:

- Monitor a multiple-hour peak period, rather than a single peak hour in the morning and evening, and compare the new monitoring data to a new multiple-hour peak period baseline;
- Monitor all daily trips, as opposed to AM and PM peak hour or peak period trips, and compare the new monitoring data to a new daily trip baseline; and
- Update the baseline to reflect current conditions as opposed to continuation of the 2001 baseline.

The following discussion explains why continuation of peak hour monitoring, and comparison of the monitoring data to the cordon count baseline that was calculated in 2001, is considered the most accurate and appropriate method for monitoring campus traffic generation under the 2018 General Use Permit.

Section II demonstrates that the monitoring data that have been collected since 2001 are representative of peak hour, peak period, and daily conditions. The data show that the total numbers of automobiles entering and exiting the campus (without adjustment for cut-through and hospital trips) has not increased over time:

- In the shoulder hours outside the peak hours; and
- On a daily basis.

The 2001 baseline is also representative of the conditions that are expected to exist at completion of development authorized by the 2000 General Use Permit. If anticipated trips from occupancy of the Escondido Village Graduate Residences and the remaining academic facilities permitted under the 2000 General Use Permit are added to the 2016 counts, the result matches the 2001 baseline counts.

In addition to the monitoring data collected by Santa Clara County, Stanford has annual data on commuter drive-alone rates, obtained through surveys, that aligns with the physical traffic count data.

Section III describes why changing the monitoring methodology and associated baseline would introduce potential error and add uncertainty to the assessment of trip growth under the 2018 General Use Permit.

II. Campus Vehicle Trip Trends: 2001 - 2016

As demonstrated in the 2000 General Use Permit Annual Traffic Monitoring Reports, Stanford has met the No Net New Commute Trips standard, which measures automobile trips in the peak hour/peak direction, every year under the 2000 General Use Permit. The 2000 General Use Permit trip monitoring data and Stanford's annual transportation survey provide multiple metrics that indicate traffic levels also have not increased in the shoulder hours outside the peak hours, and throughout the day. These data are presented below.

A. Stanford Transportation Survey: Single-Occupancy Vehicle Trip Rate

Stanford's single occupancy vehicle rate for commuting employees and students has dropped from 69 percent in 2003 to 43 percent today (**Figure 1**). This considerable reduction in the single occupancy vehicle rate indicates that the transportation demand management (TDM) program has been successful in moving the University commuters to other alternatives modes of transportation, regardless of the time of day that they travel. The TDM program is described in Appendix TIA Part 1 of the Draft EIR (p. 8).

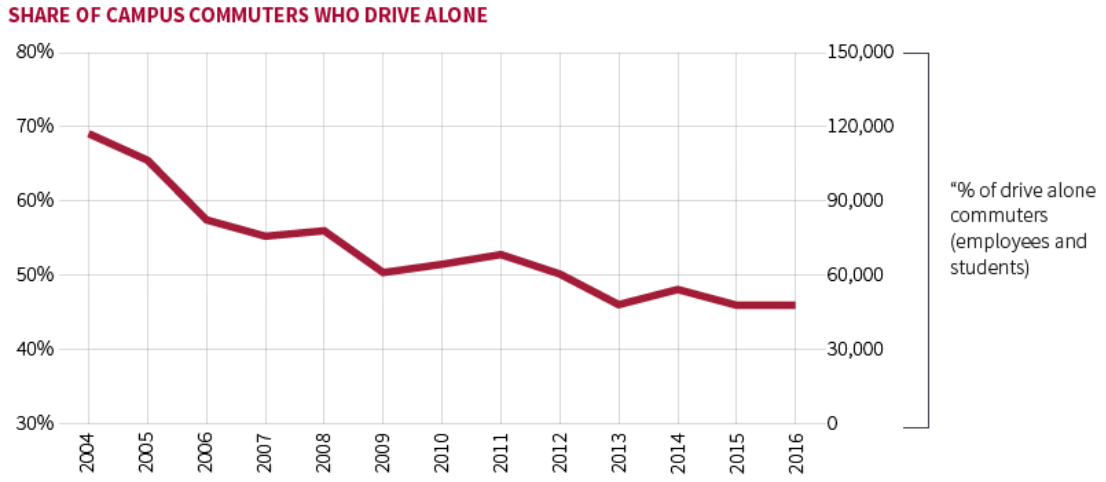


Figure 1: Employee and Student Drive-Alone Trend

B. Monitoring Data Collection and Peak Hour Results

To perform annual monitoring for the 2000 General Use Permit Conditions of Approval, the County's consultants have collected the following data since 2001:

- Raw counts of all daily automobiles crossing monitoring tubes (24 hours per day) at 16 campus gateways are collected over 8 weeks (40 days) per year. (These raw counts include all Stanford campus trips plus non-Stanford campus cars who may be simply passing through the campus and drivers traveling to the Stanford hospitals and parking in campus parking lots);
- Manual recording of license plates on all automobiles at 16 campus gateways takes place during a one-hour period for eight days each year (one for each cordon count week). (The license plate surveys at campus gateways are used to determine the percentage of automobiles that represent pass-through, or cut-through the campus, and therefore are not associated with Stanford campus uses);
- Raw counts of all daily automobiles entering and exiting hospital or shared hospital/university parking lots inside the cordon, and university or shared university/hospital parking lots outside the cordon are collected for 24 hours per day, 40 days per year.
- Manual recording of automobiles with hospital parking permits and automobiles with university parking permits, in all the lots noted above takes place during a 90-minute period, for eight days each year (one day for each cordon count week). (The parking permit surveys are used to remove hospital trips from the cordon counts, and add university

personnel parking in hospital or shared hospital/university parking lots outside the cordon to the cordon counts).

In 2001, this data set was used to determine the baseline number of peak hour, peak direction trips by Stanford campus affiliates and visitors that was occurring on a daily basis. The steps to calculate the baseline (and subsequent annual reporting) generally are as follows:

- Aberrational data collection days, such as Homecoming, are removed from the data set.
- Raw counts are reviewed to identify the morning peak hour for inbound automobiles, and evening peak hour for outbound automobiles. The peak hour is determined each year based on the data for that year, to ensure that the highest hour is measured each year.
- License plate surveys at campus gateways are used to determine the percentage of pass-through trips occurring during the peak hours during that year. That percentage is applied to the raw data to deduct pass-through trips.
- Parking permit surveys are used to determine the percentage of trips crossing the cordon that represent hospital affiliates parking in university or shared university/hospital parking lots within the cordon during that year. Those trips are deducted from the raw data.
- Parking permit surveys are used to determine the percentage of trips using university or shared university/hospital parking lots that are located outside the cordon that represent university affiliates. Those trips are added to the raw data.
- The resulting, adjusted peak hour trip counts from all days of data collection are then combined to determine the average daily number of trips occurring during the AM and PM peak hours during the year.

In 2001, the final step after determining the average daily trips occurring during the AM and PM peak hour was to calculate a confidence interval to allow for statistically insignificant variation in traffic volumes. The threshold for exceeding the baseline was set at one percent above the upper confidence interval. The AM and PM peak hour baselines were thus set as shown in **Table 1**.

Table 1: 2001 Baselines

Step	AM Peak Hour Inbound	PM Peak Hour Outbound
2001 Adjusted Average	3,319	3,446
90% Confidence Interval	+/- 120	+/- 109
2001 Upper Limit	3,439	3,555
1% Increase	35	36
2001 Baseline	3,474	3,591

Source: 2000 General Use Permit Annual Traffic Monitoring Reports, Table 4.

This same monitoring methodology has been repeated every year. By using the same method to collect and adjust the data as was used to determine the baseline, the comparison is an apples-to-apples comparison. The confidence interval and 1% allowance over that interval further ensures that an insignificant statistical anomaly does not affect the results.

As shown in **Figure 2**, in most years of monitoring, including the most recent monitoring year, Stanford has generated fewer trips at the campus cordon than the baseline calculated in 2001. (In years where trips exceeded the baseline, the no net new commute trips standard was achieved through trip reduction credits for removing automobile trips outside the campus cordon, within the local impact area.) Figure 2 also shows that, while the trip totals have largely remained below baseline levels, there has been annual variation in both the AM and PM trip counts. Because this type of variation was anticipated when the no net new commute trips standard was developed, the standard is based on compliance with the standard during two of three consecutive years.

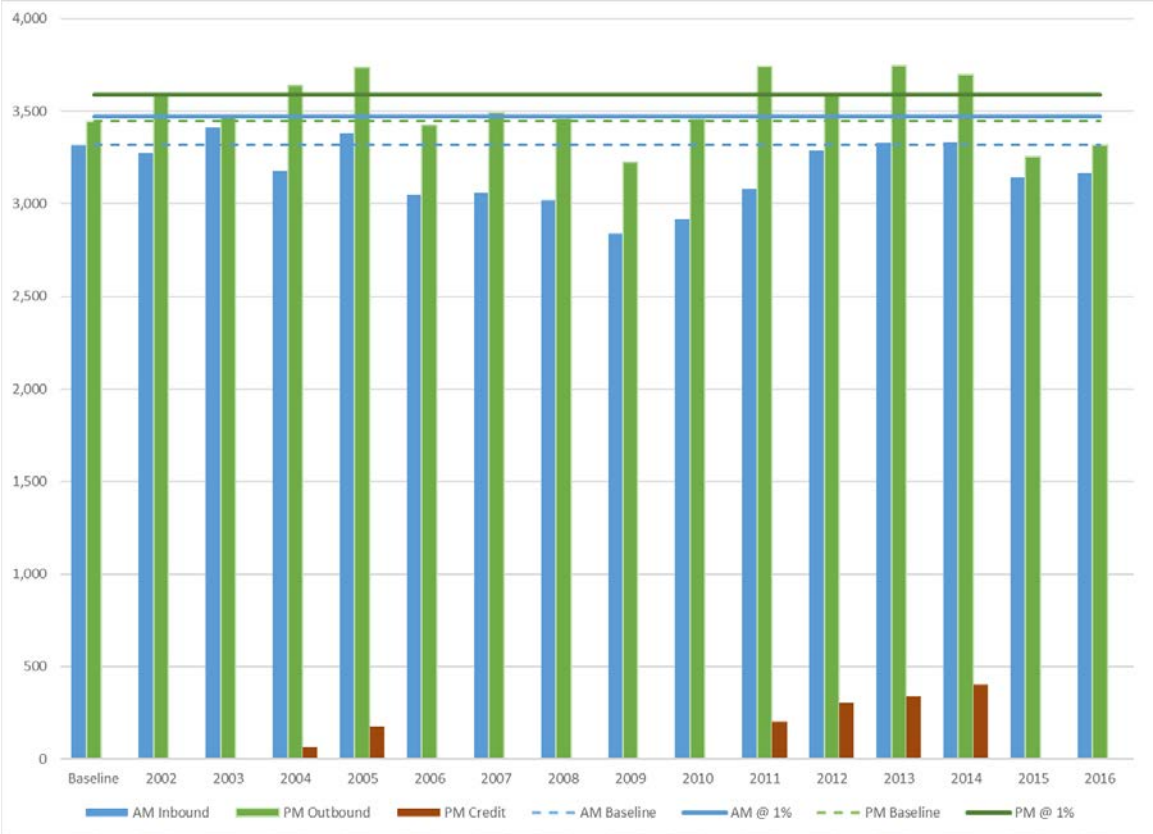
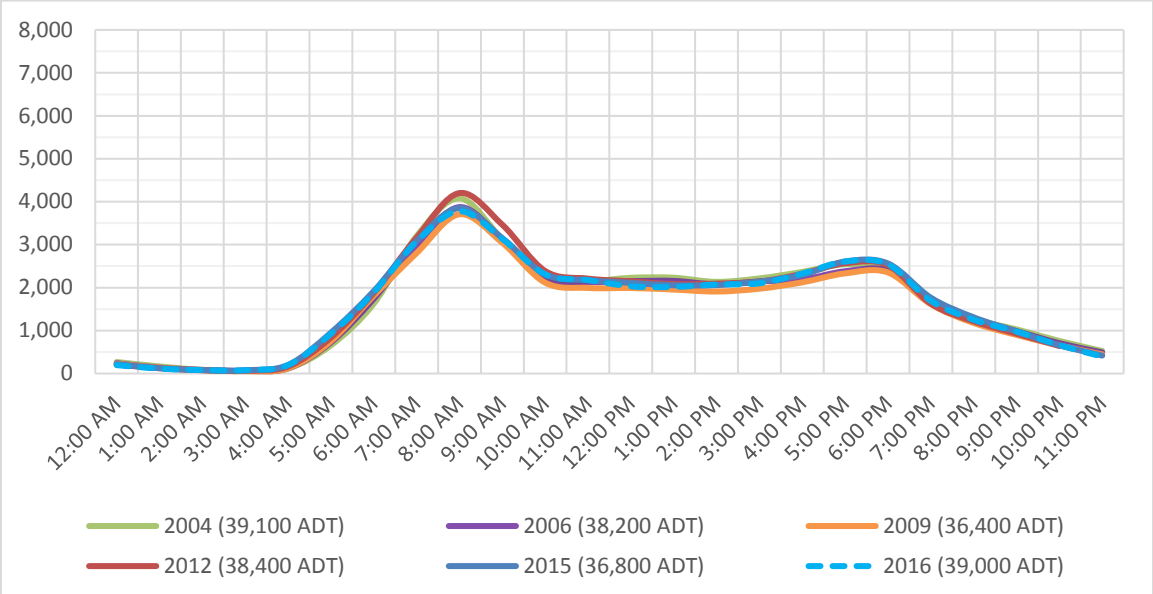


Figure 2: Historic 2000 General Use Permit Monitoring Results, 2001 – 2016

C. Raw Data Shoulder Hour Trip Trends

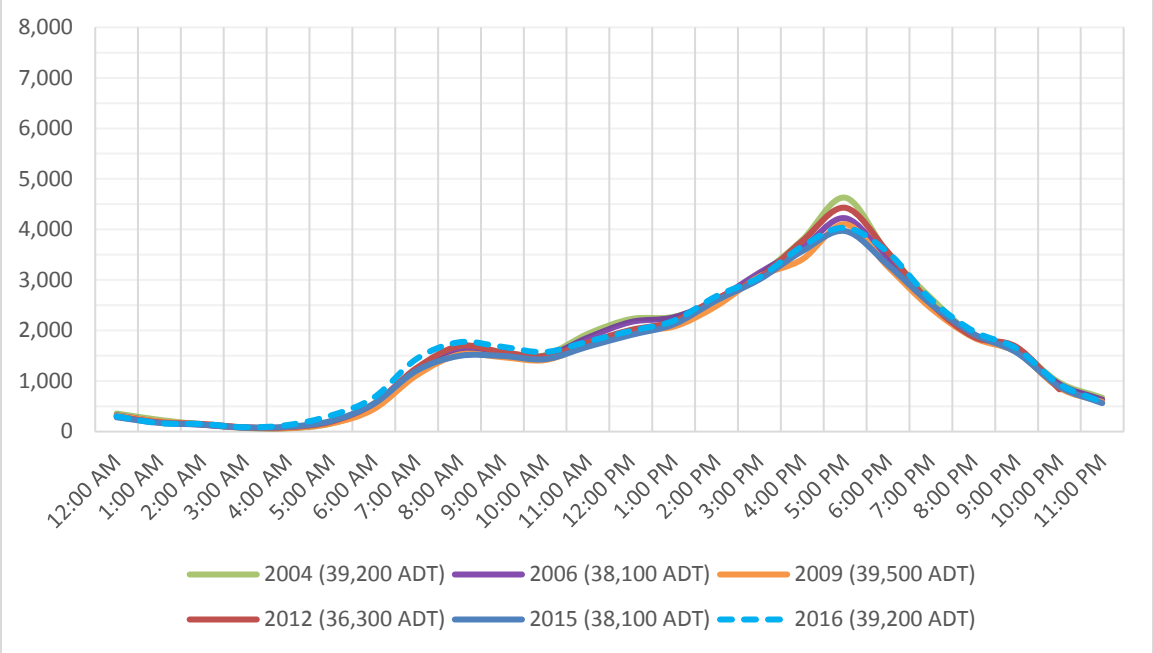
While the annual traffic monitoring reports present data on the No Net New Commute Trip standard, the traffic counts at the 16 cordon gateways are collected for the full day in both directions. The 24-hour monitoring data shows that trip growth has not grown outside the peak hours, over the life of the 2000 General Use Permit. **Figures 3** and **4** show the average hourly traffic flow at the campus gateways between 2004 and 2016 for the inbound and outbound movements respectively.

The graphs illustrate that the daily distribution of traffic by hour is consistent year to year. There are clear peaks in the AM (8:00 – 9:00) and PM (5:00 – 6:00) peak hours that reflect commuters with relatively fixed work schedules (8:00 am to 5:00 pm). In addition, the hours outside those regularly-occurring peak hours – e.g. 7:00 – 8:00 AM and 9:00 – 10:00 AM in the morning (Figure 3), and 4:00 – 5:00 PM and 6:00 – 7:00 PM in the afternoon/evening (Figure 4) -- show consistent volumes, with little variation from year to year. Thus, there is no evidence that the traffic volumes have been growing in the "shoulder hours" outside the peak hours.



Source: Traffic count data collected by the engineering firm AECOM for Santa Clara County, 2004 – 2016.
Figure prepared by Fehr & Peers, 2018

Figure 3: Comparison of Average Hourly Inbound Volumes



Source: Traffic count data collected by the engineering firm AECOM for Santa Clara County, 2004 – 2016. Figure prepared by Fehr & Peers, 2018

Figure 4: Comparison of Average Hourly Outbound Volumes

D. Daily Traffic Trends

Figure 5 presents the compilation of all eight weeks (40 weekdays) for each year of traffic monitoring since 2004, with the bars representing the average number of cars crossing the cordon each weekday[1]. Figure 5 demonstrates that, while there have been fluctuations from year to year, the average daily number of cars crossing the cordon in 2004 was almost identical to the number of average daily number of cars crossing the cordon in 2016.

[1] Note that complete data sets for all monitoring gateways are not available for 2001-2003.

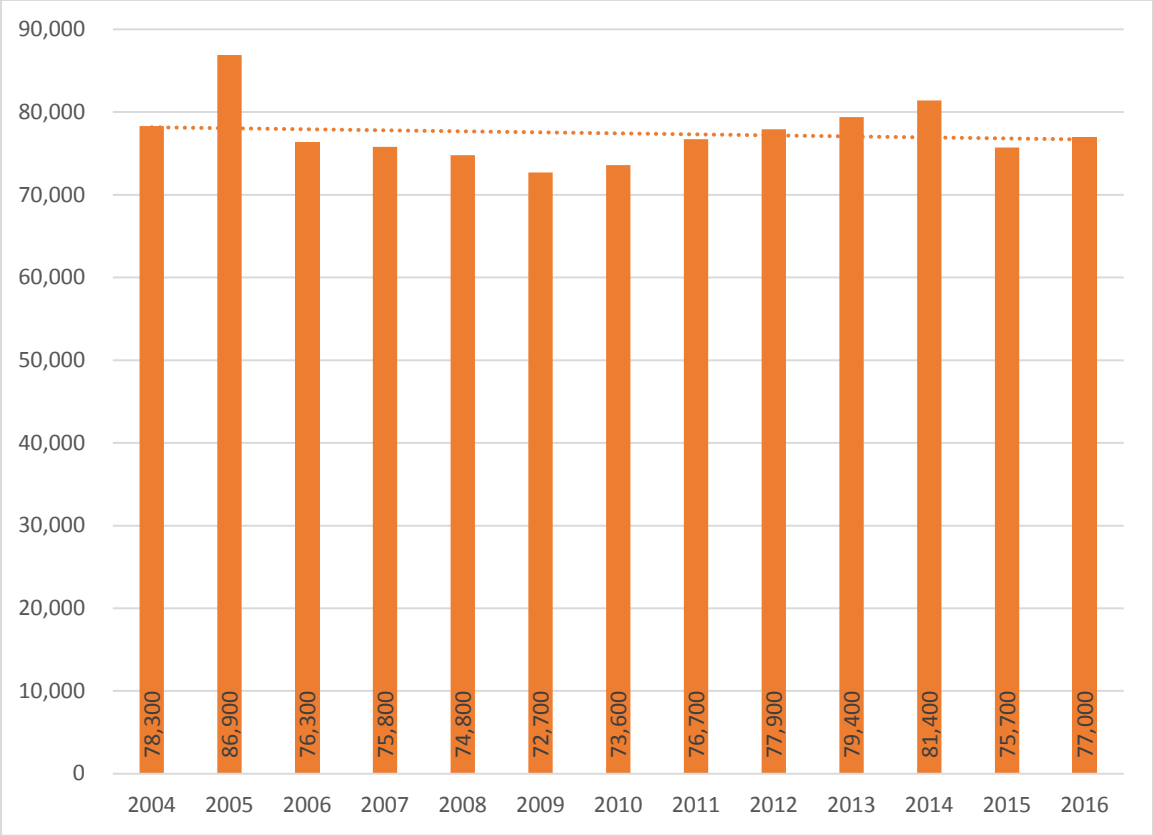


Figure 5: All Daily Trips Crossing Cordon

The all-day annual monitoring conducted by AECOM for Santa Clara County shows that the total number of cars crossing the cordon each weekday - including Stanford and non-Stanford cars - has not increased during buildout of the 2000 General Use Permit.[2] Although daily traffic volumes fluctuate over the years, similar to the trends in the economy, the all-day campus cordon traffic has remained stable. In 2004 the average daily traffic (ADT) was at 78,300 vehicles per day (vpd), compared to 77,000 vpd in 2016. The ADT peaked in 2005 at 86,900 vpd, and was at its lowest during the economic recession in 2009 at 72,700 vpd.

E. Completion of Construction Under 2000 General Use Permit

The 2001 baseline represents the conditions that are expected to exist upon completion of the academic space and housing permitted under the 2000 General Use Permit. When comparing the 2016 monitoring results to the 2001 baseline, the remaining margin for trip growth aligns well with the estimated trips associated with completion of the 2000 General Use Permit. **Figure 6** shows this analysis. While Stanford was below the No Net New Commute Trips standard in the 2016

[2] https://www.sccgov.org/sites/dpd/Programs/Stanford/Pages/Archive.aspx

monitoring, there are pending development projects allowed under the 2000 General Use Permit. The 2000 General Use Permit allows for an additional 632,450 square feet of academic space, and 2,404 residential units (as of August 2016). As these development projects are completed and occupied there may be additional trips associated with those projects. Figure 6 shows the cordon count projection with completion of all development under the 2000 General Use Permit, using the 2016 monitoring results and adding the trip generation associated with the remaining development (assuming continuation of the current TDM program effectiveness). The projections indicate that, at completion of the 2000 General Use Permit development allocation (including the completion of the Escondido Village Graduate Residences Project in 2020), the cordon trips would be slightly under the AM peak hour inbound baseline threshold (one percent significance trigger) and right at the PM peak hour outbound baseline threshold (one percent significance trigger). Thus, the best available projections of trip generation at commencement of the 2018 General Use Permit line up with the actual 2001 baseline.

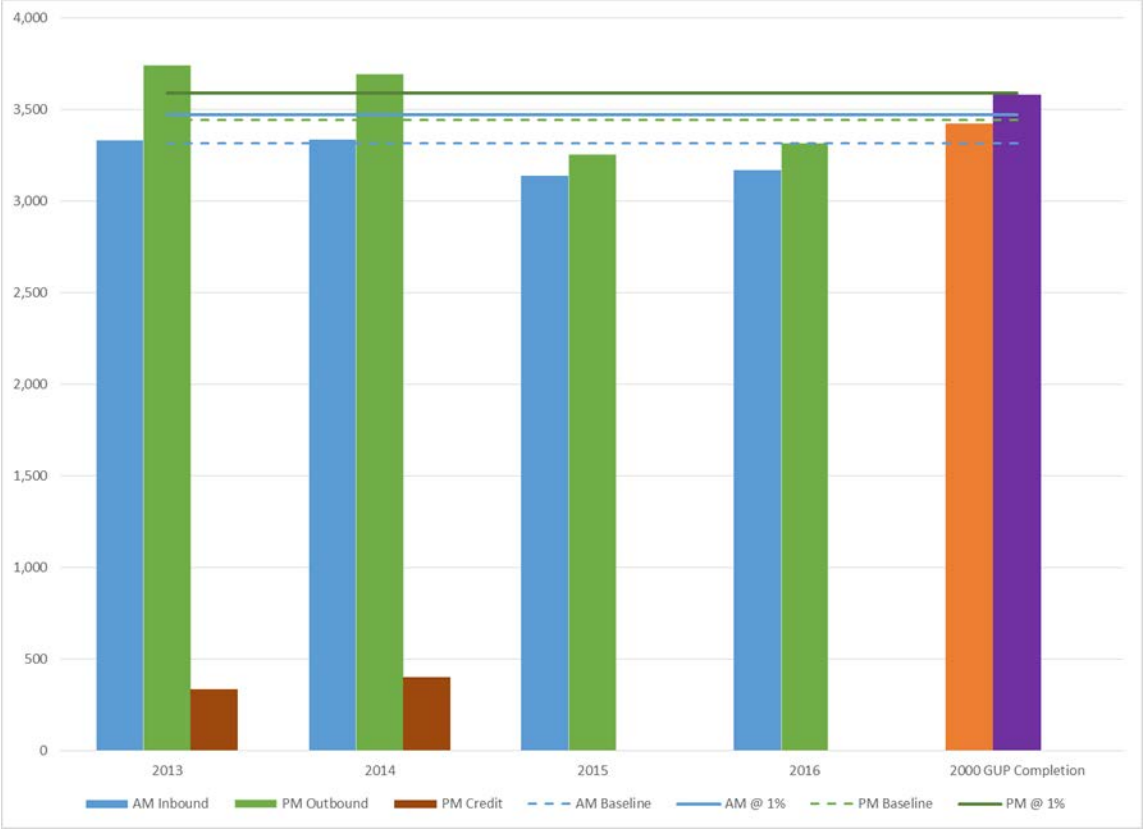


Figure 6: Projected Cordon Trips at Completion of the 2000 General Use Permit

Based on the above considerations, the No Net New Commute Trip baseline established in 2001 is an appropriate and reliable baseline for use in monitoring trips under the 2018 General Use Permit.

III. Changing the 2018 General Use Permit Trip Baseline: Data Requirements and Methodology

As described in Section II, the monitoring data indicate that (1) Stanford has met the No Net New Commute Trips standard under the 2000 General Use Permit, (2) there has been no increase in automobile trips at the campus gateways during shoulder hours; (3) there has been no increase in daily automobile trips at the campus gateways; and (4) the 2001 baseline represents the number of automobile trips expected upon full completion of the 2000 General Use Permit. Therefore, a change to the monitoring methodology and baseline is not warranted. Such a change also appears to be infeasible, for the reasons presented below.

A. Baseline Adjustment Overview

Any change to the monitoring requirements for the No Net New Commute Trips standard would necessitate a corresponding change to the baseline. For example, if the County were to change the standard to be based on a peak period rather than a peak hour, then a baseline for the peak period would need to be established. Theoretically, a new baseline could be established in one of two ways:

1. The 2001 baseline data could be adjusted to account for the change in approach or
2. New baseline data could be collected, and the baseline could be re-set.

Both approaches have pitfalls.

The 2001 dataset is incomplete. Peak period data is not available for 2001. Multiple assumptions would have to be made to adjust the 2001 peak hour data to represent a peak period. Further, license plate survey and parking lot survey data are limited to one-hour and two-hour peak periods, respectively. There are no data available to determine the percentage of pass-through trips over a period of more than an hour, and of hospital-related trips inside the cordon/university trips outside the cordon that occur over a period of more than two hours. These data gaps would necessitate a substantially higher confidence interval than was used for comparison to the 2001 data to represent statistical uncertainty. The resulting comparison would be far less precise than the current comparison.

A new baseline would be similarly uncertain because development under the 2000 General Use Permit will not be completed prior to commencement of development under the 2018 General Use Permit. Thus, it is not possible to establish a new baseline simply by conducting new counts: some adjustment to those counts would be needed. This in turn would introduce uncertainty into the data, resulting in a comparison that would be less precise than the current comparison.

B. 2001 Baseline Adjustments to Account for Peak Period or Daily Trips

Gaps in the 2001 data set include the following:

1. It is not possible to determine what the peak period baseline or daily trip baseline was in 2001 from the data collected during that year. A full set of cordon data from 2001 was not preserved, nor were full data sets from 2002 and 2003 preserved. For 2001, raw count data is only available for six gateways, and week 8 data is not available. None of the other data (license plate survey results, hospital/university lot counts and permit survey results) are available.

2. In addition, the license plate surveys covered only the peak hours, so the cut through percentage could not be determined over a peak period, or over the course of an entire day.

3. Hospital parking permit data is available for a two-hour period in the AM and PM. Data are not available for the period outside these two hours .

Due to these data gaps, a calculated adjustment would need to be made by extrapolating from other data. Each such calculated adjustment would add substantial potential for error and reduced confidence that the baseline reflects actual 2001 conditions.

In addition, moving to a 24-hour traffic monitoring baseline would cause a disconnect between the purpose of the monitoring – to measure whether Stanford is mitigating the potential impacts of the 2018 General Use Permit on peak commute hour traffic congestion – and the monitoring data. 24-hour traffic totals reveal nothing about the peak hours when congestion is highest and the impacts identified in the DEIR are projected to occur.

C. Establishment of a New 2019 Baseline

It is also not possible to establish a new baseline by using counts and surveys alone. This is because there is a substantial amount of academic building square footage authorized by the 2000 General Use Permit that will not yet be occupied at commencement of the 2018 General Use Permit. In addition, the Escondido Village Graduate Residences project, which is currently under construction, will not be occupied until 2020. That project represents the largest project constructed on the

campus lands in unincorporated Santa Clara County. It will house over 2,000 graduate students. Some graduate student housing has been demolished to make way for the new housing. Therefore, trip counts taken now would not represent the trip counts at full completion of the 2000 General Use Permit.

Adjustments would have to be made to counts taken to re-establish the baseline:

1. Because current counts would be conducted while there is entitled development remaining to be built, the baseline would have to be increased by the number of trips associated with the entitled development. This step of adding the theoretical trip growth associated with the entitled development could increase the baseline above the 2001 baseline currently in effect.
2. New trip generation rates would need to be determined for the remaining development if a peak period or daily metric were to be used rather than a peak hour metric. The current trip generation rates are based on a peak hour. It is noted that the confidence interval and 1% threshold would need to be modified for the peak period or daily baseline.
3. If a daily baseline were to be developed, the following additional steps would be required:
    a. Expand the manual license plate surveys at the campus gateways to 24 hours
    b. Change the hospital and campus parking lot survey methodology to capture hospital and campus usage throughout the day.

These changes, particularly the all-day license plate surveys, would be costly. Further, because counts would not be available for facilities yet to be occupied under the 2000 General Use Permit, calculated adjustments would be required. Each such calculated adjustment would add substantial potential for error and reduced confidence that the baseline reflects actual conditions.

IV. Conclusion

The discussion in Section II demonstrates that Stanford has consistently met the No Net New Commute Trips standard under the 2000 General Use Permit, and there has not been an increase in trips entering and exiting the campus during the shoulder hours and on a daily basis. Further, the 2001 baseline represents the actual conditions expected upon completion of the development authorized by the 2000 General Use Permit. Section III describes the potential challenges associated with different baseline re-set methods. Maintaining a reliable baseline is of the utmost importance, to provide transparency and ensure public confidence in the ongoing monitoring process under

the 2018 General Use Permit. For this reason, continuation of the 2001 No Net New Commute Trips baseline is recommended.