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To: SF State Campus Master Plan EIR, Transit Impact Analysis Project File

From: Duncan Watry and Julia Chan, URS Corporation

Subject: **Revised - SF State Transit Impact Analysis Technical Memorandum**

1. PROJECT OVERVIEW

In December 2006, URS provided an analysis of the transit impacts of the San Francisco State University (SF State) Master Plan on the transit services in the area, as an input into the Draft Environmental Impact Report (DEIR) being prepared at the time. The analysis done for the DEIR looked at the impact of new trips on local and regional transit services during the standard weekday PM peak hour (“standard peak hour”), defined as the time period from 5:00-5:59 p.m. This is the time period defined by the San Francisco Planning Department’s *Transportation Impact Analysis Guidelines – For Environmental Review*, as the peak period to be analyzed for EIRs. The quantitative analysis done at that time showed that no significant impacts to transit services operated by the public transit agencies in the area would occur as a result of the Master Plan. This conclusion does not include analysis of the M-Ocean View streetcar line. No quantitative capacity analysis of this line was possible, as load and boarding data for this line has been unavailable during the preparation of this analysis. This standard peak hour analysis is included in this memorandum.

The DEIR was circulated for agency and public comment. In response to comments submitted during the review period, the project team undertook a secondary analysis of the impacts of the Master Plan on the peak hour for SF State travel, which is different than the standard peak hour described above. Universities may not generally have travel patterns that conform to the traditional peak periods, and thus a transit impact analysis could be appropriate for a period other than the standard PM peak hour. A review of the transit load data for the SF State vicinity revealed that the time period when peak travel to SF State occurs is actually from 8:00-8:59 a.m. (“campus peak hour”), and thus this time period was added to the quantitative analysis of the transit impacts (see Appendix C – Defining the Campus Peak Hour section). This secondary analysis looked at the peak hour for SF State travel, in addition to the standard peak hour as defined by the Planning Department. This campus peak hour analysis also shows that no significant impacts to the transit services operated by the public transit agencies in the area would occur as a result of the Master Plan, and this new analysis is summarized in this memorandum. As for the standard peak hour, this conclusion does not include analysis of the M-Ocean View streetcar line.



Another comment submitted during the DEIR review caused the project team to research additional background information and to conduct additional analysis. One added piece of information for the analysis of both the standard peak hour and for the new campus peak hour was a growth factor that was applied to the existing background ridership. This growth factor was added before adding the new SF State riders in the Muni screenline analysis, to account for expected incremental ridership growth between the existing year (2005) and cumulative year (2020) conditions. A background growth factor of 0.156 percent was applied to existing year data before new 2020 riders were distributed among the Year 2020 screenlines. This factor was based on the SFCTA Countywide Plan modeling data, which assumes a 3.9 percent increase in Muni ridership over a 25-year period (from 2000 to 2025). This background growth yields an annual growth rate of 0.156 percent.

One other change reflected in this document is a change that has occurred to the project since December 2006, and that is that the Master Plan project has been refined to include additional housing units on the campus and to provide for a smaller conference center and guest facilities, which reduces the expected number of commuters traveling to and from the campus. This affects the assumptions about the number of transit riders during the standard peak hour and campus peak hour, lowering the expected number of new riders attributable to SF State.

The cumulative effect of these changes to the analysis has been very minimal. The basic conclusions do not change – that the public transit services in the area are not significantly affected by the Master Plan. The SF State campus-operated shuttle is currently operating over capacity, and this situation continues and is made worse with growth contemplated by the Master Plan.

This technical memorandum is organized to first outline campus population and transit assumptions applicable to both the standard peak and campus peak hours. The memorandum will then discuss transit impact assumptions and findings as they pertain to different transit operators during the two peak hour scenarios.

2. PEAK HOUR DISTRIBUTION OF NEW RIDERS BY MODE OF TRANSIT

This section outlines how the number of new transit riders during the two peak periods was developed, and how those riders were distributed to the various services in the area. The assumptions outlined in this section are applicable to both the standard peak hour and campus peak hour. The two time periods will be collectively referenced as the “peak hour.”

New Transit/ Shuttle Ridership Methodology

SF State anticipates 6,356 new persons on campus by the Year 2020. To determine the number of new persons traveling during the peak hour, the new persons were grouped by campus affiliation (students, faculty/staff, hotel employees and visitors) and further sub-divided into new on-campus (“non-commuters”) and new off-campus (“commuters”) populations. Assumptions on the percentage of commuters traveling during the peak hour for each campus group were

directly applied to each of the new SF State off-campus commuter groups traveling during the peak hour (see Appendix A, Table 1 and Table 2 for campus population and peak hour commuter travel distribution assumptions). The campus-affiliated population distribution assumptions are applicable to both standard and campus peak hours (see Appendix C – New SF State Population sections for explanation). This yielded a total of 867 new peak hour commuters using transit or other forms of travel (744 new student commuters, 101 new faculty/staff commuters, 16 new hotel employee commuters, and 6 new visitor commuters).

The total number of new transit/shuttle trips was calculated by applying a 45 percent transit/shuttle mode split to the new peak hour commuters. This was based on two scenarios developed from different Year 2020 mode split assumptions provided by Nelson/Nygaard: Option 1 - hold the off-campus mode split constant (resulting in a 42 percent transit/shuttle mode split) and Option 2 - hold the auto trips constant (resulting in a 45 percent transit/shuttle mode split).¹ The more conservative 45 percent transit/shuttle mode split was applied to each of the new peak hour commuters groups (see Appendix C – New SF State Population sections for transit mode split assumptions). New visitors were not factored into the transit/shuttle mode split calculation since only 3 new visitors taking transit or the shuttle were generated during the peak hour. Therefore, it is anticipated that 387 new peak hour commuters will use some form of transit or take the campus shuttle. This translates to 335 new student commuters, 45 new faculty/staff commuters, and 7 new hotel employee commuters traveling during the peak hour (see Appendix A, Table 2 for new transit/shuttle commuter peak hour travel distributions).

New transit/shuttle ridership distributed by transit operator was then calculated, assuming new ridership distributions are divided by the same ridership by transit operator percent distributions established from the Existing Conditions Intercept Survey and cordon counts.² Also, given that the nearest BART station is located approximately 1 mile from the campus, it is assumed the 133 new BART riders will either transfer to/from Muni or to/from the free campus shuttle for their last leg of travel, redistributed 25 percent and 75 percent respectively. Therefore, the 387 new SF State peak hour commuters were redistributed among transit operators as follows for purposes of the screenline analysis: 172 Muni riders, 192 campus shuttle riders, 13 SamTrans riders, and 10 AC Transit, Golden Gate Transit and Caltrain riders (see Appendix A, Table 3 for a summary of the redistribution of new riders by transit operator). Transit impact findings are summarized in the Transit Impact Analysis by Operator section.

3. TRANSIT IMPACT ANALYSIS BY OPERATOR

This section describes the effect on individual transit lines caused by the new riders that were distributed using the methods described in Section 2 above.

¹ Year 2020 Mode Split Assumptions provided by Jeff Tumlin of Nelson/Nygaard.

² SF State intercept survey and cordon count conducted by Nelson/Nygaard on 11/28/05 and 12/6/05 for the Existing Conditions Analysis Report, Campus Master Plan, 2006.

3.1 LOCAL TRANSIT

Muni

Two separate screenline analyses were performed to determine Muni service capacity during the standard peak hour and campus peak hour under 2020 cumulative conditions. The following screenline methodology is based on shared assumptions that are applicable to both standard and campus peak hour scenarios.

Four screenlines were defined around the SF State campus (north, northeast, east, and south) and the following six Muni lines crossed at least one of the established screenlines: 17 - Park Merced, 18 - 46th Avenue, 28 - 19th Avenue, 28L - 19th Avenue Limited, 29 - Sunset, and M - Ocean View. The lines in each screenline were further subdivided by travel direction, based on Muni established inbound and outbound directions (see Appendix A, Table 4 for a summary of Muni Screenlines and Appendix B for screenline locations). Muni transit service capacity utilization for Year 2020 was based on the sum of peak hour ridership demand under existing conditions and new additional passengers under cumulative conditions. In order to establish existing year peak hour ridership demand numbers, ridecheck data for each line was obtained from Muni (see Appendix C - Existing Year Conditions Muni Screenline Table Calculations section). Ridecheck data on average load values for buses traveling toward SF State reflect the load on the bus prior to crossing the SF State screenline location, while average load values for buses leaving SF State reflect loads leaving the SF State screenline. Since Muni ridecheck data was collected during time periods that spanned several hours, the data was converted from peak period to peak hour values. Muni collected ridecheck data in trip time intervals that ranged from 2 to 3 hour periods. The ridecheck period for each Muni line was respectively divided by a factor of 2 or 3 to establish peak hour periods (see Appendix C - Defining the Standard Peak Hour and Defining the Campus Peak Hour sections for peak hour calculation assumptions).

Ridecheck data was available for all lines except for the M-Ocean View streetcar line; therefore, existing year hourly ridership for the M-Ocean View line could not be established.³ As a result, only new riders for the M-Ocean View line were analyzed under the Year 2020 cumulative conditions. New riders include both SF State affiliates and those associated with background growth, as defined above. Since no M-Ocean View line load and boarding data was available, no quantitative capacity analysis is possible. Also, given that Year 2020 Muni ridership was based on route distributions established from the Existing Conditions Intercept Survey and no distribution assumptions from the intercept survey for the 17-line exist, it was assumed that 17-line ridership data (calculated from Muni ridecheck data) remained the same under Year 2020 cumulative conditions.

For both the standard peak hour and campus peak hour analyses, it was assumed that no new standard peak hour capacity will be added to the Muni lines under 2020 cumulative conditions, holding capacity per vehicle and the number of vehicles constant from existing conditions. After Year 2020 hourly ridership and hourly capacity data was established, Muni Capacity Utilization

³ An inquiry to the Muni Scheduling Office in April 2007 confirmed that Muni M-Ocean View streetcar line data will not be available until July 2007 at the earliest.

Rates for Year 2020 cumulative conditions for the lines in each screenline were calculated by dividing Hourly Ridership by Hourly Capacity (see Appendix C – Cumulative Conditions (Year 2020) Muni Screenline Table Calculations section for an explanation of service capacity utilization calculations).

NOTE: The capacity per vehicle for each line was based on Muni's 85 percent load standard, as outlined in the 2006 Muni Short Range Transit Plan. Muni considers a line to be at capacity for scheduling purposes when it is operating at 85% of full capacity during any time period. For purposes of this screenline analysis, however, a 100 percent capacity utilization rate in this analysis is equivalent to Muni's 85 percent load standard. This standard was used in both the December 2006 analysis and this analysis.

Based on the two peak hour scenarios, the new Muni riders were distributed among the screenlines as follows:

Standard Peak Hour Muni Screenline Analysis (5:00-5:59 p.m.)

New additional passengers traveling during the standard peak hour under cumulative conditions (2020) were calculated by distributing the 172 new Muni riders among the screenlines based on the directional travel patterns of each campus group. The distribution was accomplished by assuming that campus-affiliated Muni passengers and riders during the Muni ridecheck have the same origin and destination patterns. To appropriately assign new ridership to each screenline, directional travel patterns were applied to each campus group. First, new riders by campus affiliation were distributed among the Muni lines (see Appendix A, Table 5a), and then the riders from each campus group were assigned to a SF State Inbound-Outbound travel direction based on ridership distributions provided by the URS.⁴ (see Appendix A, Table 5b and Appendix C – Standard Peak Hour New SF State Population section for a summary of SF State-defined Inbound-Outbound travel direction assumptions). Then new riders were distributed to Muni-defined Inbound-Outbound travel directions based on Muni directional load distribution assumptions for each line (see Appendix A, Table 5c). The 172 new Muni riders were then assigned to screenlines (see Appendix A, Table 6a for a summary of ridership distributions by Muni line). A background growth rate of 0.156 percent annually (over a 15 year period from 2005-2020) was then applied to the new riders of each screenline.⁵ The growth rate added approximately 5 additional riders to the 172 new additional passengers under cumulative conditions. Therefore, it is anticipated that the Campus Master Plan plus background growth will generate 177 new riders by 2020.

⁴ SF State Inbound-Outbound travel direction based on ridership distributions provided by Nayan Amin and Duncan Watry of URS.

⁵ This growth rate is based on the San Francisco County Transportation Authority's Countywide Transportation Plan, which projected that trips internal to San Francisco (assumed as Muni trips) would grow at a rate of 3.9 percent over 25 years, or an annual rate of growth of 0.156 percent.

Appendix A, Table 7a (Existing Year Conditions – Weekday Standard Peak Hour) and Table 7b (2020 Cumulative Conditions – Weekday Standard Peak Hour) provide summaries of the Muni screenline findings. Under existing year conditions, the capacity utilization rates for the screenline subtotals defined by inbound and outbound direction ranged from 1 percent⁶ to 54 percent. Overall, the four Muni screenlines operated at about 17 percent capacity under existing conditions. Year 2020 conditions show that the capacity utilization rates for the screenline subtotals would range from 2 percent⁷ to 59 percent. Overall, the four Muni screenlines would operate at about 19 percent capacity under 2020 cumulative conditions. Therefore, all four screenlines are far from approaching the Muni capacities during the standard peak hour under existing and Year 2020 cumulative conditions.

Looking at individual lines, the 28-line and 29-line were the closest to approaching the capacity utilization than the other lines, but these lines were still not over the threshold standard. For instance, existing year capacity utilization rates for the 28-line ranged from 27 percent (south screenline, inbound direction) to 66 percent (south screenline, outbound direction) while the 29-line capacity utilization rates ranged from 30 percent (north screenline, inbound direction) to 77 percent (east screenline, outbound direction). Year 2020 capacity utilization rates for the 28-line ranged from 35 percent (south screenline, inbound direction) to 71 percent (south screenline, outbound direction) while the 29-line capacity utilization rates ranged from 31 percent (north screenline, inbound direction) to 80 percent (east screenline, outbound direction).

The addition of approximately 172 new Muni riders generated by the Campus Master Plan would not substantially impact the standard peak hour capacity utilization at the screenlines in Year 2020. However, when looking at individual lines that cross the screenlines, the 28-line (south screenline, outbound direction) and 29-line (east screenline, outbound direction) are closest to approaching a 100 percent capacity utilization rate (equivalent to Muni's 85 percent passenger load standard) than other individual lines. As noted previously, no data was available for Muni's M-Ocean View streetcar line.

Campus Peak Hour Muni Screenline Analysis (8:00-8:59 a.m.)

New additional passengers traveling during the campus peak hour under cumulative conditions (2020) were calculated by distributing the 172 new Muni riders among the screenlines based on the directional travel patterns of each campus group. The distribution was accomplished by assuming that campus-affiliated Muni passengers and riders during the Muni ridecheck have the same origin and destination patterns. To

⁶ Low screenline subtotals for the Northeast Screenline (Downtown) is a result of non-existent M-Ocean View streetcar line ridecheck data from Muni.

⁷ Low screenline subtotals for the Northeast Screenline (Downtown) is a result of no information on the distribution of Muni riders to SF State using the Line 17 and non-existent M-Ocean View streetcar line ridecheck data from Muni.

appropriately assign new ridership to each screenline, directional travel patterns were applied to each campus group. First, new riders by campus affiliation were distributed among the Muni lines (see Appendix A, Table 5d), and then the riders from each campus group were assigned to a SF State Inbound-Outbound travel direction based on ridership distributions provided by the URS traffic engineering and planning departments (see Appendix A, Table 5e and Appendix C – Campus Peak Hour New SF State Population section for a summary of SF State-defined Inbound-Outbound travel direction assumptions). Then new riders were distributed to Muni-defined Inbound-Outbound travel directions based on Muni directional load distribution assumptions for each line (see Appendix A, Table 5f). The 172 new Muni riders were then assigned to screenlines (see Appendix A, Table 6b for a summary of ridership distributions by Muni line). A background growth rate of 0.156 percent annually (over a 15 year period from 2005-2020) was then applied to the new riders of each screenline.⁸ The growth rate added approximately 5 additional riders to the 172 new additional passengers under cumulative conditions. Therefore, it is anticipated that the Campus Master Plan project plus background growth will generate 177 new riders by 2020.

Appendix A, Table 7c (Existing Year Conditions - Weekday Campus Peak Hour) and Table 7d (2020 Cumulative Conditions - Weekday Campus Peak Hour) provide summaries of Muni screenline findings. Under existing year conditions, the capacity utilization rates for the screenline subtotals defined by inbound and outbound direction ranged from 0.4 percent⁹ to 44 percent. Overall, the four Muni screenlines operated at about 15 percent capacity under existing conditions. Year 2020 conditions show that the capacity utilization rates for the screenline subtotals would range from 2 percent¹⁰ to 51 percent. Overall, the four Muni screenlines would operate at about 17 percent capacity under 2020 cumulative conditions. Therefore, all four screenlines are far from approaching the Muni capacities during the campus peak hour under existing and Year 2020 cumulative conditions.

Looking at individual lines, the 28-line, 28L-line and 29-line were closer to approaching capacity than the other lines, but still did not exceed the threshold. For instance, existing year capacity utilization rates for the 28-line ranged from 11 percent (south screenline, outbound direction) to 45 percent (north screenline, inbound direction), the 28L-line ranged from 4 percent (south screenline, outbound direction) to 46 percent (north screenline, inbound direction), and the 29-line ranged from 49 percent (east screenline, outbound direction) to 90 percent (east north screenline, inbound direction and the east screenline, inbound direction). Year 2020 capacity utilization rates for the 28-line ranged

⁸ This growth rate is based on the San Francisco County Transportation Authority's Countywide Transportation Plan, which projected that trips internal to San Francisco (assumed as Muni trips) would grow at a rate of 3.9 percent over 25 years, or an annual rate of growth of 0.156 percent.

⁹ Low screenline subtotals for the Northeast Screenline (Downtown) is a result of non-existent M-Ocean View streetcar line ridecheck data from Muni.

¹⁰ Low screenline subtotals for the Northeast Screenline (Downtown) is a result of no information on the distribution of Muni riders to SF State using the Line 17 and non-existent M-Ocean View streetcar line ridecheck data from Muni.

from 11 percent (south screenline, outbound direction) to 54 percent (south screenline, inbound direction), the 28L-line ranged from 4 percent (south screenline, outbound direction) to 46 percent (north screenline, inbound direction), and the 29-line ranged from 49 percent (east screenline, outbound direction) to 93 percent (east screenline, inbound direction).

The addition of approximately 172 new Muni riders generated by the Master Plan would not substantially impact the campus peak hour capacity utilization at the screenlines in Year 2020. However, when looking at individual lines that cross the screenlines, the 28-line (south screenline, inbound direction), the 28L-line (north screenline, inbound direction) and 29-line (east screenline, inbound direction), are much closer to approaching a 100 percent capacity utilization rate (equivalent to Muni's 85 percent passenger load standard) than other individual lines. As noted previously, no data was available for the Muni's M-Ocean View streetcar line.

When looking at the standard and campus peak hour screenline data, it is important to recognize that the peak hour of activity for the campus does not correlate exactly with the peak hour of loads on the Muni system. The peak loads on the Muni system as a whole are still between 5:00 and 5:59 p.m., and this is reflected in the screenline analysis that shows higher loads at the screenlines during the standard peak hour (5:00-5:59 p.m.) than in the campus peak hour (8:00-8:59 a.m.). However, the SF State component of the ridership and the levels of SF State activity are higher in the 8:00-8:59 a.m. period than in the 5:00-5:50 p.m. period (see Appendix C – Defining the Campus Peak Hour section).

M - Ocean View

Based on Muni route distribution data from the Existing Conditions Analysis Intercept Survey, it is anticipated that 68 new SF State transit riders will take the M-Ocean View streetcar line during the peak hour in Year 2020 (see Appendix A, Table 8). However, given the unavailability of M-Ocean View line ridecheck data, it was not possible to calculate current ridership and load data or project future ridership and loads for the M-Ocean View line in the Muni screenline analysis. As a result, the 68 peak hour trips could not be added to existing or projected future trips to determine if the M-Ocean View line is overcapacity. Under existing conditions, M-Ocean View line total capacity at SF State in the peak hour is approximately 2,424 trips (see Appendix C for further information); therefore, assuming there will be no changes in M-Ocean View line capacity for the Year 2020, the new 68 passengers will represent approximately 3 percent of M-Ocean View line total capacity at SF State in the peak hour (see Appendix C – Muni Ridership Data Assumptions section for M-Ocean View line capacity calculations).

Existing Conditions Analysis- Qualitative versus Quantitative Data

It is important to note that the Existing Conditions Analysis report for the Campus Master Plan concluded the 28-line and M-Ocean View line are “overcrowded when arriving at SF State during the morning peak and leaving during the afternoon peak.”¹¹ However, the Existing

¹¹ Existing Conditions Analysis Report, 2006, p. 23.



Conditions report conclusion was based on casual observations (not data analysis) made during the survey period from November-December 2005. In contrast, the existing year screenline analysis outlined in this technical memorandum was constructed from available ridecheck and bus stop file data during the campus peak hour (8:00-8:59 a.m.) and standard peak hour (5:00-5:59 p.m.).

Bus stop files and ridecheck data were directly obtained from the Muni Service Planning and Muni Scheduling Offices from November-December 2006. The Muni data used for the screenline analysis averages ridership over all vehicles traveling during each time period, so it is possible that incidental observations could be made of crowded conditions on one vehicle during the time period, when data analysis of the entire time period would not reveal a problem for the entire time period. Transit lines with heavy ridership, such as Muni lines, often experience bunching and gapping in daily operation, which can cause individual vehicles to become overloaded, even when the sum total of all vehicles within a one or two-hour time period, when averaged, may not be reported as overloaded. This may explain the difference between the visual observations noted in the Existing Conditions Analysis Report and the project screenline analysis capacity conclusions for the 28-line. As mentioned earlier, given the unavailability of M-Ocean View streetcar line ridecheck data, it was not possible to calculate current ridership and project future ridership for the M-Ocean View line in the Muni screenline analysis.

SF State Campus Shuttle

As noted in Appendix A, Table 3, it is assumed that 75 percent of the 133 new BART riders or approximately 99 new BART riders will be transferring to the free campus shuttle. Therefore, the SF State Master Plan will generate approximately 99 additional new shuttle riders in addition to the 93 new shuttle riders calculated before the redistribution of BART riders, for a total of 192 new peak hour shuttle riders by the Year 2020. Campus shuttle ridership was based on the assumption that the percent distributions of transit/shuttle riders by transit operator for Year 2020 mirror ridership distributions by transit operator established from the Existing Conditions Intercept Survey data on unlinked routes (see Appendix A, Table 3).

Appendix A, Tables 9a-c show the campus shuttles currently operate at overcapacity, with a peak hour capacity utilization rate of 131 percent (approximately 798 shuttle riders travel during the peak hour while the total shuttle system hourly capacity only accommodates a maximum of 608 riders). The addition of 192 new peak hour shuttle riders during Year 2020 would increase the total number to 990 riders, translating to a peak hour capacity utilization rate of 163 percent (holding total shuttle system hourly capacity constant from existing conditions).

3.2 REGIONAL TRANSIT

BART

As mentioned earlier, for purposes of the Muni transit screenline analysis, it is assumed the 133 new BART riders will be distributed among the Muni screenlines and the campus shuttle, 25 percent and 75 percent respectively. These SF State BART riders do not cross the screenlines

discussed above on BART, but instead cross such screenlines on either Muni or the SF State Shuttle when traveling between the nearest BART station and the SF State campus.

A separate BART transit impact analysis was performed for the standard and campus peak hour periods. For the standard peak hour, the analysis calculated the number of new campus-affiliated BART commuters who travel from the SF State vicinity through the Transbay Tube and commuters who travel from the SF State vicinity to the Peninsula. In contrast, the campus peak hour analysis looked at the number of new campus-affiliated BART commuters who travel to the SF State vicinity by way of the Transbay Tube and commuters who travel to the SF State vicinity from the Peninsula (see Appendix C – BART Standard Peak Hour Assumptions and BART Campus Peak Hour Assumptions sections for BART calculation assumptions).

Calculations for inbound and outbound distributions of new campus-related BART commuters were based on available zip code data from the Existing Conditions Intercept Survey. Since the intercept survey only provided the origin splits of existing campus-related BART commuters, it was assumed that future campus-affiliated BART riders are commuters and that they would have similar origin and destination patterns. The directionality splits established that 80 percent of respondents using BART for part of their trip had origins or destinations in the East Bay, 12 percent in the Peninsula, 6 percent in San Francisco, and 2 percent in the North Bay. The origin directionality splits from the intercept survey were applied to the 133 new BART riders that were established in Appendix A, Table 3.

BART Analysis - Standard Peak Hour (5:00-5:59 p.m.)

BART- Transit Impact on the Transbay Tube

Using zip code data from the Existing Conditions Intercept Survey, it was established that 80 percent of respondents using BART for part of their trip had origins or destinations in the East Bay. Therefore, it was assumed that out of the 133 new campus-affiliated BART standard peak hour riders, 80 percent are East Bay residents. This translates to 106 new East Bay BART Riders. It was also assumed that 20 10-car BART trains travel from the SF State vicinity through the Transbay Tube during the standard peak hour (based on the BART timetable). Therefore, the Master Plan will generate 5 new BART passengers per train traveling from the SF State vicinity through the Transbay Tube in the standard peak hour (106 new BART passengers/ 20 BART trains = 5 new BART passengers/train).

The 5 new campus-affiliated BART riders would represent approximately 0.4 percent of the total passenger capacity per BART train traveling from the SF State vicinity through the Transbay Tube in the standard peak hour. This was based on the assumption that the total capacity of a 10-car BART train is 1,275 passengers (see Appendix C – BART Standard Peak Hour Assumptions section for detailed calculations). Therefore, this analysis shows that the Master Plan will not substantially impact BART ridership through the Transbay Tube during the standard peak hour.

BART- Transit Impact on the Peninsula

The impact of new SF State transit riders on southbound BART trains from the SF State vicinity to the Peninsula was also assessed. The same methodology used in the above Transbay Tube analysis was applied to BART riders with origins or destinations in the Peninsula.

Using zip code data from the Existing Conditions Intercept Survey, it was established that 12 percent of respondents using BART for part of their trip has origins or destinations in the Peninsula. Therefore, it was assumed that out of the 133 new campus-related BART peak hour riders, 12 percent would be Peninsula residents. This translates to 16 new Peninsula-bound BART riders. It was also assumed that 4 10-car BART trains travel from the SF State vicinity towards the Peninsula during the standard peak hour (based on the BART timetable). Therefore, the proposed project would generate approximately 4 new BART passengers per Peninsula-bound train in the standard peak hour (16 new BART passengers / 4 BART trains = 4 new BART passengers/ train).

The 4 new campus-affiliated BART riders would represent approximately 0.3 percent of the total passenger capacity per Peninsula-bound BART train in the standard peak hour. This was based on the assumption that the total capacity of a 10-car BART train is 1,275 passengers (see Appendix C – BART Standard Peak Hour Assumptions section for detailed calculations). Therefore, this analysis shows that the Master Plan will not substantially impact Peninsula-bound BART ridership during the standard peak hour.

BART Analysis - Campus Peak Hour (8:00-8:59 a.m.)

A similar BART analysis was performed for the campus peak hour (8:00-8:59 a.m.) (see Appendix C – BART Campus Peak Hour Assumptions section for detailed calculations) and generated the same conclusions under standard peak hour. Under campus peak hour conditions, the Master Plan will generate 5 new BART passengers per train traveling through the Transbay Tube to the SF State vicinity (0.4 percent of the total passenger capacity per BART train traveling through the Transbay Tube to the SF State vicinity) and 4 new BART passengers per train traveling from the Peninsula to the SF State vicinity (0.3 percent of the total passenger capacity per BART train originating from the Peninsula to the SF State vicinity in the campus peak hour). Therefore, this analysis shows that the Master Plan would not substantially impact campus-bound BART ridership traveling from the Peninsula or Transbay Tube during the campus peak hour.

Proposed BART Service Changes

In May 2007, BART announced its plans to enhance service along the SFO/Millbrae Extension. The proposed service changes includes having the Pittsburg/Bay Point trains serve the San Francisco International Airport Station (SFO) and the Richmond trains bypass SFO and go directly into Millbrae Station, Monday through Friday from 4:00 a.m. to 7:00 p.m. According to BART, the enhanced changes will double the number of trains

that serve San Bruno, South San Francisco and Colma commuters and reduce the wait time from 15 to 8 minutes. If approved by the BART Board, the enhanced train service would go into effect in September 2007.¹² This will substantially increase capacity on the BART service to the Peninsula, which will reduce the percent of total capacity that the new SF State riders represent.

Other Transit Operators

The analysis showed the Campus Master Plan would not significantly impact the other transit operators serving the SF State campus population during the two peak hour scenarios. As noted earlier and in Appendix A, Table 1, the assumptions for the percent of campus population by affiliation who travel by transit during the peak hour were the same for the standard peak hour and campus peak hour (see Appendix C – New SF State Population sections for explanation). Both peak hour analyses conclude that SamTrans would generate approximately 13 new transit users, while AC Transit, Golden Gate Transit and Caltrain would generate a combined 10 transit users, and these small totals do not create a significant impact for those transit operators. It was assumed the percent distributions of transit/shuttle riders by transit operator for Year 2020 mirror ridership distributions by transit operator established from Existing Conditions Intercept Survey data on unlinked routes (see Appendix A, Table 3 for the distribution of transit/shuttle riders to SF State by transit system).

4. CONCLUSION

The transit impact analysis summarized in this memorandum indicates that the anticipated increase in the SF State population from the Campus Master Plan under Year 2020 cumulative conditions does not create a significant impact on the fixed route transit lines operated by the public transit operating agencies in the area. This applies to both the standard peak hour analyzed for the DEIR in December 2006 and the additional analysis done for the campus peak hour. This conclusion supports the conclusion in the technical memorandum prepared for the DEIR in December 2006. For Muni, the expected additional riders do not create a situation in which the Muni load standard would be exceeded, and the new riders will not significantly impact fixed route transit service. This conclusion does not include analysis of the M-Ocean View streetcar line. No quantitative capacity analysis of this line was possible, as load and boarding data for this line has been unavailable during the preparation of this analysis.

The analysis does show that the SF State campus-operated shuttle services are currently operating over-capacity, and that capacity issues are expected to worsen with the projected increase in Year 2020 new shuttle ridership resulting from the Master Plan.

¹² Bay Area Rapid Transit, <http://bart.gov/news/press/news20070511.asp>

Appendix A: Table 1

Percent of Campus Population by Affiliation who travel during the Standard Peak Hour (5:00-5:59 p.m.) and Campus Peak Hour (8:00-8:59 a.m.)

Percent of the SF State population by affiliation who travel during the Standard Peak Hour (5:00-5:59 p.m.) and Campus Peak Hour (8:00-8:59 a.m.)	
Students	20%
Faculty/Staff	90%
Hotel/Employees	25%
Visitors	10%

Source: Distributions established by URS and based on standard p.m. peak hour commuter behavior assumptions. These distributions were also applied to the campus peak hour.

Appendix A: Table 2

New Population Assumptions Standard Peak Hour (5:00-5:59 p.m.) and Campus Peak Hour (8:00-8:59 a.m.)

Population Calculations															
Campus Affiliation	On-Campus and Off-Campus Population									2020 Peak Hour Commuter Population					
	Current Headcount	2020 Headcount	Headcount Increase	Current Housing Units	Current On Campus Population	Current Off Campus Population	2020 On Campus Population	2020 Off Campus Population	2020 Increase in On Campus Pop	2020 Increase in Off Campus Pop	2020 Assumptions: Percent of Off-Campus Commuters in the Peak Hour	2020: New Peak Hour Commuters	Option 1: New Transit/ Shuttle Riders (42% of commuters)	Option 2: New Transit/ Shuttle Riders (45% of commuters)	Option 2: New Transit/ Shuttle Riders (45% of commuters)*
Students	26,596	32,113	5,517	<i>1,008</i>	<i>3,023</i>	<i>23,573</i>	<i>4,820</i>	<i>27,293</i>	<i>1,797</i>	<i>3,720</i>	20%	744	312	335	335
Faculty and Staff	3,428	4,139	711	<i>31</i>	<i>31</i>	<i>3,397</i>	<i>630</i>	<i>3,509</i>	<i>599</i>	<i>112</i>	90%	101	42	45	45
Hotel Employees	-	<i>65</i>	<i>65</i>	-	-	-	-	<i>65</i>	-	<i>65</i>	25%	16	7	7	7
Visitors*	300	363	63	-	-	300	-	363	-	63	10%	6	3	3	0
Total	30,324	36,680	6,356	<i>1,039</i>	<i>3,054</i>	<i>27,270</i>	<i>5,450</i>	<i>31,230</i>	<i>2,396</i>	<i>3,960</i>		867	364	390	387

* Given the statistically insignificant number of new visitors in the Peak Hour, visitors will not be factored in the New transit/shuttle mode split calculation.

Numbers in italics were provided by URS in May 2007 in response to additional housing that will be constructed on campus and included in the final Master Plan. Also, the numbers reflect a reduced conference facility and inn.

Appendix A: Table 3

Distribution of New Transit/ Shuttle Riders to Campus Standard Peak Hour (5:00-5:59 p.m.) and Campus Peak Hour (8:00-8:59 a.m.)

Distribution of New Transit/ Shuttle Riders to SF State during the Peak Hour by Transit System				
Transit System	# of respondents	% of respondents	New SF State Riders	Redistributed New SF State Riders ^a
MUNI	152	35.9%	139	172
BART	145	34.3%	133	0
SF State Shuttle	101	23.9%	93	192
SamTrans	14	3.3%	13	13
AC Transit, GGT, Caltrain	11	2.6%	10	10
Total	423	100%	387	387

Source: SF State intercept survey (unlinked routes) and cordon count conducted by Nelson/Nygaard on 11/28/05 and 12/6/05.

^a Assumption: BART riders will be distributed among screenlines. Out of the 133 BART riders, 75% will take the SF State shuttle and 25% will take Muni during the Peak Hour. Ridership on Muni will be distributed based on the Muni ridership distribution outlined in the Nelson/Nygaard Intercept Survey (Existing Conditions Analysis Report, Campus Master Plan, 2006).

Appendix A: Table 4

Summary of Muni Screenlines

Standard Peak Hour (5:00-5:59 p.m.) and Campus Peak Hour (8:00-8:59 a.m.)

Summary of Muni Screenlines			
Screenline	Transit Corridor	Transit Lines	Screenline Location
North	19th Ave-Sunset	Inbound 18 - 46th Ave 28 - 19th Ave 28L - 19th Ave Limited 29 - Sunset	Lake Merced and SF State 19th Ave and Holloway (leaving) 19th Ave and Holloway 19th Ave and Holloway (leaving)
		Outbound 18 - 46th Ave 28 - 19th Ave 28L - 19th Ave Limited 29 - Sunset	Lake Merced and Higuera 19th Ave and Winston (leaving) 19th Avenue and Winston 19th Ave and Buckingham
Northeast	Downtown	Inbound 17 - Park Merced M - Ocean View	19th and Holloway (NE corner) 19th Ave (SF State)
		Outbound 17 - Park Merced M - Ocean View	20th Ave and Winston (SE corner) 19th Ave (SF State)
South	19th Ave-Serra	Inbound 28 - 19th Ave 28L - 19th Ave Limited	19th Ave and Banbury (leaving) Daly City BART (leaving)
		Outbound 28 - 19th Ave 28L - 19th Ave Limited	19th Ave and Holloway (leaving) 19th Ave and Holloway
East	Balboa Park	Inbound 29 - Sunset M - Ocean View	Holloway and Junipero Serra 19th Ave (SF State)
		Outbound 29 - Sunset M - Ocean View	19th Ave and Holloway (SE corner) 19th Ave (SF State)

Appendix A: Tables 5a-c

Standard Peak Hour (5:00-5:59 p.m.)

Table 5a: Muni Route Distribution by Campus Affiliation (Year 2020) (5:00-5:59 p.m.)

Muni Route Distribution by Campus Affiliation (Year 2020)				
Muni Route	Students	Faculty/Staff	Hotel/Employees	New SF State Muni Riders
28	66	9	1	76
28L	7	1	0	8
M	59	8	1	68
29	13	2	0	15
18	4	1	0	5
Total	149	20	3	<u>172</u>

Source: Applied Percent distribution of Muni Riders by SF State affiliation to Muni ridership distributions by route
Same distribution as Campus Peak Hour (based on same population and transit mode split assumptions)

Table 5b: Percent Distribution of SF State Affiliations by Inbound-Outbound Travel Direction* (5:00-5:59 p.m.)

Percent Distribution of SF State Affiliations by Inbound-Outbound Travel Direction during Standard Peak Hour*			
Affiliation	Inbound: Arriving at SF State	Outbound: Leaving from SF State	Total IB + OB
Students	60%	40%	100%
Faculty/Staff	30%	70%	100%
Hotel Employees	50%	50%	100%

Source: Assumptions provided by URS.

* Directional travel is based on: Inbound to SF State / Outbound from SF State assignments (This differs from Muni-defined inbound and outbound routes).

Table 5c: Distribution of Total Muni Loads at SF State by Inbound and Outbound (5:00-5:59 p.m.)

Distribution of Total Muni Loads at SF State by Inbound and Outbound during Standard Peak Hour (5:00-5:59 p.m.)				
Line	Inbound Loads		Outbound Loads	
	Inbound	Inbound %	Outbound	Outbound %
17*	17	27%	45	73%
18	56	68%	27	32%
28	141	33%	285	67%
28L	33	50%	34	50%
29	33	21%	126	79%
M**	n/a	50%	n/a	50%

Source: Muni Baseline Ridecheck Boarding Data at SF State Load Points.

*Line 17 is a "loop" service, baseline boarding data has been redistributed 50-50% between inbound-outbound service.

**M-Line daily load data (average load per trip and daily actual trips) will not available from Muni until July 2007. Assumed a 50%-50% split for M-Line Inbound-Outbound ridership.

Appendix A: Tables 5d-f

Campus Peak Hour (8:00-8:59 a.m.)

Table 5d: Muni Route Distribution by Campus Affiliation (Year 2020) (8:00-8:59 a.m.)

Muni Route Distribution by Campus Affiliation (Year 2020)				
Muni Route	Students	Faculty/Staff	Hotel/Employees	New SF State Muni Riders
28	66	9	1	76
28L	7	1	0	8
M	59	8	1	68
29	13	2	0	15
18	4	1	0	5
Total	149	20	3	<u>172</u>

Source: Applied Percent distribution of Muni Riders by SF State affiliation to Muni ridership distributions by route.

Same distribution as Standard Peak Hour (based on same population and transit mode split assumptions).

Table 5e: Percent Distribution of SF State Affiliations by Inbound-Outbound Travel Direction* (8:00-8:59 a.m.)

Percent Distribution of SF State Affiliations by Inbound-Outbound Travel Direction during Campus Peak Hour*			
Affiliation	Inbound: Arriving at SF State	Outbound: Leaving from SF State	Total IB + OB
Students	100%	0%	100%
Faculty/Staff	100%	0%	100%
Hotel Employees	100%	0%	100%

Source: Assumptions provided by URS.

* Directional travel is based on: Inbound to SF State / Outbound from SF State assignments (This differs from Muni-defined inbound and outbound routes).

Table 5f: Distribution of Total Muni Loads at SF State by Inbound and Outbound (8:00-8:59 a.m.)

Distribution of Total Muni Loads at SF State by Inbound and Outbound during Campus Peak Hour (8:00- 8:59 a.m.)				
Line	Inbound Loads		Outbound Loads	
	Inbound	Inbound %	Outbound	Outbound %
17*	24	81%	5	19%
18	16	23%	53	77%
28	131	63%	77	37%
28L	52	87%	8	13%
29	177	63%	105	37%
M**	n/a	50%	n/a	50%

Source: Muni Baseline Ridecheck Boarding Data at SF State Load Points.

*Line 17 is a "loop" service, baseline boarding data has been redistributed 50-50% between inbound-outbound service.

**M-Line daily load data (average load per trip and daily actual trips) will not be available from Muni until July 2007. Assumed a 50%-50% split for M-Line Inbound-Outbound ridership.

Appendix A: Table 6a

**Distribution of New Riders by Muni Line (SF State IB/OB data converted into Muni Baseline Ridecheck IB/OB directions in 2020)
Standard Peak Hour (5:00-5:59 p.m.)**

Distribution of New Riders by Muni Line (SF State IB/OB data converted into Muni Baseline Ridecheck IB/OB directions) (Year 2020)						
Line 28	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	40	26	3	6	1	1
28- Muni Outbound	13	18	1	4	0	0
Screenline crossed	North Screenline	South Screenline	North Screenline	South Screenline	North Screenline	South Screenline
28- Muni Inbound	27	9	2	2	0	0
Screenline crossed	South Screenline	North Screenline	South Screenline	North Screenline	South Screenline	North Screenline
Total new riders	66		9		1	
Line 28L	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	4	3	0	1	0	0
28L- Muni Outbound	2	1	0	0	0	0
Screenline crossed	North Screenline	South Screenline	North Screenline	South Screenline	North Screenline	South Screenline
28L- Muni Inbound	2	1	0	0	0	0
Screenline crossed	South Screenline	North Screenline	South Screenline	North Screenline	South Screenline	North Screenline
Total new riders	7		1		0	
Line 29	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	8	5	1	1	0	0
29- Muni Outbound	2	4	0	1	0	0
Screenline crossed	North Screenline	East Screenline	North Screenline	East Screenline	North Screenline	East Screenline
29- Muni Inbound	6	1	0	0	0	0
Screenline crossed	East Screenline	North Screenline	East Screenline	North Screenline	East Screenline	North Screenline
Total new riders	13		2		0	
Line 18	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	3	2	0	0	0	0
18- Muni Outbound	2	1	0	0	0	0
Screenline crossed	North Screenline	North Screenline	North Screenline	North Screenline	North Screenline	North Screenline
18- Muni Inbound	1	1	0	0	0	0
Screenline crossed	North Screenline	North Screenline	North Screenline	North Screenline	North Screenline	North Screenline
Total new riders	4		1		0	
M- Line*	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	35	23	2	6	1	1
M - Muni Outbound	18	12	1	3	0	0
Screenline crossed	Northeast Screenline	East Screenline	Northeast Screenline	East Screenline	Northeast Screenline	East Screenline
M - Muni Inbound	18	12	1	3	0	0
Screenline crossed	East Screenline	Northeast Screenline	East Screenline	Northeast Screenline	East Screenline	Northeast Screenline
Total new riders	59		8		1	

Grand Total New Riders: 172

Source: 1) Muni Route Distribution by Campus Affiliation table, 2) Percent Distribution of SF State Affiliations by Inbound-Outbound Travel Direction table and 3) Distribution of Total Muni Loads at SF State by Inbound and Outbound during Standard Peak Hour (5:00-5:59 p.m.) table

* Assumes M-Line IB and OB will be distributed 50-50%

Note: No data on Route 17 available from Nelson/Nygaard Intercept Survey

Appendix A: Table 6b

**Distribution of New Riders by Muni Line (SF State IB/OB data converted into Muni Baseline Ridecheck IB/OB directions in 2020)
Campus Peak Hour (8:00-8:59 a.m.)**

Distribution of New Riders by Muni Line (SF State IB/OB data converted into Muni Baseline Ridecheck IB/OB directions) (Year 2020)						
Line 28	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	66	0	9	0	1	0
28- Muni Outbound	42	0	6	0	1	0
Screenline crossed	North Screenline	South Screenline	North Screenline	South Screenline	North Screenline	South Screenline
28- Muni Inbound	24	0	3	0	1	0
Screenline crossed	South Screenline	North Screenline	South Screenline	North Screenline	South Screenline	North Screenline
Total new riders	66		9		1	
Line 28L						
	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	7	0	1	0	0	0
28L- Muni Outbound	6	0	1	0	0	0
Screenline crossed	North Screenline	South Screenline	North Screenline	South Screenline	North Screenline	South Screenline
28L- Muni Inbound	1	0	0	0	0	0
Screenline crossed	South Screenline	North Screenline	South Screenline	North Screenline	South Screenline	North Screenline
Total new riders	7		1		0	
Line 29						
	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	13	0	2	0	0	0
29- Muni Outbound	8	0	1	0	0	0
Screenline crossed	North Screenline	East Screenline	North Screenline	East Screenline	North Screenline	East Screenline
29- Muni Inbound	5	0	1	0	0	0
Screenline crossed	East Screenline	North Screenline	East Screenline	North Screenline	East Screenline	North Screenline
Total new riders	13		2		0	
Line 18						
	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	4	0	1	0	0	0
18- Muni Outbound	1	0	0	0	0	0
Screenline crossed	North Screenline	North Screenline	North Screenline	North Screenline	North Screenline	North Screenline
18- Muni Inbound	3	0	0	0	0	0
Screenline crossed	North Screenline	North Screenline	North Screenline	North Screenline	North Screenline	North Screenline
Total new riders	4		1		0	
M- Line*						
	Students		Staff/Faculty		Hotel employees	
Direction of Travel	Toward SF State	Away from SF State	Toward SF State	Away from SF State	Toward SF State	Away from SF State
New rider Distribution	59	0	8	0	1	0
M - Muni Outbound	29	0	4	0	1	0
Screenline crossed	Northeast Screenline	East Screenline	Northeast Screenline	East Screenline	Northeast Screenline	East Screenline
M - Muni Inbound	29	0	4	0	1	0
Screenline crossed	East Screenline	Northeast Screenline	East Screenline	Northeast Screenline	East Screenline	Northeast Screenline
Total new riders	59		8		1	

Grand Total New Riders: 172

Source: 1) Muni Route Distribution by Campus Affiliation table, 2) Percent Distribution of SF State Affiliations by Inbound-Outbound Travel Direction table and 3) Distribution of Total Muni Loads at SF State by Inbound and Outbound during Campus Peak Hour (8:00-8:59 a.m.) table

* Assumes M-Line IB and OB will be distributed 50-50%

Note: No data on Route 17 available from Nelson/Nygaard Intercept Survey

Appendix A: Table 7a

MUNI Transit Screenline Analysis

Existing Year Conditions: Weekday Standard Peak Hour (5:00-5:59 p.m.)

			EXISTING YEAR CONDITIONS					
Screenline	Transit Corridor	Transit Lines	Hourly Ridership Demand			Hourly Capacity		Capacity Utilization (%) of Muni Load Standard ^c
			# of vehicle trips	Ave. Load	Passengers	Per vehicle	Passengers	
North	19th Ave-Sunset	Inbound						
		18 - 46th Ave	3.8	15.0	56	54	201	28%
		28 - 19th Ave	7.1	25.1	178	54	380	47%
		28L - 19th Ave Limited	4.6	8.4	38	54	245	16%
		29 - Sunset	2.0	16.1	32	54	107	30%
		Subtotal			305		933	33%
		Outbound						
		18 - 46th Ave	3.5	7.7	27	54	187	14%
		28 - 19th Ave	8.3	33.6	277	54	442	63%
		28L - 19th Ave Limited	2.9	12.7	36	54	154	24%
29 - Sunset	3.3	35.1	116	54	177	66%		
Subtotal			456		959	48%		
Screenline Total			761		1,892	40%		
Northeast	Downtown	Inbound						
		17 - Park Merced ^a	3.0	5.6	17	38	115	15%
		M - Ocean View ^b	6.0	n/a	n/a	202	1,214	n/a
		Subtotal			17		1,329	1%
		Outbound						
		17 - Park Merced ^a	3.0	14.9	45	38	115	39%
M - Ocean View ^b	6.0	n/a	n/a	202	1,214	n/a		
Subtotal			45		1,329	3%		
Screenline Total			62		2,657	2%		
South	19th Ave-Serra	Inbound						
		28 - 19th Ave	7.1	14.5	103	54	380	27%
		28L - 19th Ave Limited	4.6	6.1	28	54	245	11%
		Subtotal			131		625	21%
		Outbound						
		28 - 19th Ave	8.3	35.5	293	54	442	66%
28L - 19th Ave Limited	2.9	10.8	31	54	154	20%		
Subtotal			324		595	54%		
Screenline Total			455		1,220	37%		
East	Balboa Park	Inbound						
		29 - Sunset	2.0	16.7	33	54	107	31%
		M - Ocean View ^b	6.0	n/a	n/a	202	1,214	n/a
		Subtotal			33		1,321	3%
		Outbound						
		29 - Sunset	3.3	41.2	136	54	177	77%
M - Ocean View ^b	6.0	n/a	n/a	202	1,214	n/a		
Subtotal			136		1,391	10%		
Screenline Total			169		2,711	6%		
Total For All Screenlines					1,447		8,481	17%

^a Assumes no change 17-line ridership in 2020 Cumulative Conditions. No information available on the distribution of Muni Riders to SF State using the 17-line.

^b Existing Conditions ridecheck data for M Line was not available. Only new M Line ridership is reflected in 2020 Cumulative Conditions.

^c Note: The Muni load standard is factored into the screenline capacity utilization rate (i.e. a capacity utilization rate of 100% is equivalent to the 85% crush load standard on Muni).

*BART ridership from Existing Conditions Report has been assigned to Muni Screenlines (25%) and SF State shuttle (75%) between SF State and Daly City BART.

Appendix A: Table 7b

MUNI Transit Screenline Analysis

2020 Cumulative Year Conditions: Weekday Standard Peak Hour (5:00-5:59 p.m.)

2020 CUMULATIVE YEAR CONDITIONS													
Screenline	Transit Corridor	Transit Lines	2020 Total Passengers Calculations				Hourly Ridership Demand			Hourly Capacity		Capacity Utilization (%) of Muni Load Standard ^d	
			Additional New Passengers	New Passengers + Growth Rate ^c	Existing Year Passengers	2020 Total New Passengers	# of vehicle trips	Ave. Load	Passengers	Per vehicle	Passengers		
North	19th Ave-Sunset	Inbound											
		18 - 46th Ave	2	2	56	59	3.8	15.6	59	54	201	29%	
		28 - 19th Ave	11	11	178	190	7.1	26.7	190	54	380	50%	
		28L - 19th Ave Limited	2	2	38	40	4.6	8.8	40	54	245	16%	
		29 - Sunset	1	1	32	34	2.0	16.8	34	54	107	31%	
		Subtotal							322		933	35%	
		Outbound											
		18 - 46th Ave	3	3	27	30	3.5	8.5	30	54	187	16%	
		28 - 19th Ave	14	15	277	292	8.3	35.4	292	54	442	66%	
		28L - 19th Ave Limited	2	2	36	39	2.9	13.5	39	54	154	25%	
		29 - Sunset	2	2	116	118	3.3	35.6	118	54	177	67%	
		Subtotal							478		959	50%	
		Screenline Total							800		1,892	42%	
		Northeast	Downtown	Inbound									
17 - Park Merced ^a	0			0	17	17	3.0	5.6	17	38	115	15%	
M - Ocean View ^b	15			15	n/a	15	6.0	2.5	15	202	1,214	1%	
Subtotal									32		1,329	2%	
Outbound													
17 - Park Merced ^a	0			0	45	45	3.0	14.9	45	38	115	39%	
M - Ocean View ^b	19	20	n/a	20	6.0	3.3	20	202	1,214	2%			
Subtotal							64		1,329	5%			
Screenline Total							96		2,657	4%			
South	19th Ave-Serra	Inbound											
		28 - 19th Ave	29	30	103	133	7.1	18.7	133	54	380	35%	
		28L - 19th Ave Limited	2	2	28	30	4.6	6.6	30	54	245	12%	
		Subtotal							163		625	26%	
		Outbound											
		28 - 19th Ave	22	23	293	316	8.3	38.3	316	54	442	71%	
28L - 19th Ave Limited	2	2	31	33	2.9	11.5	33	54	154	21%			
Subtotal							349		595	59%			
Screenline Total							512		1,220	42%			
East	Balboa Park	Inbound											
		29 - Sunset	7	7	33	40	2.0	20.1	40	54	107	38%	
		M - Ocean View ^b	19	20	n/a	20	6.0	3.3	20	202	1,214	2%	
		Subtotal							60		1,321	5%	
		Outbound											
		29 - Sunset	5	5	136	141	3.3	42.8	141	54	177	80%	
M - Ocean View ^b	15	15	n/a	15	6.0	2.5	15	202	1,214	1%			
Subtotal							156		1,391	11%			
Screenline Total							216		2,711	8%			
Total For All Screenlines			172	177				1,624		8,481	19%		

^a Assumes no change 17-line ridership in 2020 Cumulative Conditions. No information available on the distribution of Muni Riders to SF State using the 17-line.

^b Existing Conditions ridecheck data for M Line was not available. Only new M Line ridership is reflected in 2020 Cumulative Conditions.

^c Background Growth Rate (0.165% over 15 years), based on the SFCTA Countywide Transit Plan (internal SF trips applied to Muni) = Additional New Passengers(1+0.00165)¹⁵

^d Note: The Muni load standard is factored into the screenline capacity utilization rate (i.e. a capacity utilization rate of 100% is equivalent to the 85% crush load standard on Muni).

*BART ridership from Existing Conditions Report has been assigned to Muni Screenlines (25%) and SF State shuttle (75%) between SF State and Daly City BART.

Appendix A: Table 7c

MUNI Transit Screenline Analysis

Existing Year Conditions: Weekday Campus Peak Hour (8:00-8:59 a.m.)

		EXISTING YEAR CONDITIONS						
Screenline	Transit Corridor	Transit Lines	Hourly Ridership Demand			Hourly Capacity		Capacity Utilization (%) of Muni Load Standard ^c
			# of vehicle trips	Ave. Load	Passengers	Per vehicle	Passengers	
North	19th Ave-Sunset	Inbound						
		18 - 46th Ave	3.7	4.4	16	54	195	8%
		28 - 19th Ave	5.5	24.0	132	54	295	45%
		28L - 19th Ave Limited	2.2	24.8	54	54	116	46%
		29 - Sunset	4.2	36.9	153	54	222	69%
		Subtotal			355		828	43%
		Outbound						
		18 - 46th Ave	3.8	14.2	53	54	201	27%
		28 - 19th Ave	8.0	13.4	107	54	428	25%
		28L - 19th Ave Limited	1.8	6.8	12	54	98	13%
29 - Sunset	3.9	27.6	108	54	209	52%		
Subtotal			281		936	30%		
Screenline Total			635		1,764	36%		
Northeast	Downtown	Inbound						
		17 - Park Merced ^a	3.0	7.9	24	38	115	21%
		M - Ocean View ^b	6.0	n/a	n/a	202	1,214	n/a
		Subtotal			24		1,329	2%
		Outbound						
		17 - Park Merced ^a	3.0	1.8	5	38	115	5%
M - Ocean View ^b	6.0	n/a	n/a	202	1,214	n/a		
Subtotal			5		1,329	0.4%		
Screenline Total			29		2,657	1%		
South	19th Ave-Serra	Inbound						
		28 - 19th Ave	5.5	23.6	130	54	295	44%
		28L - 19th Ave Limited	2.2	23.6	51	54	116	44%
		Subtotal			181		411	44%
		Outbound						
		28 - 19th Ave	8.0	5.8	46	54	428	11%
28L - 19th Ave Limited	1.8	2.1	4	54	98	4%		
Subtotal			50		527	10%		
Screenline Total			231		937	25%		
East	Balboa Park	Inbound						
		29 - Sunset	4.2	48.2	200	54	222	90%
		M - Ocean View ^b	6.0	n/a	n/a	202	1,214	n/a
		Subtotal			200		1,436	14%
		Outbound						
		29 - Sunset	3.9	26.0	101	54	209	49%
M - Ocean View ^b	6.0	n/a	n/a	202	1,214	n/a		
Subtotal			101		1,423	7%		
Screenline Total			301		2,859	11%		
Total For All Screenlines					1,197		8,217	15%

^a Assumes no change 17-line ridership in 2020 Cumulative Conditions. No information available on the distribution of Muni Riders to SF State using the 17-line.

^b Existing Conditions ridecheck data for M Line was not available. Only new M Line ridership is reflected in 2020 Cumulative Conditions.

^c Note: The Muni load standard is factored into the screenline capacity utilization rate (i.e. a capacity utilization rate of 100% is equivalent to the 85% crush load standard on Muni).

*BART ridership from Existing Conditions Report has been assigned to Muni Screenlines (25%) and SF State shuttle (75%) between SF State and Daly City BART.

Appendix A: Table 7d

MUNI Transit Screenline Analysis
2020 Cumulative Year Conditions: Weekday Campus Peak Hour (8:00-8:59 a.m.)

2020 CUMULATIVE YEAR CONDITIONS												
Screenline	Transit Corridor	Transit Lines	2020 Total Passengers Calculations				Hourly Ridership Demand			Hourly Capacity		Capacity Utilization (%) of Muni Load Standard ^d
			Additional New Passengers	New Passengers + Growth Rate ^c	Existing Year Passengers	2020 Total New Passengers	# of vehicle trips	Ave. Load	Passengers	Per vehicle	Passengers	
North	19th Ave-Sunset	Inbound										
		18 - 46th Ave	4	4	16	20	3.7	5.5	20	54	195	10%
		28 - 19th Ave	0	0	132	132	5.5	24.0	132	54	295	45%
		28L - 19th Ave Limited	0	0	54	54	2.2	24.8	54	54	116	46%
		29 - Sunset	0	0	153	153	4.2	36.9	153	54	222	69%
		Subtotal				359			359		828	43%
		Outbound										
		18 - 46th Ave	1	1	53	54	3.8	14.5	54	54	201	27%
		28 - 19th Ave	48	49	107	157	8.0	19.6	157	54	428	37%
		28L - 19th Ave Limited	7	7	12	20	1.8	10.8	20	54	98	20%
		29 - Sunset	9	10	108	117	3.9	30.0	117	54	209	56%
		Subtotal				348			348		936	37%
Screenline Total				707			707		1,764	40%		
Northeast	Downtown	Inbound										
		17 - Park Merced ^a	0	0	24	24	3.0	7.9	24	38	115	21%
		M - Ocean View ^b	0	0	n/a	0	6.0	0.0	0	202	1,214	0%
		Subtotal				24			24		1,329	2%
		Outbound										
		17 - Park Merced ^a	0	0	5	5	3.0	1.8	5	38	115	5%
M - Ocean View ^b	34	35	n/a	35	6.0	5.8	35	202	1,214	3%		
Subtotal				40			40		1,329	3%		
Screenline Total				64			64		2,657	2%		
South	19th Ave-Serra	Inbound										
		28 - 19th Ave	28	29	130	159	5.5	28.9	159	54	295	54%
		28L - 19th Ave Limited	1	1	51	52	2.2	24.2	52	54	116	45%
		Subtotal				211			211		411	51%
		Outbound										
		28 - 19th Ave	0	0	46	46	8.0	5.8	46	54	428	11%
28L - 19th Ave Limited	0	0	4	4	1.8	2.1	4	54	98	4%		
Subtotal				50			50		527	10%		
Screenline Total				261			261		937	28%		
East	Balboa Park	Inbound										
		29 - Sunset	5	6	200	206	4.2	49.6	206	54	222	93%
		M - Ocean View ^b	34	35	n/a	35	6.0	5.8	35	202	1,214	3%
		Subtotal				240			240		1,436	17%
		Outbound										
		29 - Sunset	0	0	101	101	3.9	26.0	101	54	209	49%
M - Ocean View ^b	0	0	n/a	0	6.0	0.0	0	202	1,214	0%		
Subtotal				101			101		1,423	7%		
Screenline Total				342			342		2,859	12%		
Total For All Screenlines			172	177		1,374			1,374		8,217	17%

^a Assumes no change 17-line ridership in 2020 Cumulative Conditions. No information available on the distribution of Muni Riders to SF State using the 17-line.

^b Existing Conditions ridecheck data for M Line was not available. Only new M Line ridership is reflected in 2020 Cumulative Conditions.

^c Background Growth Rate (0.165% over 15 years), based on the SFCTA Countywide Transit Plan (internal SF trips applied to Muni) = Additional New Passengers(1+0.00165)¹⁵

^d Note: The Muni load standard is factored into the screenline capacity utilization rate (i.e. a capacity utilization rate of 100% is equivalent to the 85% crush load standard on Muni).

*BART ridership from Existing Conditions Report has been assigned to Muni Screenlines (25%) and SF State shuttle (75%) between SF State and Daly City BART.

Appendix A: Table 8

Muni Route Distribution from Intercept Survey (unlinked trips) Standard Peak Hour (5:00-5:59 p.m.) and Campus Peak Hour (8:00-8:59 a.m.)

Muni Route Distribution from Intercept Survey (unlinked trips)			
Muni Route	# Respondents	% of respondents who ride Muni	New SF State Muni Riders
28	62	44%	76
28L	7	5%	8
M	55	39%	68
29	12	9%	15
18	4	3%	5
	140	100%	172

Source: Unlinked Routes Intercept survey by Nelson/Nygaard: MUNI Route Analysis from Intercept Survey.xls

Note: Estimated % distribution of Total Boardings for Line 28 and 28L were calculated from MUNI ridecheck data

Appendix A: Table 9a-c

Standard Peak Hour (5:00-5:59 p.m.) and Campus Peak Hour (8:00-8:50 a.m.)

Table 9a: Current Shuttle Ridership in the Peak Hour

Current Shuttle Ridership in Peak Hour					
Shuttle Ridership	Existing Year	Current Transit/ Shuttle Mode split	Current Shuttle % of transit	% of SF State pop. who travel in the peak	Current Peak Hr Riders
Students	23,561	0.43	23.9%	20%	484
Faculty and Staff	3,399	0.43	23.9%	90%	314
Hotel Employees	-	0.43	23.9%	25%	0
Total Ridership					798

Source: New Population Calculations Table, Distribution of New Transit/ Shuttle Riders to SF State during Peak Hour by Transit System Table, Percent of the SF State population by affiliation who travel during the peak hour (Year 2020) Table.

Table 9b: Existing Year Peak Hour Shuttle Capacity in the Peak Hour

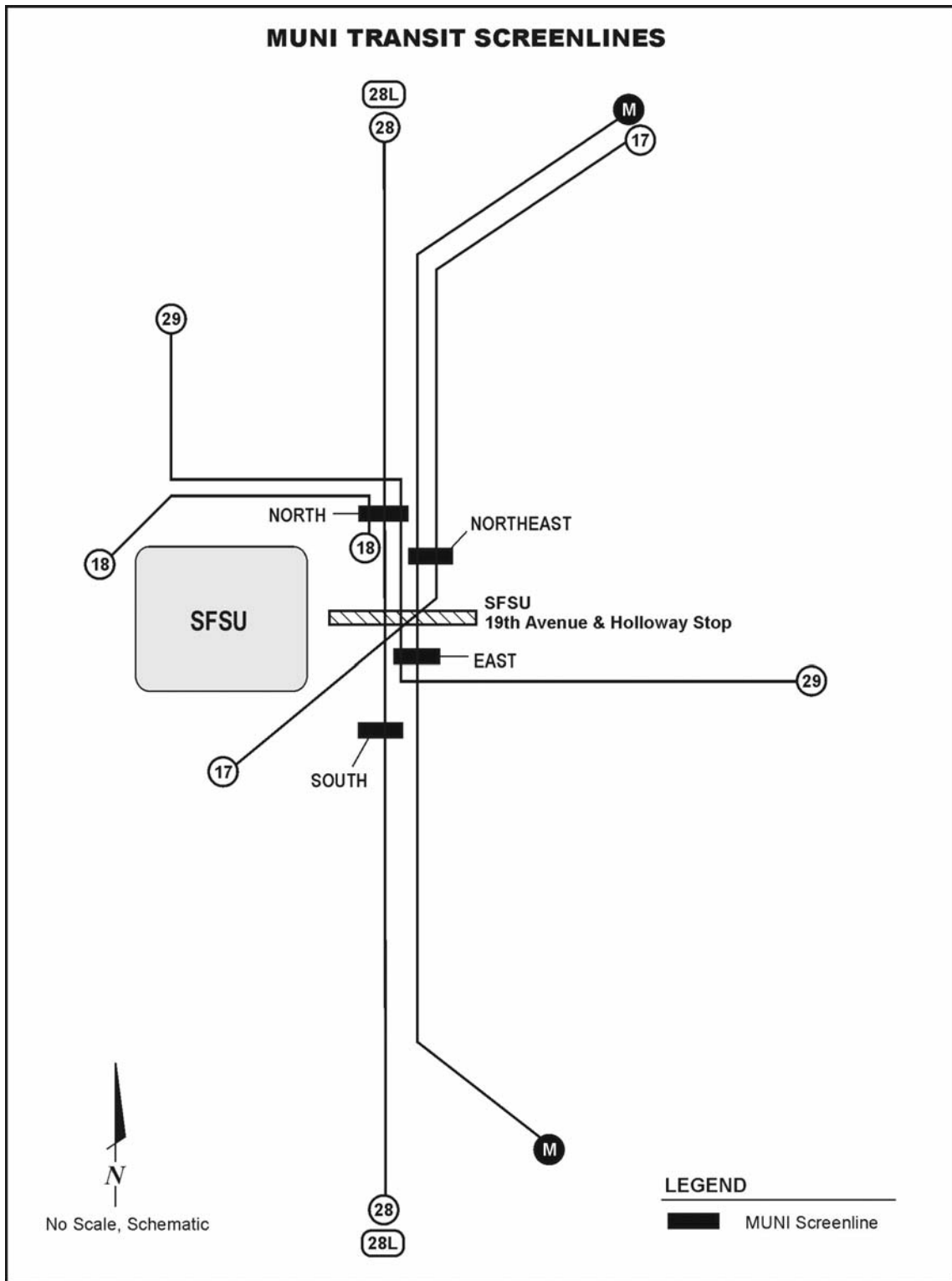
Existing Year Peak Hour Shuttle Capacity				
Capacity per vehicle	Frequency (15 min headway)	Number of Routes	Capacity per direction	Capacity in both Directions
38	4	2	304	608

Source: Assumptions are based on Existing Conditions Analysis SF State Shuttle section

Table 9c: Shuttle Capacity Utilization Rates - Peak Hour

Shuttle Capacity Utilization Rates			
	No. Peak Hr Riders	Peak Hour Capacity	Utilization Rate (%)
Existing Conditions	798	608	131%
2020 Cumulative Conditions	990	608	163%

Appendix B: Muni Transit Screenlines



Appendix C: Transit Impact Assumptions

Assumptions Applicable to Both Standard and Campus Peak Hours

Existing Year Conditions Muni Screenline Table Calculations

1. Existing Year Hourly Ridership Demand data for the lines in each screenline were calculated by multiplying the number of Peak Hour vehicle trips x Peak Hour Average Load at SF State ridecheck stops.
 - a. Peak Hour Vehicle Trips: The number of actual boardings on a line during the peak hour. Boarding information was obtained from Muni ridecheck data.
 - b. Peak Hour Average Load at SF State: The average load values for buses traveling toward SF State reflect the load on bus prior to crossing the SF State screenline location, while average load values for buses leaving SF State reflect loads at the SF State screenline. The load information was obtained from Muni ridecheck data.
2. Existing Year Hourly Capacity was based on Muni vehicle capacity load standards defined in the Muni Short Range Transit Plan (2006).
 - a. Hourly capacity was based on the following assumption: the peak period passenger load factor does not exceed the service standard goal of “no greater than 85 percent of combined seating and standing capacity” (as defined in Muni 2006 SRTP, Figure 39, p. 92).
 - b. The 85 percent Muni Passenger Load Standard was applied to Muni screenline vehicle capacity calculations (i.e. 100 percent vehicle capacity utilization rate = 85 percent Muni Load Standard).
3. Existing Conditions Service Capacity Utilization was calculated by dividing Existing Year hourly ridership by Existing Year hourly capacity.

Cumulative Conditions (Year 2020) Muni Screenline Table Calculations

1. 2020 Hourly Ridership Demand = Existing Year Hourly Ridership Demand + 2020 new Muni riders (addition new passengers) + background growth rate.
 - a. The “Additional New Passengers” in 2020 were calculated by converting the SF State Inbound/Outbound direction assumptions for each campus affiliation into Muni defined Inbound/Outbound directions. Based on assumption that SF State Muni passengers and riders during the Muni ridecheck had the same origin and destination patterns.
 - i. Muni Inbound/Outbound Data was based on specific Muni transit route travel patterns as defined in the Muni ridecheck data files.
 - ii. Inbound/Outbound travel patterns To/From SF State assumptions were based on URS Traffic and Planning Department Assumptions. It was assumed SF State-defined Inbound/Outbound directions are as follows:
 1. “Inbound” as SF State transit users traveling to SF State
 2. “Outbound” as SF State transit users traveling away from SF State (see standard and campus peak hour “New SF State Population” sections).
 - b. New SF State Muni riders were then distributed accordingly:
 - i. By campus affiliation
 - ii. Then by SF State-defined inbound and outbound travel directions
 - iii. Then by inbound-outbound distributions defined from ridecheck data from the total peak hour Muni Loads at SF State.
 - c. Then a background growth rate of 0.165 percent was applied to each screenline to account for expected incremental ridership growth between the existing year (2005) and cumulative year (2020) conditions over a 15 year period. This growth rate is based on the San Francisco County

Transportation Authority's Countywide Transportation Plan modeling data, which assumed that trips internal to San Francisco (assumed as Muni trips) would grow at a rate of 3.9 percent over 25 years, or an annual growth rate of 0.156 percent.

2. 2020 Hourly Capacity (it was assumed Existing Year Hourly capacity = 2020 Muni Hourly capacity). The capacity per vehicle and the number of vehicles (actual number of trips) was held constant from existing conditions.
3. 2020 Conditions Service Capacity Utilization was calculated by dividing 2020 hourly ridership by 2020 hourly capacity.

Muni Ridership Data Assumptions

1. In the Existing Conditions Intercept Survey,¹ respondents did not differentiate between the 28-line and 28L-line. In order to determine distributions of Muni ridership by line, it was assumed 90 percent of 28-line intercept survey respondents took the 28-line and 10 percent of 28-line respondents took the 28L-line. This is based on Muni ridecheck data on the total boardings of the two lines, which indicated 28-line and 28L-line total boardings were distributed 90:10 respectively.
2. The average load ridecheck location for the 18-line inbound north screenline was taken at the Lake Merced Font bus stop (SF State screenline), while the outbound north average load was taken at the stop before the SF State screenline, at the Lake Merced Higuera bus stop.
3. 17-line is a loop service, but for purposes of the screenline analysis, ridecheck data (on the average load and actual number of boardings during the peak hour) was separated into inbound and outbound directions at the 19th Avenue and Holloway bus stop. The assumptions were as follows:
 - a. The Muni-defined outbound ridecheck point is located at the Winston Drive and 20th Avenue SE corner bus stop
 - b. The Muni-defined inbound ridecheck point is located at the 19th Avenue and Holloway NE corner bus stop.
4. Data on the distribution of Muni ridership by line from the Existing Conditions Analysis Intercept Survey did not include information on 17-line ridership; however, 17-line ridecheck data from Muni indicates boardings and alightings do occur at the 19th Avenue and Holloway SF State bus stop. Given that Year 2020 Muni ridership is based on route distributions established from the Intercept Survey and no distribution assumptions from the intercept survey for the 17-line exist, it is assumed 17-line ridership (calculated from Muni ridecheck data) will remain the same under 2020 Cumulative Conditions.
5. Ridecheck data was available for all Muni lines except for the M-Ocean View line; therefore, existing year hourly ridership for the M-Ocean View line could not be established. According to the Muni Service Planning/ Scheduling Departments, ridecheck data on the M-Ocean View line will not be available until July 2007 at the earliest. Given the unavailability of the M-Ocean View line data, a quantitative analysis of the 68 new M-Ocean View line riders was not possible. Additional information obtained on the M-Ocean View line includes the following:
 - a. Muni estimates the entire M-Ocean View line has an average weekday ridership of 26,182 passengers (from the 2006 Muni Short-Range Transit Plan).
 - b. M-Ocean View line frequency assumptions are based on the 2005 Muni Street and Transit Map, which denotes 9 minute frequencies during the peak hour (both in the standard and campus peak hours): 60 minutes/9 minutes = 6 trains per hour.
 - c. The M-Ocean View line (light rail vehicle) has a 2-car trip capacity of 202 (based on the 85 percent Muni Load Standard). 202 capacity x 6 trips = 1,212 capacity per direction at SF State

¹ Existing Conditions Intercept Survey conducted by Nelson/Nygaard for the Existing Conditions Analysis Report, Campus Master Plan, 2006.

- during peak hour or 2,424 riders in both directions (from the 2006 Muni Short-Range Transit Plan).
- d. Therefore, 68 new SF State M-Ocean View line riders/ 2,424 maximum capacity of the M-Ocean View line during the peak hour = 3 percent of M-Ocean View line total capacity at SF State in the peak hour can be attributed to new SF State M-Ocean View line riders in Year 2020.
6. Daily boarding calculations (in the screenline analysis table)
 - a. M-Ocean View line boarding data is not available (according to Muni, M-Ocean View line ridecheck is non-existent and will not be available until July 2007 at the earliest).
 - b. Line 17 is a "loop" service and baseline boarding data was categorized as "outbound." Outbound data will be redistributed 50-50 percent between inbound-outbound service.

New Local and Regional Ridership Assumptions

1. New local transit ridership impacts will be analyzed quantitatively using Muni Transit Screenlines. Muni mode splits are based on the SF State last leg of trip (unlinked trips) assumptions from the Existing Conditions Intercept Survey.
2. For purposes of the Muni screenline analysis, BART riders will be distributed among the Muni screenlines. Out of the 133 BART riders, 75 percent will take the SF State shuttle and 25 percent will take Muni. Therefore, 100 will be added to the SF State shuttle and 33 will be added to Muni. Ridership on Muni will be distributed based on Muni ridership distribution findings from the Nelson/Nygaard Existing Conditions Intercept Survey.
3. A separate regional transit ridership analysis was also conducted, analyzing the impact of new SF State-affiliated transit ridership on BART travel via the Transbay Tube (campus-affiliated East Bay BART ridership) and travel to and from the Peninsula (campus-affiliated Peninsula BART ridership). See sections on "BART Standard Peak Hour Assumptions" and "BART Campus Peak Hour Assumptions" for more details.

Standard Peak Hour (5:00-5:59 p.m.)

Defining the Standard Peak Hour

1. The standard peak hour of 5:00-5:59 p.m. was analyzed per the guidance provided by the San Francisco Planning Department *Transportation Impact Analysis Guidelines – For Environmental Review, dated October 2002*. Given that SF State has a large night student population as well as a day student population, it was determined that 5:00-5:59 p.m. was a reasonable peak hour to use, as day students, night students and employees would all be traveling during this period.
2. Ridecheck data was obtained from Muni. For the established standard peak hour, Muni collected ridecheck data during either the 4:00-5:59 p.m. or 2:00-5:00 p.m. time periods instead of every hour. To derive ridecheck data for the standard peak hour, ridecheck data (daily actual trips and number of Muni boardings by route ridership) was divided by a factor of 2 for time periods that spanned 2 hours and by a factor of 3 for time periods that spanned 3 hours to establish hourly data (Per suggestion from Jeff Tumlin of Nelson/Nygaard).

New SF State Population

1. Assumptions regarding new on-campus and off-campus populations under Year 2020 cumulative conditions are provided in Appendix A, Table 2.
2. Campus-affiliated population distributions

- a. For the analysis performed for the 5:00-5:59 p.m. peak hour period (analyzed in the Technical Memorandum prepared for the Draft EIR), the assumption was that the following percentages of the total campus population would travel during that hour:

Table 1: Percent of Off-Campus Population by Affiliation who Travel during the Standard Peak Hour (5:00- 5:59 p.m.)

Students	20%
Faculty/Staff	90%
Hotel/Employees	25%
Visitors	10%

These percentage estimates were derived during the first phase of the project, when the existing conditions were being documented. This method actually overestimates the total amount of ridership during the peak hour. Using this model, the total transit and shuttle ridership expected at SF State during the peak single hour would be approximately 3,500 riders.

- b. In actuality, the total transit and shuttle ridership during the peak hour is currently approximately 310 for the Muni buses 798 for the shuttle services. For rail, no figures are available, but if it is assumed that SF State could fill up a 2-car M-Ocean View line train every 9 minutes in the peak hour/peak direction (capacity of 238 riders per train x 6 trains/hour = 1,428 riders capacity for the peak hour), then the current total ridership maximum in the 5:00-5:59 p.m. peak hour would be approximately 2,536. Therefore, this model overestimates current assumed ridership in this period by approximately 38 percent. This is a conservative estimate, and is a good model for estimating ridership potential, ensuring that sufficient capacity is anticipated.
- c. The above assumptions regarding SF State ridership by campus affiliation, and SF State-defined Inbound-Outbound travel directions during the standard peak hour are also summarized below (the latter was based on standard p.m. peak hour commuter behavior assumptions):
- i. Students (who live off-campus): 20 percent of off-campus students travel during the standard peak hour:
 1. Inbound (travel towards SF State): 60 percent
 2. Outbound (travel away from SF State): 40 percent
 - ii. Faculty/Staff (who live off-campus): 90 percent of off-campus faculty/staff travel during the standard peak hour:
 1. Inbound (travel towards SF State): 30 percent
 2. Outbound (travel away from SF State): 70 percent
 - iii. Hotel Employees: 25 percent of all hotel and employees travel during the standard peak hour:
 1. Inbound (travel towards SF State): 50 percent
 2. Outbound (travel away from SF State): 50 percent
 - iv. Visitors: 10 percent of all SF State visitors travel during the standard peak hour. Visitors will not be included in the new ridership calculation since only 63 new visitors are expected in 2020 (statistically insignificant).
 - v. NOTE: SF State affiliates who live on campus or visitors who stay on campus were not factored into the commuter population calculations. The travel patterns of on-campus residents and visitors to off-campus locations are assumed to be irregular as to both timing and destination, and not appropriate for the same type of analysis as regular daily commuters to/from campus.
3. Jeff Tumlin of Nelson/Nygaard provided two transit/shuttle mode split options, taking into consideration work performed by his firm for SF State's parking strategy and the existing conditions mode split analysis:
- a. Two Options:

- i. Option 1: transit/shuttle = 42 percent
 - ii. Option 2: transit/shuttle = 45 percent
- b. Option 2 (more conservative) was applied to each of the new peak hour commuter groups (students, staff/faculty, and hotel employees).
- c. The Intercept Survey sample size in Existing Conditions Analysis only included a small number of non-students (they make up a small percentage of the population).
- d. However, given the lack of data, other than what is stated in the reported mode share for the population as a whole, a 45 percent transit/shuttle mode split will be applied to each campus population group (students, faculty/staff, and new employees).

BART Standard Peak Hour Assumptions

A separate analysis regarding SF State transit impacts on BART ridership (via the Transbay Tube and the Peninsula) during the standard peak hour was performed. The analysis was based on the following assumptions:

1. For inbound and outbound distributions of new campus-related BART commuters, calculations were based on available zip code data from the Existing Conditions Intercept Survey conducted for the Campus Master Plan. Since the intercept survey only provided the origin splits of existing campus-related BART commuters, it was assumed that future campus-affiliated BART riders are commuters and that they would have similar origin and destination patterns. The directionality splits established that 80 percent of respondents using BART for part of their trip had origins or destinations in the East Bay, 12 percent in the Peninsula, 6 percent in San Francisco, and 2 percent in the North Bay. The origin directionality splits from the intercept survey were applied to the 133 new BART riders (established in Appendix A, Table 3).
2. Impact on BART trains (via the Transbay Tube) during the standard peak hour
 - a. New BART Passengers per train
 - i. 133 new BART riders during the standard peak hour in Year 2020
 - ii. Currently, during the 5:00-5:59 p.m. standard peak hour, there are 20 BART trains traveling from SF State vicinity through the Transbay Tube (based on the BART timetable)
 - iii. Using the Existing Conditions intercept survey zip code data, it was established that:
 1. 80 percent of respondents using BART for part of their trip had origins or destinations in the East Bay.
 2. 133 new BART riders x 80 percent East Bay residents = 106 new East Bay BART Riders.
 3. Therefore, 106 new East Bay BART Riders/ 20 BART trains during the standard peak hour = 5 new BART passengers/train in the peak hour traveling via the Transbay Tube).
 - b. BART Capacity per 10-car train = 1,275 passengers. Based on the following BART car assumptions:
 - i. 150 crush load per car (per BART website)
 - ii. 85 percent passenger load standard (assumed to be the same as Muni passenger load factor standard)
 - iii. 150 crush load x 85 percent Muni load standard = 128 passenger capacity per car
 - iv. 10-car BART train x 128 passengers = 1,275 passengers
 - c. New SF State ridership impact on BART: 5 new passengers per train/ 1,275 passenger capacity per 10-car train = 0.004 or 0.4 percent of total passengers per train. Therefore, new SF State BART riders will make up 0.4 percent of total passengers per BART train traveling through the Transbay Tube during in the standard peak hour.
3. Impact on Peninsula-bound BART trains during the standard peak hour
 - a. New BART Passengers per train

- i. 133 new BART riders during the standard peak hour in Year 2020.
- ii. Currently, during the 5:00-5:59 p.m. standard peak hour, there are 4 BART trains traveling from SF State vicinity to the Peninsula (based on the BART timetable)
- iii. Using the Existing Conditions intercept survey zip code data, it was established that:
 - 1. 12 percent of respondents using BART for part of their trip had origins or destinations in the Peninsula.
 - 2. 133 new BART riders x 12 percent Peninsula residents = 16 new Peninsula BART Riders.
 - 3. Therefore, 16 Peninsula BART Riders/ 4 BART trains during the standard peak hour = 4 new BART passengers/train in the peak hour to the Peninsula
- b. BART Capacity per 10-car train = 1,275 passengers. Based on the following BART car assumptions:
 - i. 150 crush load per car (per BART website)
 - ii. 85 percent passenger load standard (assumed to be the same as Muni passenger load factor standard)
 - iii. 150 crush load x 85 percent load standard = 128 passenger capacity per car
 - iv. 10-car BART train x 128 passengers = 1,275 passengers
- c. New SF State ridership impact on BART: 4 new passengers per train/ 1,275 passenger capacity per 10-train train = 0.003 or 0.3 percent of total passengers per train. Therefore, new SF State BART riders will make up 0.3 percent of total passengers per BART train bound for the Peninsula during in the standard peak hour.

Campus Peak Hour (8:00-8:59 a.m.)

Defining the Campus Peak Hour

1. Since universities typically do not have travel patterns that conform to the traditional peak periods, a transit impact analysis for a period other than the typical 5:00-5:59 p.m. peak hour was analyzed. This campus peak hour from 8:00-8:59 a.m. was based on when the actual campus peak hour ridership occurs.
2. To determine this campus peak hour, the project team analyzed Muni ridership data for the stops directly adjacent to SF State to determine the time periods of highest activity, and thus the appropriate alternate peak hour, if one would be applicable. Data for the stop on each line closest to SF State in each time period was analyzed, using data for both boardings and alightings. The totals for each time period were divided by the number of hours in each time period to give an average hourly total for each hour within each time period. The averages are shown in Table 2. (Note that as with all other Muni analysis, data for the M-Ocean View line was not available.)

Table 2: Average Hourly Stop Activity at SF State

Time Period	Average total boardings per hour	Average total alightings per hour	Average total one-hour activity for each hour in time period
4:00-6:59 a.m.	27.9	43.0	70.9
7:00-8:59 a.m.	183.7	323.1	506.7
9:00-9:59 a.m.	115.8	212.7	328.5
10:00 a.m.-1:59 p.m.	175.0	180.7	355.7
2:00-3:59 p.m.	222.2	151.2	373.4
4:00-5:59 p.m.	211.9	97.7	309.6
6:00-6:59 p.m.	111.8	47.9	159.7
7:00 p.m.-1:59 a.m.	29.7	14.7	44.4

3. From the data available, the time period with the busiest average hourly activity is the 7:00-8:59 a.m. period, with a one-hour average of almost 507 riders per hour. This is due to the very high amount of alighting activity at the SF State stops, in addition to high levels of boardings. This one hour average is approximately 35 percent higher than the next-closest hourly average, which would be the 2:00-3:59 p.m. period. This data suggests that the peak analysis should be performed on a one-hour period within the 7:00-8:59 a.m. period, as the period when the campus appears to have the highest level of activity within a one-hour period.
4. The peak hour of activity for the campus does not correlate exactly with the peak hour of loads on the Muni system, and this is important to recognize when looking at the data. The peak loads on the Muni system as a whole are still between 5:00 and 5:59 p.m., and this is reflected in the screenline analysis that shows higher loads at the screenlines in the 5:00-5:59 p.m. period than in the 8:00-8:59 a.m. period. However, the SF State component of the ridership and the levels of SF State activity are higher in the 8:00-8:59 a.m. period.
5. Therefore, the established campus peak hour is from 8:00-8:59 a.m. The same methodology used to calculate standard peak hour ridecheck data was used to calculate the campus peak hour data. Ridecheck data was obtained from Muni. For the established campus peak hour, Muni collected ridecheck data during either the 7:00-8:59 a.m. or 7:00-9:59 a.m. time periods instead of every hour. To derive ridecheck data for the campus peak hour, ridecheck data (daily actual trips and number of Muni boardings by route ridership) was divided by a factor of 2 for time periods that spanned 2 hours and by a factor of 3 for time periods that spanned 3 hours to establish hourly data (Per suggestion from Jeff Tumlin of Nelson/Nygaard).

New SF State Population

1. Assumptions regarding new on-campus and off-campus populations under Year 2020 cumulative conditions are provided in Appendix A, Table 2.
2. Campus-affiliated population distributions
 - a. The same distribution percentages for the campus-affiliated population who travel during the standard peak hour were applied to the total campus population to derive the expected numbers of SF State-affiliated travelers during the campus peak hour (see Appendix C, Table 1).
 - b. If these same distribution assumptions used in the standard peak hour are applied, except that the bus ridership is higher by 200 riders an hour (as documented in the Average Hourly Stop Activity at SF State table, see Appendix C, Table 2), then the total ridership expected in the 8-8:59 a.m. peak hour would be 2,736. Thus, the assumption of 3,500 riders produced by the model above is still a conservative estimate.
 - c. The following assumptions regarding SF State ridership by campus affiliation and travel by inbound-outbound direction were applied as follows for Year 2020 new SF State ridership during the campus peak hour (assumptions formulated by URS):
 - i. Students (who live off-campus): 20 percent of off-campus students travel during the campus peak hour:
 1. Inbound (travel towards SF State): 100 percent
 2. Outbound (travel away from SF State): 0 percent
 - ii. Faculty/Staff (who live off-campus): 90 percent of off-campus faculty/staff travel during the campus peak hour:
 1. Inbound (travel towards SF State): 100 percent
 2. Outbound (travel away from SF State): 0 percent
 - iii. Hotel Employees: 25 percent of all hotel and employees travel during the campus peak hour:
 1. Inbound (travel towards SF State): 100 percent
 2. Outbound (travel away from SF State): 0 percent

- iv. Visitors: 10 percent of all SF State visitors travel during the campus peak hour. Visitors will not be included in the new ridership calculation since only 63 new visitors are expected in 2020 (statistically insignificant).
 - v. NOTE: SF State affiliates who live on campus or visitors who stay on campus were not factored into the commuter population calculations. The travel patterns of on-campus residents and visitors to off-campus locations are assumed to be irregular as to both timing and destination, and not appropriate for the same type of analysis as regular daily commuters to/from campus.
3. Jeff Tumlin of Nelson/Nygaard provided two transit/shuttle mode split options, taking into consideration work performed by his firm for SF State's parking strategy and the existing conditions mode split analysis:
- a. Two Options:
 - i. Option 1: transit/shuttle = 42 percent
 - ii. Option 2: transit/shuttle = 45 percent
 - b. Option 2 (more conservative) was applied to each of the new peak hour commuter groups (students, staff/faculty, and hotel employees).
 - c. The Intercept Survey sample size in Existing Conditions Analysis only included a small number of non-students (they make up a small percentage of the population).
 - d. However, given the lack of data, other than what is stated in the reported mode share for the population as a whole, a 45 percent transit/shuttle mode split will be applied to each campus population group (students, faculty/staff, and new employees).

BART Campus Peak Hour Assumptions

A separate analysis regarding SF State transit impacts on BART ridership (via the Transbay Tube and the Peninsula) during the campus peak hour was performed. This separate BART analysis was based on the following assumptions:

- 1. For inbound and outbound distributions of new campus-related BART commuters, calculations were based on available zip code data from the Existing Conditions Intercept Survey conducted for the Campus Master Plan. Since the intercept survey only provided the origin splits of existing campus-related BART commuters, it was assumed that future campus-affiliated BART riders are commuters and that they would have similar origin and destination patterns. The directionality splits established that 80 percent of respondents using BART for part of their trip had origins or destinations in the East Bay, 12 percent in the Peninsula, 6 percent in San Francisco, and 2 percent in the North Bay. The origin directionality splits from the intercept survey were applied to the 133 new BART riders (established in Appendix A, Table 3).
- 2. Impact on SF State-bound BART trains traveling via Transbay Tube to the SF State vicinity during the campus peak hour.
 - a. New BART Passengers per train
 - i. 133 new BART riders during the campus peak hour in Year 2020
 - ii. Currently, during the 8:00-8:59 a.m. campus peak hour, there are 23 BART trains traveling to the SF State vicinity via the Transbay Tube (based on the BART timetable)
 - iii. Using the Existing Conditions intercept survey zip code data, it was established that:
 - 1. 80 percent of respondents using BART for part of their trip had origins or destinations in the East Bay.
 - 2. 133 new BART riders x 80 percent East Bay residents = 106 new East Bay BART Riders.
 - 3. Therefore 106 new East Bay BART Riders/ 23 BART trains during the campus peak hour = 5 new BART passengers/train in the peak hour via the Transbay Tube.

- b. BART Capacity per 10-car train= 1,275 passengers. Based on the following BART car assumptions:
 - i. 150 crush load per car (per BART website)
 - ii. 85 percent passenger load standard (assumed to be the same as Muni passenger load factor standard)
 - iii. 150 crush load x 85 percent load standard = 128 passenger capacity per car
 - iv. 10-car BART train x 128 passengers = 1,275 passengers
 - c. New SF State ridership impact on BART: 5 new passengers per train/ 1,275 passenger capacity per 10-train train = 0.004 or 0.4 percent of total passengers per train. Therefore, new SF State BART riders will make up 0.4 percent of total passengers per BART train bound for SF State via the Transbay Tube during in the campus peak hour.
3. Impact on SF State-bound BART trains from the Peninsula during the campus peak hour
- a. New BART Passengers per train
 - i. 133 new BART riders during the campus peak hour in Year 2020.
 - ii. Currently, during the 8:00-8:59 a.m. campus peak hour, there are 4 BART trains traveling to the SF State vicinity from the Peninsula (trains originating from SFO/Millbrae stations) based on the BART timetable)
 - iii. Using the Existing Conditions intercept survey zip code data, it was established that:
 - 1. 12 percent of respondents using BART for part of their trip had origins or destinations in the Peninsula.
 - 2. 133 new BART riders x 12 percent Peninsula residents = 16 new Peninsula BART Riders.
 - 3. Therefore 16 Peninsula BART Riders/ 4 BART trains during the campus peak hour = 4 new BART passengers/train in the peak hour to SF State from the Peninsula
 - b. BART Capacity per 10-car train= 1,275 passengers. Based on the following BART car assumptions:
 - i. 150 crush load per car (per BART website)
 - ii. 85 percent passenger load standard (assumed to be the same as Muni passenger load factor standard)
 - iii. 150 crush load x 85 percent load standard = 128 passenger capacity per car
 - iv. 10-car BART train x 128 passengers = 1,275 passengers
 - c. New SF State ridership impact on BART: 4 new passengers per train/ 1,275 passenger capacity per 10-train train = 0.003 or 0.3 percent of total passengers per train. Therefore, new SF State BART riders will make up 0.3 percent of total passengers per BART train bound for SF State from the Peninsula during in the campus peak hour.