Chabot College
Facilities Master Plan

Draft Transportation Impact Analysis

Prepared for:

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Executive Summary

This report presents the results of the traffic impact analysis conducted for the Chabot College Facilities Master Plan. The purpose of the traffic study was to identify any traffic-related impacts that would result from the proposed Master Plan. The college is located on the northwest corner of Hesperian Boulevard and Depot Road in the City of Hayward. The proposed Master Plan elements involve construction of seven new buildings, demolition of eight existing buildings, and renovation of thirty existing buildings. The Master Plan improvements would lead to traffic increases as they would support an increase in the population of students and faculty. The current enrollment at Chabot College is 15,250 students, plus 494 college faculty. The Master Plan is intended to accommodate a future enrollment capacity of 17,500 students and 544 college faculty by 2015, which is a 14.6 percent increase in the existing student and faculty population over the next 10 years. Accordingly, the campus parking facilities would provide 2,833 parking spaces, an increase of 341 parking spaces.

According to the proposed site plan, the project would eliminate one driveway on Hesperian Boulevard and one driveway on Depot Road, resulting in three access driveways on Hesperian Boulevard and three on Depot Road. A new ring road is proposed that would improve on-site circulation by linking the parking lots.

Project Trip Estimates and Traffic Volumes

Driveway counts at the college were conducted in May of 2005. The college projections for 2015 show a 14.6 percent increase in student and faculty population compared to the existing student and faculty population. New trips generated by the Facilities Master Plan project were estimated by first calculating the existing number of vehicular trips per college student and faculty based on the driveway counts and a total student plus faculty population of 15,744. Using this approach, Chabot College currently generates 0.104 trips per person during the AM peak hour and 0.056 trips per person during the PM peak hour. The existing trip generation rates were then used to determine the number of new peak hour trips generated by the project based on a new student plus faculty population of 18,044. Based on an increase of 2,250 students and 50 college faculty over the next 10 years, the project would generate 239 new AM peak hour trips and 128 new PM peak hour trips by the year 2015. Based on the existing inbound/outbound splits, the project would produce 186 inbound trips and 53 outbound trips during the AM peak hour, and 63 inbound trips and 65 outbound trips during the PM peak hour.

Project trips were added to the 2015 No Project traffic volumes to represent future 2015 traffic conditions with implementation of the project (hereafter called *2015 project traffic volumes*). The 2015 project traffic volumes were then reassigned to the local roadways based on the proposed new driveway locations and parking lot configuration.

Project Intersection Analysis

The results of the intersection level of service analysis are summarized in Table ES-1. The results show that, measured against the City of Hayward level of service standards, the following signalized study intersection would operate at an unacceptable level of service under 2015 Project conditions:

- Hesperian Boulevard and Winton Avenue – LOS E during the AM and PM peak hours

Hesperian Boulevard and Winton Avenue. The estimated future growth in the study area over the next 10 years alone would worsen the level of service at the intersection of Hesperian Boulevard and Winton Avenue from an acceptable LOS D to an unacceptable LOS E during the PM peak hour of traffic. Although the project would contribute to the worsening of level of service by adding 2.5 seconds of delay to the LOS E intersection, this is not considered a significant project impact and no project sponsored improvements would be necessary.

The level of service reported for each unsignalized driveway is based on the average total delay at the intersection. The results show that the following unsignalized study intersection (college driveway) would operate at an unacceptable level of service under 2015 Project conditions:

- Hesperian Boulevard and Chabot Court/DW #2 – LOS F during the AM and PM peak hours

Hesperian Boulevard and Chabot Court/DW #2. The average total delay at this driveway would worsen compared to existing and 2015 No Project conditions. This is because the Facilities Master Plan would eliminate the Chabot driveway #3, and the outbound volumes from the existing driveway #3 would instead be using driveway #2. Thus, driveway #2 would operate at LOS F due to the excessive delays that the outbound left-turn movement would experience as a result of the opposing through and left-turn volumes on Hesperian Boulevard. The outbound left-turn movement at this driveway would have three opposing movements, making it difficult for vehicles to turn left from the college campus.

Although this unsignalized driveway would operate at LOS F under 2015 project conditions, the excessive vehicle delay is an operational issue only and is not considered a significant adverse traffic impact according to City of Hayward and CEQA guidelines. The City understands that it is common for unsignalized intersections located along major corridors such as Hesperian Boulevard to operate at LOS E or F due to excessive vehicle delays on the minor street approaches. The City of Hayward has not established significant impact criteria relative to unsignalized intersections and, thus, does not consider poor levels of service at unsignalized intersections as a result of added project traffic a significant impact.

Also important to note is that there are signalized intersections both north and south of the Chabot College driveway #2 that would provide gaps in the flow of traffic on Hesperian Boulevard. These gaps would eventually allow vehicles to safely complete the left-turn movement. In order to improve the operation of the outbound left-turn from the campus, a safe “refuge” that provides vehicle storage within the existing median on Hesperian Boulevard could be included in the design of the new driveway in order to facilitate a two-step merging process. This would significantly improve egress and the overall operation of the driveway, particularly during the peak traffic periods.

Table ES-1
Intersection Level of Service Summary

Study Number		Peak Hour	Existing Ave. Delay [1]	Existing LOS [1]	2015 No Project Ave. Delay [1]	2015 No Project LOS [1]	2015 Project Conditions Ave. Delay [1]	2015 Project Conditions LOS [1]	2015 Project Conditions Incr. In Crit. Delay	2025 Cumulative Ave. Delay [1]	2025 Cumulative LOS [1]
1	Hesperian Bl / Winton Av	AM	57.7	E	47.8	E	47.2	E	0.0	74.2	F
		PM	29.3	D	44.3	E	46.1	E	2.5	74.9	F
2	Hesperian Bl / Southland Dr	AM	15.0	B	15.2	C	15.2	C	0.6	16.3	C
		PM	17.3	C	21.1	C	21.5	C	0.6	38.5	D
3	Hesperian Bl / Depot Rd	AM	22.4	C	23.3	C	24.9	C	3.0	30.8	D
		PM	17.4	C	18.6	C	18.9	C	1.5	21.1	C
4	Hesperian Bl / WB SR 92 Ramps	AM	8.1	B	16.5	C	16.5	C	0.2	23.5	C
		PM	3.5	A	16.1	C	16.1	C	0.2	17.5	C
5	Hesperian Bl / EB SR 92 Ramps	AM	9.7	B	9.8	B	10.3	B	0.7	15.1	B
		PM	17.6	C	20.8	C	21.4	C	1.1	28.5	D
6	Hesperian Bl / Sleepy Hollow Av	AM	8.6	B	8.8	B	8.6	B	-0.2	8.8	B
		PM	9.3	B	9.8	B	9.7	B	0.0	10.3	B
7	Hesperian Bl / Tennyson Rd	AM	18.7	C	19.1	C	19.1	C	0.0	20.1	C
		PM	23.5	C	26.9	D	27.2	D	0.6	34.3	D
8	Hesperian Bl / Turner Ct - DW#1	AM	10.9	B	10.8	B	11.4	B	0.9	11.5	B
		PM	7.3	B	7.4	B	7.6	B	0.0	7.7	B
9	Hesperian Bl / Chabot Ct - DW#2 [2]	AM	1.5	A	1.4	A	overflow	F	---	overflow	F
		PM	72.2	F	158.7	F	overflow	F	---	overflow	F
10	Hesperian Bl / Chabot DW#3 - LotA [2,3]	AM	103.7	F	99.7	F	n/a	n/a	n/a	n/a	n/a
		PM	overflow	F	overflow	F	n/a	n/a	n/a	n/a	n/a
11	Hesperian Bl / Chabot DW#4 - LotH	AM	10.2	C	9.0	B	27.4	D	---	63.1	F
		PM	6.1	B	10.7	C	18.2	C	---	28.9	D
12	Chabot DW#5 - LotG / Depot Rd [3]	AM	0.6	A	0.5	A	n/a	n/a	n/a	n/a	n/a
		PM	0.6	A	0.6	A	n/a	n/a	n/a	n/a	n/a
13	Chabot DW#6 - LotF / Depot Rd	AM	0.3	A	0.3	A	0.9	A	---	1.0	A
		PM	0.5	A	0.5	A	1.2	A	---	1.3	A
14	Chabot DW#7 - LotE / Depot Rd	AM	17.4	C	20.3	D	19.7	C	---	28.5	D
		PM	5.4	B	6.3	B	6.6	B	---	7.6	B
15	Chabot DW#8 - LotD / Depot Rd	AM	0.1	A	0.1	A	0.1	A	---	0.1	A
		PM	0.2	A	0.2	A	0.2	A	---	0.2	A

Notes:

Study intersections 9 through 15 are unsignaliized driveways.

[1] The average delay and corresponding level of service reported for each signalized intersection are based on the average stopped delay at the intersection. The average delay and corresponding level of service reported for each unsignalized driveway are based on the average total delay at the driveway.

[2] "Overflow" = TRAFFIX is unable to calculate the average delay at these intersections due to oversaturated conditions.

[3] These driveways would not exist in the future with implementation of the Chabot College Facilities Master Plan.

Drivers also would have the option to either utilize the adjacent signalized driveway #1, which would be accessible by driving through the reconfigured parking lot B, or to turn right out of the driveway and make a u-turn at the intersection of Hesperian Boulevard and Depot Road. Also important to note is that the excessive delay for the westbound left-turn movement would only occur during the peak traffic periods and would not present a problem the remainder of the day.

Signal Warrant Analysis

Peak hour signal warrant checks (*Caltrans Traffic Manual*, Chapter 9, Warrant 11) were performed for the unsignalized Chabot College driveways to determine whether signalization would be justified on the basis of 2015 Project peak hour volumes. The analysis revealed that the unsignalized intersection of Hesperian Boulevard and Chabot Court/College DW#2 would warrant signalization. This is because the Chabot driveway #3 will be eliminated, according to the Facilities Master Plan, and the outbound volumes from driveway #3 would then use driveway #2. No other unsignalized driveway would warrant a traffic signal based on 2015 Project AM and PM peak hour volumes. If signalized, this driveway would operate at LOS B during both the AM and PM peak hours of traffic.

The signal warrant was checked at the request of the City of Hayward. Although this unsignalized driveway would warrant a signal based on 2015 project traffic volumes, meeting the Caltrans signal warrant is not considered a significant adverse traffic impact according to CEQA guidelines. In addition, according to Roxy Carmichael-Hart, the City's senior transportation planner, the City would have no desire to construct a traffic signal at this driveway location due to its close proximity (approximately 400 feet) to the signalized intersection of Hesperian Boulevard and Turner Court/DW #1. It would be difficult to coordinate the two signals.

Site Access and On-Site Circulation

According to the proposed site plan, the Chabot College Facilities Master Plan would eliminate one driveway on Hesperian Boulevard and one driveway on Depot Road, resulting in three full access driveways on Hesperian Boulevard and three on Depot Road. Overall, the site plan exhibits good on-site circulation for vehicles. A new continuous ring road is proposed that would improve on-site circulation by linking all of the parking lots on the college campus. Based on the site plan, the parking would be reconfigured such that the ring road cuts through the middle of parking lots A/B and lots G/H. The entire expanse of the ring road ranges in width between a minimum of 22 feet to a maximum of 30 feet.

The two driveways connecting Hesperian Boulevard to the new ring road would have throat lengths of between approximately 100 and 150 feet. Although limited, these reconfigured driveways would provide stacking for approximately 4 to 6 outbound vehicles. It is recommended that stop signs be placed on the ring road in both directions at both driveway locations in order to provide a free movement for inbound traffic. A free inbound movement would be necessary to reduce the likelihood of inbound traffic backing up onto Hesperian Boulevard during the peak traffic periods. This is especially important since there are no dedicated southbound right-turn lanes on Hesperian Boulevard. Stop signs on the ring road also would help to meter the flow of outbound traffic. The on-site traffic control devices must be clearly marked such that there is no driver confusion. It needs to be obvious to inbound drivers that they have a free movement. Additionally, the new on-site T-intersections must be designed such that vehicles that are stopped on the ring road can clearly see vehicles entering the site. These on-site traffic control recommendations also should apply to the two driveways connecting Depot Road to the ring road, which would have almost no stacking space for outbound vehicles.

According to the site plan, only the small 37-space parking lot located adjacent to the Broadcast building contains a dead-end drive aisle. There are no other dead-end drive aisles on the entire site. Based on the location of this parking lot, which is isolated from the other parking areas, its use most likely will be limited to faculty and staff parking only.

Truck Access and Circulation

An analysis was conducted to determine the adequacy of driveway access and on-site circulation along the new ring road at the Social Science building location for the truck category SU 30, which includes buses, garbage trucks and other single unit trucks. Based on the analysis, the driveway and drive aisle widths would be adequately wide for the public bus routes to continue to serve the campus. The curb radii on-site would be sufficiently large to allow buses and other large trucks, including emergency vehicles, to safely turn into and out of the site. Included in the new site plan design is a bus loading area (duckout) located adjacent to the campus buildings. This would be an improvement over existing conditions, since currently the bus duckout is located adjacent to parking lot A.

On-Site Parking

The college campus currently provides 2,492 parking spaces. According to a parking space occupancy survey completed for this study in April of 2005, the peak parking demand on a typical weekday is approximately 2,195 spaces, or 88 % of the total 2,492 parking spaces. The peak parking period occurs during the AM. The Facilities Master Plan will provide a total of 2,833 parking spaces in the campus' parking lots. Based on the design goal of 1 space per 6.2 students, the forecast enrollment of 17,500 students at Chabot College would create a need for 2,823 spaces. The planned 2,833 parking spaces would represent a ratio of 1 space per 6.18 students, which exceeds the design goal. A detailed parking analysis for Chabot College is contained in Appendix E.

Other Transportation Issues

The proposed Chabot College Facilities Master Plan project would not have a significant adverse effect on existing transit, pedestrian, or bicycle facilities in the study area.

1. Introduction

This report presents the results of the traffic impact analysis conducted for the Chabot College Facilities Master Plan. The purpose of the traffic study was to identify any traffic-related impacts that would result from the proposed Master Plan. The college is located on the northwest corner of Hesperian Boulevard and Depot Road in the City of Hayward. The proposed Master Plan elements involve construction of seven new buildings, demolition of eight existing buildings, and renovation of thirty existing buildings. The Master Plan improvements would lead to traffic increases as they would support an increase in the population of students and faculty. The current enrollment at Chabot College is 15,250 students, plus 494 college faculty. The Master Plan is intended to accommodate a future enrollment capacity of 17,500 students and 544 college faculty by 2015, which is a 14.6 percent increase in the existing student and faculty population over the next 10 years. Accordingly, the campus parking facilities would provide 2,833 parking spaces, an increase of 341 parking spaces.

According to the proposed site plan, the project would eliminate one driveway on Hesperian Boulevard and one driveway on Depot Road, resulting in three access driveways on Hesperian Boulevard and three on Depot Road. A new ring road is proposed that would improve on-site circulation by linking the parking lots. The project site and the surrounding study area are shown on Figure 1. The existing and proposed campus plans are show in Figures 2 and 3.

Scope of Study

This study was conducted for the purpose of identifying the potential traffic impacts related to the increase in student and faculty population due to the Chabot College Facilities Master Plan. The impacts of the project were evaluated following the standards and methodologies set forth by the City of Hayward. The following study intersections were analyzed for potential impacts:

Study Intersections

Hesperian Boulevard and Winton Avenue
Hesperian Boulevard and Southland Drive
Hesperian Boulevard and Depot Road

Figure 1
Site Location and Study Intersections

Figure 2
Existing Chabot Facilities

Figure 3
Proposed Chabot Facilities Plan

Hesperian Boulevard and Westbound SR 92 Ramps
Hesperian Boulevard and Eastbound SR 92 Ramps
Hesperian Boulevard and Sleepy Hollow Avenue
Hesperian Boulevard and Tennyson Road
Hesperian Boulevard and Turner Court/Chabot DW 1 – Lot B
Hesperian Boulevard and Chabot Court/Chabot DW 2 – Lot A (one-way) *
Hesperian Boulevard and Chabot DW 3 – Lot A (one-way) *
Hesperian Boulevard and Chabot DW4 – Lots G and H *
Chabot DW 5 (Lot G) and Depot Road *
Chabot DW 6 (Lots F and G) and Depot Road *
Chabot DW 7 (Lots E and F)/Dodge Street and Depot Road *
Chabot DW 8 (Lots D and E) and Depot Road *

An asterisk (*) denotes an unsignalized intersection.

In summary, the study includes an analysis of 8 signalized and 7 unsignalized intersections in the vicinity of the project site. Traffic conditions at the intersections were analyzed for the weekday AM and PM peak hours of traffic. The AM peak hour of traffic is generally between 7:00 and 9:00 AM, and the PM peak hour is typically between 4:00 and 6:00 PM. It is during these periods that the most congested traffic conditions occur on an average day.

Traffic conditions were evaluated for the following scenarios:

Scenario 1: *Existing Conditions.* Existing traffic volumes were obtained from recent traffic counts.

Scenario 2: *2015 No Project Conditions.* Future 2015 traffic volumes without implementation of the Facilities Master Plan project were estimated by applying an annual growth rate of 1 percent to existing traffic volumes not associated with Chabot College. According to the City of Hayward staff, there are no approved or pending projects in the study area. Thus, the City staff suggested that applying an annual growth rate of 1 percent would be acceptable for the purpose of this traffic study to account for the development of potential projects over the next 10 years. This scenario assumes no increase in student enrollment or faculty in the forecast, so no traffic increases associated with Chabot College would be expected.

Scenario 3: *2015 Project Conditions.* New peak hour trips generated by the Master Plan project were estimated based on the existing AM and PM peak hour trip generation rates at Chabot College. The existing trip generation was based on the current student plus faculty population at the college and existing driveway counts conducted in April of 2005. The existing trip generation rates of 0.104 trips per person during the AM peak hour and 0.056 trips per person during the PM peak hour were applied to the forecasted maximum increase in population of 2,250 students and 50 college faculty over the next 10 years. The resulting project trips were added to 2015 No Project traffic volumes to represent future 2015 traffic conditions with implementation of the project (hereafter called *2015 project traffic volumes*). The 2015 project traffic volumes were then reassigned to the surrounding roadway network based on the proposed driveway locations.

Scenario 4: *2025 Cumulative Conditions.* Additional trips generated by potential future developments in the project area beyond 2015 were estimated by applying an annual growth rate of 1 percent to 2015 No Project volumes, and then adding the Chabot College project trips generated by an increase in population of 2,250 students and 50 college faculty. No increase in student or faculty population is expected to occur at Chabot College beyond 2015. The resulting 2025 cumulative traffic volumes were then assigned to the roadways based on the driveway locations proposed by the Master Plan project.

Methodology

This section presents the methods used to determine the traffic conditions for each scenario described above. It includes descriptions of the data requirements, the analysis methodologies, and the applicable level of service standards.

Data Requirements

The data required for the analysis were obtained from new traffic counts, field observations, ACTransit, and the City of Hayward. The following data were collected from these sources:

- Existing traffic volumes
- Lane configurations
- Bus route data
- Planned roadway improvements

Analysis Methodologies and Level of Service Standards

Traffic conditions at the study intersections were evaluated using level of service (LOS). *Level of Service* is a qualitative description of operating conditions ranging from LOS A, or free-flow conditions with little or no delay, to LOS F, or jammed conditions with excessive delays. The various analysis methods are described below.

Signalized Intersections

All of the signalized study intersections are located in the City of Hayward and are therefore subject to the City of Hayward Level of Service standards. The City of Hayward level of service standard for signalized intersections is LOS D or better. The level of service methodology used for this study is TRAFFIX, based on the *1994 Highway Capacity Manual* (HCM) operations method for signalized intersections. The 1994 HCM method evaluates signalized intersection operations on the basis of average stopped delay time for all vehicles at the intersection. Thus, the average delay and corresponding level of service reported for each signalized intersection analyzed for this traffic study are based on the average stopped delay at the intersection. The correlation between average stopped delay and level of service is shown in Table 1.

Table 1
Signalized Intersection Level of Service Definitions

Level of Service	Description	Average Stopped Delay Per Vehicle (Sec.)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	5.0 or less
B	Operations with low delay occurring with good progression and/or short cycle lengths.	5.1 to 15.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	15.1 to 25.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	25.1 to 40.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	40.1 to 60.0
F	Operation with delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths.	Greater than 60.0

Source: Transportation Research Board, *Highway Capacity Manual, Special Report 209, 1994* , pp 9-4, 5.

Unsignalized Intersections

The majority of the college driveways are presently unsignalized. Level of service for the unsignalized intersections was determined using TRAFFIX based on the *1994 Highway Capacity Manual* (HCM) methodology. The 1994 HCM methodology calculates unsignalized intersection operations on the basis of average total delay time for all vehicles at the intersection. Total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line, and includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. Thus, the average delay and corresponding level of service reported for each unsignalized intersection (driveway) analyzed for this traffic study are based on the average total delay at the intersection. The correlation between average total delay and level of service is shown in Table 2.

The need for signalization of unsignalized intersections is assessed based on the Peak Hour Volume Warrant (Warrant #11) described in the *Caltrans Traffic Manual*. This method provides an indication whether vehicular peak hour volumes are, or would be, sufficient to justify installation of a traffic signal. A signal warrant was checked for each unsignalized Chabot College driveway location.

Table 2
Unsignalized Intersection Level of Service Definitions

Level of Service	Description of Operations	Average Total Delay Per Vehicle (Sec.)
A	Little or no traffic delay	5.0 or less
B	Good progression and short cycle lengths	5.1 to 10.0
C	Fair progression and longer cycle lengths	10.1 to 20.0
D	Some unfavorable progression and long traffic delays	20.1 to 30.0
E	Poor progression and very long traffic delays	30.1 to 45.0
F	Extreme traffic delays unacceptable to most drivers	Greater than 45.0

Source: Transportation Research Board, *Highway Capacity Manual (1994), Special Report 209.*

Intersection Operations

The operations analysis is based on vehicle queuing for high-demand turning movements at signalized intersections. The basis of the analysis is as follows: (1) the TRAFFIX intersection analysis software is used to estimate the 95th percentile maximum number of queued vehicles per signal cycle for a particular movement; (2) the estimated maximum number of vehicles in the queue is translated into a queue length, assuming 25 feet per vehicle; and (3) the estimated maximum queue length is compared to the existing or planned available storage capacity for the movement. This analysis provides a basis for estimating future storage requirements at intersections.

Report Organization

The remainder of this report is divided into four chapters. Chapter 2 describes existing conditions in terms of the existing roadway network, transit service, and existing bicycle and pedestrian facilities. Chapter 3 presents the intersection operations under 2015 conditions without implementation of the Facilities Master Plan project. Chapter 4 describes the method used to estimate project traffic and any project-related impacts on the transportation system. Chapter 5 presents the conclusions of the transportation analysis.

2.
Existing Conditions

This chapter describes the existing conditions for all the major transportation facilities in the vicinity of the site, including the roadway network, transit service, and bicycle and pedestrian facilities.

Existing Roadway Network

Regional access to the project site is provided via I-880 and SR 92. Local access to the site is provided by Hesperian Boulevard and Depot Road. These facilities are described below.

Interstate 880 (I-880) is a north/south freeway providing regional access from Oakland to San Jose, where it becomes SR 17. I-880 is an eight-lane freeway with six-mixed flow lanes and two High Occupancy Vehicle (HOV) lanes south of SR 92. I-880 widens to ten-lanes north of SR 92 with eight mixed-flow lanes and two HOV lanes. Full interchanges are provided at Winton Avenue, SR 92 and Tennyson Road.

State Route 92 (SR 92) begins at its junction with State Route 1 and State Route 35 in Half Moon Bay, and extends northeast across San Francisco Bay (San Mateo Bridge) and into Hayward. Within the City of Hayward, SR 92 changes designation to Jackson Street at its intersection with I-880 and then Foothill Boulevard at its intersection with Mission Boulevard. SR 92 provides access to Chabot College via a full interchange at Hesperian Boulevard.

Hesperian Boulevard is a six-lane major arterial with a center median in the vicinity of the project site. Hesperian Boulevard begins in San Leandro as a transition from Bancroft Avenue, and extends southward through Hayward and into Union City becoming Union City Boulevard. Left-turn pockets provide protected left turns at the major intersections along Hesperian Boulevard. Crosswalks with pedestrian push buttons and signal heads also are provided at the major intersections along Hesperian Boulevard. There are no bike lanes on Hesperian Boulevard. Access to Chabot College is provided via four driveways on Hesperian Boulevard.

Depot Road is an east-west undivided minor arterial with one lane of travel in the westbound direction and two lanes of travel in the eastbound direction. Depot Road begins at Cabot Boulevard in an industrial area of Hayward, and extends eastward where it transitions into Cathy Way at its intersection with Hesperian Boulevard. Crosswalks are provided at one Chabot College driveway on Depot Road and at

Hesperian Boulevard. There are no bike lanes on Depot Road. Access to Chabot College is provided via four driveways on Depot Road.

Existing Bicycle and Pedestrian Facilities

According to the City of Hayward Bicycle Master Plan, the number of bicycle facilities in the immediate project vicinity are limited and intermittent. Class II bike lanes are provided on Cathy Way between Hesperian Boulevard and Calaroga Avenue, Tennyson Road south of Chabot College, and Calaroga Avenue east of Chabot College. Class II bike lanes are proposed on Turner Court. According to the Bicycle Master Plan, Class III bike routes are proposed near the project site on the following roadways:

- Depot Road west of Hesperian Boulevard
- Southland Drive east and west of Hesperian Boulevard
- Winton Avenue east of Southland Drive and west of Clawiter Road
- Hesperian Boulevard north of La Playa Drive
- La Playa Drive east of Hesperian Boulevard
- Industrial Boulevard and Clawiter Road

The proposed bike lanes and bike routes would greatly improve the connectivity of the currently limited network of bicycle facilities. The existing and proposed bicycle facilities are shown on Figure 4.

Pedestrian facilities in the study area consist primarily of a continuous network of sidewalks along the previously described local roadways and throughout the Chabot College campus. Crosswalks with pedestrian push buttons and signal heads are provided at the major intersections in the project area. Existing pedestrian traffic in the project area primarily is generated by Chabot College students and local residents walking to and from Chabot College, bus stops, Rancho Arroyo Park, and nearby retail centers such as the Southland Mall.

Existing Transit Service

Existing transit service to the study area is provided by Alameda-Contra Costa Transit District (ACTransit). Chabot College is served directly by local bus lines 92, 97 and M. These bus lines stop on the Chabot College campus via the existing one-way loop road off of Hesperian Boulevard and provide service to nearby BART stations, retail centers, CSU Hayward, and Foster City and San Mateo via the San Mateo Bridge. A bus duckout is located on the Chabot College campus adjacent to parking lot A for loading and unloading of passengers.

Bus route information was obtained from the ACTransit website. The most recent boardings and alightings count data for these bus lines is for Spring 2005 and was provided by an ACTransit representative. It is reasonable to assume that 100 percent of the boardings and alightings that occur at the Chabot College Lot A bus stop are attributable to students and faculty. For the nearby Turner Court and Depot Road/Cathy Way bus stops, it is assumed that 50 percent of the riders are students and Chabot College faculty. The three local ACTransit bus routes are described below and shown on Figure 5.

Figure 4
Existing Bicycle Facilities

Figure 5
Existing Transit Service

ACTransit Bus Routes

The *92 line* provides service between California State University Hayward and the South Hayward Bay Area Rapid Transit (BART) station, with 15-minute headways during commute hours. This line operates along Hesperian Boulevard, Tennyson Road, Southland Drive and Winton Avenue near the project site. Based on ACTransit counts, approximately 235 Chabot College students and faculty currently use the 92 line on an average weekday.

The *97 line* provides service between the Bay Fair BART station and the Union City BART station, with 20-minute headways during commute hours. This line operates along Hesperian Boulevard. Based on ACTransit counts, approximately 130 Chabot College students and faculty currently use the 97 line on an average weekday.

The *M line* provides transbay service via the San Mateo Bridge between the Castro Valley BART station and Hillsdale Mall in San Mateo, with 30-minute headways during commute hours. This line operates along Hesperian Boulevard, Winton Avenue and SR 92 (San Mateo Bridge). Based on ACTransit counts, approximately 30 Chabot College students and faculty currently use the M line on an average weekday.

Based on the most recent boardings and alightings data provided by ACTransit for bus lines 92, 97 and M, it is estimated that about 395 Chabot College students and faculty currently use these bus lines on an average weekday. Based on a current enrollment of 15,250 students and 494 college faculty, this equates to approximately 2.5 percent of the total college population that currently utilizes ACTransit service.

Existing Intersection Lane Configurations

The existing lane configurations at the study intersections were collected in the field. The existing intersection lane configurations are shown on Figure 6.

Existing Traffic Volumes

Existing AM and PM peak hour traffic volumes were obtained from new manual turning-movement counts at all of the study intersections. The existing peak hour intersection volumes are shown on Figure 7. Figure 8 shows the existing driveway volumes only. The traffic count data are included in Appendix A.

Existing Intersection Levels of Service

The results of the intersection level of service analysis under existing conditions are summarized in Table 3. The results show that, measured against the City of Hayward level of service standards, the following signalized study intersection currently operates at an unacceptable level of service:

- Hesperian Boulevard and Winton Avenue – LOS E during the AM peak hour

Figure 6
Existing Lane Configurations

Figure 7
Existing Traffic Volumes

Figure 8
Existing Driveway Counts

Table 3
Existing Intersection Levels of Service

Study Number	Intersection	Peak Hour	Ave. Delay [1]	LOS [1]
1	Hesperian Bl / Winton Av	AM	57.7	E
		PM	29.3	D
2	Hesperian Bl / Southland Dr	AM	15.0	B
		PM	17.3	C
3	Hesperian Bl / Depot Rd	AM	22.4	C
		PM	17.4	C
4	Hesperian Bl / WB SR 92 Ramps	AM	8.1	B
		PM	3.5	A
5	Hesperian Bl / EB SR 92 Ramps	AM	9.7	B
		PM	17.6	C
6	Hesperian Bl / Sleepy Hollow Av	AM	8.6	B
		PM	9.3	B
7	Hesperian Bl / Tennyson Rd	AM	18.7	C
		PM	23.5	C
8	Hesperian Bl / Turner Ct - DW#1	AM	10.9	B
		PM	7.3	B
9	Hesperian Bl / Chabot Ct - DW#2 [2]	AM	1.5	A
		PM	72.2	F
10	Hesperian Bl / Chabot DW#3 - LotA [2]	AM	103.7	F
		PM	overflow	F
11	Hesperian Bl / Chabot DW#4 - LotH	AM	10.2	C
		PM	6.1	B
12	Chabot DW#5 - LotG / Depot Rd	AM	0.6	A
		PM	0.6	A
13	Chabot DW#6 - LotF / Depot Rd	AM	0.3	A
		PM	0.5	A
14	Chabot DW#7 - LotE / Depot Rd	AM	17.4	C
		PM	5.4	B
15	Chabot DW#8 - LotD / Depot Rd	AM	0.1	A
		PM	0.2	A

Notes:
Study intersections 9 through 15 are unsignaliized driveways.
[1] The average delay and corresponding level of service reported for each signalized intersection are based on the average stopped delay at the intersection.
The average delay and corresponding level of service reported for each unsignalized driveway are based on the average total delay at the intersection.
[2] "Overflow" = TRAFFIX is unable to calculate the average delay at these intersections due to oversaturated conditions.

The level of service reported for each unsignalized driveway is based on the average total delay at the intersection. The results show that, measured against the City of Hayward level of service standards, the following unsignalized study intersections (driveways) currently operate at an unacceptable level of service:

- Hesperian Boulevard and Chabot Court/DW #2 – LOS F during the PM peak hour
- Hesperian Boulevard and Chabot DW #3 – LOS F during the AM and PM peak hours

The unsignalized intersections listed above currently operate at LOS F due to the excessive delays that the left-turn movements from the college campus and Chabot Court experience as a result of the opposing traffic on Hesperian Boulevard.

The level of service calculation sheets are included in Appendix C.

Signal Warrant Analysis

Peak hour signal warrant checks (*Caltrans Traffic Manual*, Chapter 9, Warrant 11) were performed for the unsignalized Chabot College driveways to determine whether signalization would be justified on the basis of existing peak hour volumes. The analysis revealed that the unsignalized intersection of Hesperian Boulevard and Chabot College DW#3 currently warrants signalization based on existing AM and PM peak hour volumes. No other unsignalized driveway currently warrants a traffic signal. This driveway would not exist under project conditions, according to the Master Plan. The signal warrant sheets are included in Appendix D.

Observed Existing Traffic Conditions

Traffic conditions were observed in the field in order to identify existing operational deficiencies and to confirm the accuracy of calculated levels of service. The purpose of this effort was (1) to identify any existing traffic problems that may not be directly related to intersection level of service, and (2) to identify any locations where the level of service calculation does not accurately reflect level of service in the field.

The majority of the study intersections operated well during both the AM and PM peak hours of traffic, and the level of service analysis appears to accurately reflect actual existing traffic conditions.

Existing Chabot College Trip Generation

The total existing peak hour trip generation of Chabot College was determined based on counts at the college driveways conducted in May of 2005. According to driveway counts, the college is generating 1,639 trips during the AM peak hour and 877 trips during the PM peak hour. Of the 1,639 AM peak hour trips, 1,284 trips (about 78%) are inbound and 355 trips (about 22%) are outbound. During the PM peak hour, 434 trips (about 49%) of the 877 total trips are inbound and 443 trips (about 51%) are outbound.

Chabot College Parking

The college campus currently provides 2,492 parking spaces. According to a parking space occupancy survey completed for this study in April of 2005, the peak parking demand on a typical weekday is approximately 2,195 spaces, or 88 % of the total 2,492 parking spaces. The peak parking period occurs during the AM. During the PM peak hour, the college parking lots are at approximately 75 percent capacity. Thus, the amount of parking currently provided by the campus appears to be adequate, although the spaces closest to the campus fill very quickly.

3.
2015 No Project Conditions

This chapter describes future 2015 traffic conditions without implementation of the Chabot College Facilities Master Plan project, and describes the procedure used to determine 2015 No Project traffic volumes.

Future Roadway Network

Based on data provided by the City of Hayward, the transportation network under 2015 No Project conditions (including roadways and intersection lane configurations) would be the same as that described under existing conditions with the following exceptions:

Winton Avenue at Hesperian Boulevard. The existing westbound right-turn lane at this intersection will be converted into a shared through/right-turn lane.

SR 92 Westbound Ramps at Hesperian Boulevard. A new westbound SR 92 loop off-ramp will be constructed to replace the existing westbound diagonal off-ramp to northbound Hesperian Boulevard. The new loop ramp will have two left-turn lanes and one right-turn lane.

SR 92 Eastbound Ramps at Hesperian Boulevard. The existing shared through/left-turn lane on the SR 92 off-ramp will be converted into a separate left-turn lane, and a new shared through/right-turn lane will be constructed.

2015 No Project Traffic Volumes

Future 2015 traffic volumes without implementation of the Chabot College Master Plan project were estimated by applying an annual growth rate of 1 percent to existing traffic volumes not associated with Chabot College. An annual growth rate of 1 percent is commonly used to estimate traffic growth resulting from future developments. This approach to determine potential growth resulting from future developments in the project area has been reviewed and approved by City of Hayward staff. According to City of Hayward staff, there are no approved projects in the study area. Thus, the 1 percent annual growth

was used to account for approval of any projects in the future. The 2015 No Project scenario assumes no enrollment growth in the forecast, so no traffic increases associated with Chabot College would be expected. 2015 No Project peak hour traffic volumes are shown on Figure 9. Traffic volumes for all components of traffic are tabulated in Appendix B.

2015 No Project Intersection Levels of Service

The results of the intersection level of service analysis under 2015 No Project conditions are summarized in Table 4. The results show that, measured against the City of Hayward level of service standards, the following signalized study intersection would operate at an unacceptable level of service under 2015 No Project conditions:

- Hesperian Boulevard and Winton Avenue – LOS E during the AM and PM peak hours

Thus, the estimated future growth in the study area over the next 10 years alone would worsen the level of service at the intersection of Hesperian Boulevard and Winton Avenue from an acceptable LOS D to an unacceptable LOS E during the PM peak hour of traffic.

The level of service reported for each unsignalized driveway is based on the average total delay at the intersection. The results show that, measured against the City of Hayward level of service standards, the following unsignalized study intersections (college driveways) would operate at an unacceptable level of service under 2015 No Project conditions:

- Hesperian Boulevard and Chabot Court/DW #2 – LOS F during the PM peak hour
- Hesperian Boulevard and Chabot DW #3 – LOS F during the AM and PM peak hours

The unsignalized intersections listed above would operate at LOS F due to the excessive delays that the left-turn movements would experience as a result of the opposing through and left-turn volumes on Hesperian Boulevard. Both unsignalized intersections have three opposing movements, making it difficult for vehicles to turn left from the college campus or side street (Chabot Court).

The level of service calculation sheets are included in Appendix C.

Signal Warrant Analysis

Peak hour signal warrant checks (*Caltrans Traffic Manual*, Chapter 9, Warrant 11) were performed for the unsignalized Chabot College driveways to determine whether signalization would be justified on the basis of 2015 No Project peak hour volumes. The analysis revealed that the unsignalized intersection of Hesperian Boulevard and Chabot College DW#3 would warrant signalization. No other unsignalized driveway would warrant a traffic signal based on 2015 No Project AM and PM peak hour volumes. The signal warrant sheets are included in Appendix D.

Figure 9
2015 No Project Traffic Volumes

Table 4
Intersection Levels of Service Under 2015 No Project Conditions

Study Number	Intersection	Peak Hour	Existing Ave. Delay [1]	Existing LOS [1]	2015 No Project Ave. Delay [1]	2015 No Project LOS [1]
1	Hesperian Bl / Winton Av	AM	57.7	E	47.8	E
		PM	29.3	D	44.3	E
2	Hesperian Bl / Southland Dr	AM	15.0	B	15.2	C
		PM	17.3	C	21.1	C
3	Hesperian Bl / Depot Rd	AM	22.4	C	23.3	C
		PM	17.4	C	18.6	C
4	Hesperian Bl / WB SR 92 Ramps	AM	8.1	B	16.5	C
		PM	3.5	A	16.1	C
5	Hesperian Bl / EB SR 92 Ramps	AM	9.7	B	9.8	B
		PM	17.6	C	20.8	C
6	Hesperian Bl / Sleepy Hollow Av	AM	8.6	B	8.8	B
		PM	9.3	B	9.8	B
7	Hesperian Bl / Tennyson Rd	AM	18.7	C	19.1	C
		PM	23.5	C	26.9	D
8	Hesperian Bl / Turner Ct - DW#1	AM	10.9	B	10.8	B
		PM	7.3	B	7.4	B
9	Hesperian Bl / Chabot Ct - DW#2 [2]	AM	1.5	A	1.4	A
		PM	72.2	F	158.7	F
10	Hesperian Bl / Chabot DW#3 - LotA [2]	AM	103.7	F	99.7	F
		PM	overflow	F	overflow	F
11	Hesperian Bl / Chabot DW#4 - LotH	AM	10.2	C	9.0	B
		PM	6.1	B	10.7	C
12	Chabot DW#5 - LotG / Depot Rd	AM	0.6	A	0.5	A
		PM	0.6	A	0.6	A
13	Chabot DW#6 - LotF / Depot Rd	AM	0.3	A	0.3	A
		PM	0.5	A	0.5	A
14	Chabot DW#7 - LotE / Depot Rd	AM	17.4	C	20.3	D
		PM	5.4	B	6.3	B
15	Chabot DW#8 - LotD / Depot Rd	AM	0.1	A	0.1	A
		PM	0.2	A	0.2	A

Notes:

Study intersections 9 through 15 are unsignaliized driveways.

[1] The average delay and corresponding level of service reported for each signalized intersection are based on the average stopped delay at the intersection.

The average delay and corresponding level of service reported for each unsignalized driveway are based on the average total delay at the intersection.

[2] "Overflow" = TRAFFIX is unable to calculate the average delay at these intersections due to oversaturated conditions.

4.
2015 Project Conditions

This chapter describes how existing traffic conditions would be altered by implementation of the Chabot College Facilities Master Plan (hereafter called *project)*. It includes a description of the method by which project traffic was estimated, as well as any impacts caused by the project. 2015 Project conditions were evaluated relative to Existing conditions in order to determine potential project impacts. The effects of the proposed Master Plan on vehicular access, on-site circulation and parking are then described. The chapter is concluded with a discussion of the effects of the project on transit, bicycle and pedestrian facilities in the project area.

Significant Impact Criteria

Significance criteria are used to establish what constitutes an impact. For this analysis, the criteria used to determine impacts on intersections are based on City of Hayward Level of Service standards.

City of Hayward Definition of Significant Intersection Impacts

The project would create a significant adverse impact on traffic conditions at a *signalized* intersection in the City of Hayward if for either peak hour:

1. The level of service at the intersection degrades from an acceptable LOS D or better under 2015 no project conditions to an unacceptable LOS E or F under 2015 project conditions,

2. The level of service at the intersection degrades from a LOS E under 2015 no project conditions to an unacceptable LOS F under 2015 project conditions, or

3. The level of service at the intersection is an unacceptable LOS F under 2015 no project conditions and the project causes the delay to increase by four (4) or more seconds.

A significant impact by City of Hayward standards is said to be satisfactorily mitigated when measures are implemented that would restore the level of service at a signalized intersection to an acceptable LOS D or better, unless the cost of mitigating an intersection back to LOS D is prohibitive. The City of Hayward ultimately will make this determination.

All of the unsignalized driveways at Chabot College were analyzed for level of service at the request of the City of Hayward. The City understands that it is common for unsignalized intersections located along major corridors such as Hesperian Boulevard to operate at LOS E or F due to excessive vehicle delays on the minor street approaches. The City of Hayward has not established significant impact criteria relative to unsignalized intersections and, thus, does not consider poor levels of service at unsignalized intersections as a result of added project traffic a significant impact. The City does, however, require that the need for signalization of unsignalized intersections be assessed based on the Peak-Hour Volume Warrant (Warrant #11) described in the *Caltrans Traffic Manual*. This method provides an indication whether vehicular peak hour volumes are, or would be, sufficient to justify installation of a traffic signal.

Transportation Network Under Project Conditions

It is assumed in this analysis that the transportation network under project conditions, including roadways and intersection lane configurations, would be the same as that described under 2015 No Project conditions with the following exceptions:

Chabot College Driveways. According to the Chabot College Facilities Master Plan, the existing Chabot College driveways #2 (one-way inbound) and #3 (one-way outbound) on Hesperian Boulevard will be combined into one full access driveway. The existing Chabot College driveways #5 and #6 on Depot Road also will be combined into one full access driveway.

Project Trip Estimates and Traffic Volumes

Driveway counts at the college were conducted in May of 2005. The college projections for 2015 show a 14.6 percent increase in student and faculty population compared to the existing student and faculty population. New trips generated by the Master Plan project were estimated by first calculating the existing number of vehicular trips per college student and faculty based on the driveway counts and a total student plus faculty population of 15,744. Using this approach, Chabot College currently generates 0.104 trips per person during the AM peak hour and 0.056 trips per person during the PM peak hour. The existing trip generation rates were then used to determine the number of new peak hour trips generated by the project based on a new student plus faculty population of 18,044. Based on an increase of 2,250 students and 50 college faculty over the next 10 years, the project would generate 239 new AM peak hour trips and 128 new PM peak hour trips by the year 2015. Based on the existing inbound/outbound splits, the project would produce 186 inbound trips and 53 outbound trips during the AM peak hour, and 63 inbound trips and 65 outbound trips during the PM peak hour. Trip generation estimates are presented below in Table 5.

Table 5
Chabot College 2015 Project Trip Generation Estimates

Increase in # of Students and Faculty	AM Peak Hour				PM Peak Hour			
	Pk-Hr Rate	In	Out	Total	Pk-Hr Rate	In	Out	Total
2,300	0.104	186	53	239	0.056	63	65	128

Project trips were added to the 2015 No Project traffic volumes to represent future 2015 traffic conditions with implementation of the project (hereafter called *2015 project traffic volumes*). The 2015 project traffic volumes were then reassigned to the local roadways based on the proposed new driveway locations and parking lot configuration. Figure 10 shows the new project trips at the driveways. Figure 11 shows 2015 traffic volumes with the project at all of the study intersection locations. Traffic volumes for all components of traffic are tabulated in Appendix B.

Project Intersection Analysis

The results of the intersection level of service analysis under 2015 Project conditions are summarized in Table 6. The results show that, measured against the City of Hayward level of service standards, the following signalized study intersection would operate at an unacceptable level of service under 2015 Project conditions:

- Hesperian Boulevard and Winton Avenue – LOS E during the AM and PM peak hours

Hesperian Boulevard and Winton Avenue. The estimated future growth in the study area over the next 10 years alone would worsen the level of service at the intersection of Hesperian Boulevard and Winton Avenue from an acceptable LOS D to an unacceptable LOS E during the PM peak hour of traffic. Although the project would contribute to the worsening of level of service by adding 2.5 seconds of delay to the LOS E intersection, this is not considered a significant project impact and no project sponsored improvements would be necessary.

The level of service reported for each unsignalized driveway is based on the average total delay at the intersection. The results show that, measured against the City of Hayward level of service standards, the following unsignalized study intersection (college driveway) would operate at an unacceptable level of service under 2015 Project conditions:

- Hesperian Boulevard and Chabot Court/DW #2 – LOS F during the AM and PM peak hours

Hesperian Boulevard and Chabot Court/DW #2. The average total delay at this driveway would worsen compared to existing and 2015 No Project conditions. This is because the Facilities Master Plan would eliminate the Chabot driveway #3, and the outbound volumes from the existing driveway #3 would instead be using driveway #2. Thus, driveway #2 would operate at LOS F due to the excessive delays that the outbound left-turn movement would experience as a result of the opposing through and left-turn volumes on Hesperian Boulevard. The outbound left-turn movement at this driveway would have three opposing movements, making it difficult for vehicles to turn left from the campus.

Although this unsignalized driveway would operate at LOS F under 2015 project conditions, the excessive vehicle delay is an operational issue only and is not considered a significant adverse traffic impact according to City of Hayward and CEQA guidelines. The City understands that it is common for unsignalized intersections located along major corridors such as Hesperian Boulevard to operate at LOS E or F due to excessive vehicle delays on the minor street approaches. The City of Hayward has not established significant impact criteria relative to unsignalized intersections and, thus, does not consider poor levels of service at unsignalized intersections as a result of added project traffic a significant impact.

Figure 10
New Project Trips at the Driveways

Figure 11
2015 Project Traffic Volumes

Table 6
Intersection Levels of Service Under 2015 Project Conditions

Study Number	Intersection	Peak Hour	Existing Ave. Delay [1]	Existing LOS [1]	2015 No Project Ave. Delay [1]	2015 No Project LOS [1]	2015 Project Conditions Ave. Delay [1]	2015 Project Conditions LOS [1]	Incr. In Crit. Delay
1	Hesperian Bl / Winton Av	AM	57.7	E	47.8	E	47.2	E	0.0
		PM	29.3	D	44.3	E	46.1	E	2.5
2	Hesperian Bl / Southland Dr	AM	15.0	B	15.2	C	15.2	C	0.6
		PM	17.3	C	21.1	C	21.5	C	0.6
3	Hesperian Bl / Depot Rd	AM	22.4	C	23.3	C	24.9	C	3.0
		PM	17.4	C	18.6	C	18.9	C	1.5
4	Hesperian Bl / WB SR 92 Ramps	AM	8.1	B	16.5	C	16.5	C	0.2
		PM	3.5	A	16.1	C	16.1	C	0.2
5	Hesperian Bl / EB SR 92 Ramps	AM	9.7	B	9.8	B	10.3	B	0.7
		PM	17.6	C	20.8	C	21.4	C	1.1
6	Hesperian Bl / Sleepy Hollow Av	AM	8.6	B	8.8	B	8.6	B	-0.2
		PM	9.3	B	9.8	B	9.7	B	0.0
7	Hesperian Bl / Tennyson Rd	AM	18.7	C	19.1	C	19.1	C	0.0
		PM	23.5	C	26.9	D	27.2	D	0.6
8	Hesperian Bl / Turner Ct - DW#1	AM	10.9	B	10.8	B	11.4	B	0.9
		PM	7.3	B	7.4	B	7.6	B	0.0
9	Hesperian Bl / Chabot Ct - DW#2 [2]	AM	1.5	A	1.4	A	overflow	F	---
		PM	72.2	F	158.7	F	overflow	F	---
10	Hesperian Bl / Chabot DW#3 - LotA [2,3]	AM	103.7	F	99.7	F	n/a	n/a	n/a
		PM	overflow	F	overflow	F	n/a	n/a	n/a
11	Hesperian Bl / Chabot DW#4 - LotH	AM	10.2	C	9.0	B	27.4	D	---
		PM	6.1	B	10.7	C	18.2	C	---
12	Chabot DW#5 - LotG / Depot Rd [3]	AM	0.6	A	0.5	A	n/a	n/a	n/a
		PM	0.6	A	0.6	A	n/a	n/a	n/a
13	Chabot DW#6 - LotF / Depot Rd	AM	0.3	A	0.3	A	0.9	A	---
		PM	0.5	A	0.5	A	1.2	A	---
14	Chabot DW#7 - LotE / Depot Rd	AM	17.4	C	20.3	D	19.7	C	---
		PM	5.4	B	6.3	B	6.6	B	---
15	Chabot DW#8 - LotD / Depot Rd	AM	0.1	A	0.1	A	0.1	A	---
		PM	0.2	A	0.2	A	0.2	A	---

Notes:

Study intersections 9 through 15 are unsignaliized driveways.

[1] The average delay and corresponding level of service reported for each signalized intersection are based on the average stopped delay at the intersection.
The average delay and corresponding level of service reported for each unsignalized driveway are based on the average total delay at the intersection.

[2] "Overflow" = TRAFFIX is unable to calculate the average delay at these intersections due to oversaturated conditions.

[3] These driveways would not exist in the future with implementation of the Chabot College Facilities Master Plan.

Also important to note is that there are signalized intersections both north and south of the Chabot College driveway #2 that would provide gaps in the flow of traffic on Hesperian Boulevard. These gaps would eventually allow vehicles to safely complete the left-turn movement. In order to improve the operation of the outbound left-turn from the campus, a safe “refuge” that provides vehicle storage within the existing median on Hesperian Boulevard could be included in the design of the new driveway in order to facilitate a two-step merging process. This would significantly improve egress and the overall operation of the driveway, particularly during the peak traffic periods. Drivers also would have the option to either utilize the adjacent signalized driveway #1, which would be accessible by driving through the reconfigured parking lot B, or to turn right out of the driveway and make a u-turn at the intersection of Hesperian Boulevard and Depot Road. Also important to note is that the excessive delay for the westbound left-turn movement would only occur during the peak traffic periods and would not present a problem the remainder of the day.

Signal Warrant Analysis

Peak hour signal warrant checks (*Caltrans Traffic Manual*, Chapter 9, Warrant 11) were performed for the unsignalized Chabot College driveways to determine whether signalization would be justified on the basis of 2015 Project peak hour volumes. The analysis revealed that the unsignalized intersection of Hesperian Boulevard and Chabot Court/College DW#2 would warrant signalization. This is because the Chabot driveway #3 will be eliminated, according to the Facilities Master Plan, and the outbound volumes from driveway #3 would then use driveway #2. No other unsignalized driveway would warrant a traffic signal based on 2015 Project AM and PM peak hour volumes. If signalized, this driveway would operate at LOS B during both the AM and PM peak hours of traffic.

The signal warrant was checked at the request of the City of Hayward. Although this unsignalized driveway would warrant a signal based on 2015 project traffic volumes, meeting the Caltrans signal warrant is not considered a significant adverse traffic impact according to CEQA guidelines. In addition, according to Roxy Carmichael-Hart, the City's senior transportation planner, the City would have no desire to construct a traffic signal at this driveway location due to its close proximity (approximately 400 feet) to the signalized intersection of Hesperian Boulevard and Turner Court/DW #1. It would be difficult to coordinate the two signals.

The level of service calculation sheets are included in Appendix C. The signal warrant sheets are included in Appendix D.

Intersection Operations Analysis

The analysis of project intersection level of service was supplemented with an analysis of intersection operations for selected intersections. The operations analysis is based on vehicle queuing for high-demand turning movements at intersections. The basis of the analysis for signalized intersections is as follows: (1) the TRAFFIX intersection analysis software is used to estimate the 95th percentile maximum number of queued vehicles per signal cycle for a particular movement; (2) the estimated maximum number of vehicles in the queue is translated into a queue length, assuming 20 feet per vehicle; and (3) the estimated maximum queue length is compared to the existing or planned available storage capacity for the movement. Maximum vehicle queues at unsignalized intersections are calculated in a similar manner, except that the 95th percentile maximum number of queued vehicles is calculated based on the peak hour volume and capacity for a particular movement (V/C ratio). The intersection operations analysis provides a basis for estimating future storage requirements at intersections. The vehicle queue estimates and summary of findings for signalized and unsignalized intersections are provided in Tables 7 and 8, respectively.

The analysis indicated that the estimated maximum vehicle queues for the northbound left-turn movement at the intersection of Hesperian Boulevard and Depot Road would exceed the planned vehicle storage capacity under project conditions during both the AM and PM peak hours. Important to note is that the northbound left-turn pocket also provides inadequate vehicle storage under existing conditions.

The northbound left-turn lane provides approximately 300 feet of vehicle storage for a capacity of up to 15 vehicles. Under existing conditions, the 95th percentile queue is 18 vehicles during the AM peak hour, which requires 360 feet of storage. The 95th percentile queue is 16 vehicles during the PM peak hour, which requires 320 feet of storage. The existing 95th percentile queue would not increase during the AM peak hour under 2015 No Project conditions, but would increase by 1 vehicle to 340 feet during the PM

Table 7
Vehicle Queuing and Turn Pocket Storage Analysis at Signalized Intersections

					Existing		2015 No Project		2015 Project		
Intersection	Mvmt.	Peak Hour	Existing # Lanes	Storage Per Lane (ft.)	Vehicle Queue /a/	Required Storage Per Lane (ft.) /b/	Vehicle Queue /a/	Required Storage Per Lane (ft.) /b/	Vehicle Queue /a/	Required Storage Per Lane (ft.) /b/	Comments
Hesperian Bl and Depot Rd	NBL	AM	1	300	18	360	18	360	19	380	Inadequate storage provided, /c/
	NBL	PM	1	300	16	320	17	340	17	340	Inadequate storage provided, /c/
	EBL/EBT /f/	AM	2	200	13	130	14	140	14	140	Adequate storage provided
	EBL/EBT /f/	PM	2	200	15	150	17	170	18	180	Adequate storage provided
Hesperian Bl and SR 92 EB Ramps	SBL	AM	1	300	13	260	13	260	13	260	Adequate storage provided
	SBL	PM	1	300	14	280	15	300	15	300	Adequate storage provided
	EBL	AM	1	/d/	5	100	5	100	5	100	Adequate storage provided, /d/
	EBL	PM	1	/d/	18	360	19	380	19	380	Adequate storage provided, /d/
Hesperian Bl and Turner Ct / DW#1	NBL	AM	1	240	8	160	8	160	9	180	Adequate storage provided
	NBL	PM	1	240	3	60	3	60	3	60	Adequate storage provided
	EBL	AM	1	40	3	60	2	40	3	60	Adequate storage provided, /e/
	EBL	PM	1	40	5	100	5	100	5	100	Adequate storage provided, /e/

/a/ Design queue calculated by TRAFFIX (# of vehicles).
/b/ Required storage is calculated based on TRAFFIX output as follows:
Design Vehicle Queue x Ave length of vehicle (20')/# lanes, rounded to nearest factor of 20
/c/ This intersection already has inadequate storage capacity under existing conditions.
/d/ The SR 92 eastbound diagonal off-ramp provides virtually unlimited storage for vehicle queues.
/e/ Adequate stacking would be provided on-site, although queues of 3 or more vehicles would begin to block the drive aisles due to the short driveway throat.
/f/ Includes one designated left-turn lane and one shared through/left-turn lane.

Table 8
Vehicle Queuing and Turn Pocket Storage Analysis at Unsignalized College Driveways

Chabot College Unsignalized Driveway	Left-Turn Movement	Peak Hour	Left-Turn Storage (ft.)	2015 Project Vehicle Queue /a/	2015 Project Required Storage (ft.) /b/	Comments
Hesperian Bl and Chabot Ct / Chabot Lots A & B DW #2	EBL	AM	140	/c/	/c/	Inadequate storage provided, /c/
	EBL	PM	140	/c/	/c/	Inadequate storage provided, /c/
	NBL	AM	120	2	40	Adequate storage provided
	NBL	PM	120	1	20	Adequate storage provided
Hesperian Bl and Chabot Student Services Center DW #4	EBL	AM	100	2	40	Adequate storage provided
	EBL	PM	100	2	40	Adequate storage provided
	NBL	AM	220	3	60	Adequate storage provided
	NBL	PM	220	1	20	Adequate storage provided
Depot Road and Chabot Theater DW #6	SBL	AM	35	1	20	Adequate storage provided
	SBL	PM	35	1	20	Adequate storage provided
Depot Road and Chabot Child Development DW #7	SBL	AM	35	1	20	Adequate storage provided
	SBL	PM	35	1	20	Adequate storage provided
Depot Road and Chabot Lots C & D DW #8	SBL	AM	570	1	20	Adequate storage provided, /d/
	SBL	PM	570	1	20	Adequate storage provided, /d/

/a/ Design queue calculated by TRAFFIX (# of vehicles). The 2000 HCM Methodology was used to determine the left-turn movement capacities for the unsignalized intersections.

/b/ Required storage is calculated based on TRAFFIX output as follows:
Design Vehicle Queue x Ave length of vehicle (20')/# lanes, rounded to nearest factor of 20

/c/ Extremely long delays would occur at this driveway location, in which case drivers could use other driveways to exit the campus.

/d/ This driveway provides virtually unlimited storage for outbound vehicle queues.

peak hour under 2015 No Project conditions. The project would increase the 2015 No Project maximum queue length during the AM peak hour by 1 vehicle to 380 feet, but would not increase the queue length during the PM peak hour. Thus, the northbound left-turn lane would require 380 feet of storage under 2015 Project conditions. Extending the northbound left-turn pocket 80 feet would require removal of the raised center median, removal of street lamps, removal of landscaping, and restriping. However, since the vehicle queue would increase by only 2 vehicles compared to existing conditions, this improvement may not be warranted. The City of Hayward ultimately will make the determination as to whether or not extending the northbound left-turn pocket at this intersection is necessary and appropriate.

The analysis indicated that the estimated maximum vehicle queues for the eastbound left-turn movement at the unsignalized intersection of Hesperian Boulevard and Chabot Lots A and B/driveway #2 would exceed the planned on-site vehicle storage capacity under project conditions during both the AM and PM peak hours. This driveway would experience extremely long vehicle delays for the outbound left-turn movement. The long delays could result in long vehicle queues on-site. Drivers would have the option to exit at other driveway locations in order to avoid the long delays. Drivers could either utilize the adjacent signalized driveway #1, which would be accessible by driving through the reconfigured parking lot B, or to turn right out of the driveway and make a u-turn at the intersection of Hesperian Boulevard and Depot Road. Important to note is that the excessive delay for the outbound left-turn movement would only occur during the peak traffic periods and would not present a problem the remainder of the day.

Site Access and On-Site Circulation

According to the proposed site plan, the Chabot College Facilities Master Plan would eliminate one driveway on Hesperian Boulevard and one driveway on Depot Road, resulting in three full access driveways on Hesperian Boulevard and three on Depot Road. Overall, the site plan exhibits good on-site circulation for vehicles. A new continuous ring road is proposed that would improve on-site circulation by linking all of the parking lots on the college campus. Based on the site plan, the parking would be reconfigured such that the ring road cuts through the middle of parking lots A/B and lots G/H. The entire expanse of the ring road ranges in width between a minimum of 22 feet to a maximum of 30 feet.

The two driveways connecting Hesperian Boulevard to the new ring road would have throat lengths of between approximately 100 and 150 feet. Although limited, these reconfigured driveways would provide stacking for approximately 4 to 6 outbound vehicles. It is recommended that stop signs be placed on the ring road in both directions at both driveway locations in order to provide a free movement for inbound traffic. A free inbound movement would be necessary to reduce the likelihood of inbound traffic backing up onto Hesperian Boulevard during the peak traffic periods. This is especially important since there are no dedicated southbound right-turn lanes on Hesperian Boulevard. Stop signs on the ring road also would help to meter the flow of outbound traffic. The on-site traffic control devices must be clearly marked such that there is no driver confusion. It needs to be obvious to inbound drivers that they have a free movement. Additionally, the new on-site T-intersections must be designed such that vehicles that are stopped on the ring road can clearly see vehicles entering the site. These on-site traffic control recommendations also should apply to the two driveways connecting Depot Road to the ring road, which would have almost no stacking space for outbound vehicles.

According to the site plan, only the small 37-space parking lot located adjacent to the Broadcast building contains a dead-end drive aisle. There are no other dead-end drive aisles on the entire site. Based on the location of this parking lot, which is isolated from the other parking areas, its use most likely will be limited to faculty and staff parking only.

Truck Access and Circulation

An analysis was conducted to determine the adequacy of driveway access and on-site circulation along the new ring road at the Social Science building location for the truck category SU 30, which includes buses, garbage trucks and other single unit trucks. Based on the analysis, the driveway and drive aisle widths would be adequately wide for the public bus routes to continue to serve the campus. The curb radii on-site would be sufficiently large to allow buses and other large trucks, including emergency vehicles, to safely turn into and out of the site. Included in the new site plan design is a bus loading area (duckout) located adjacent to the campus buildings. This would be an improvement over existing conditions, since currently the bus duckout is located adjacent to parking lot A.

On-Site Parking

The college campus currently provides 2,492 parking spaces. According to a parking space occupancy survey completed for this study in April of 2005, the peak parking demand on a typical weekday is approximately 2,195 spaces, or 88 % of the total 2,492 parking spaces. The peak parking period occurs during the AM. The Facilities Master Plan will provide a total of 2,833 parking spaces in the campus' parking lots. Based on the design goal of 1 space per 6.2 students, the forecast enrollment of 17,500 students at Chabot College would create a need for 2,823 spaces. The planned 2,833 parking spaces would represent a ratio of 1 space per 6.18 students, which exceeds the design goal. A detailed parking analysis for Chabot College is contained in Appendix E.

Other Transportation Issues

Transit Facilities

Chabot College will continue to be served directly by ACTransit bus lines 92, 97 and M. According to the most recent boardings and alightings data provided by ACTransit, it is estimated that about 395 Chabot College students currently use these bus lines on an average weekday. With the proposed project, these bus lines would continue to provide service to nearby BART stations, CSU Hayward, retail centers and across the San Mateo Bridge to Foster City and San Mateo. Based on a current enrollment of 15,744 students, approximately 2.5 percent of the student population currently utilizes ACTransit service on a typical weekday. A transit mode share of 2.5 percent equates to about 60 new transit riders per day, or 6 new peak hour riders (based on a peak hour rate of 10 percent). Based on the maximum passenger load data for bus lines 92, 97 and M, these new riders easily could be accommodated by the available ridership capacity of the bus lines. Thus, no improvements to the existing transit service would be necessary as a result of the project.

Access to and from Chabot College by buses should be maintained during construction. Safe, convenient and ADA compliant pedestrian access to and from the Chabot College Lot A bus stop also should be maintained during construction.

Pedestrian Facilities

Pedestrian traffic primarily would be generated by Chabot College students and local residents walking to and from Chabot College, bus stops, Rancho Arroyo Park, and nearby retail centers such as the Southland Mall. All of the roadways in the project area currently have sidewalks on both sides of the street, with

crosswalks and pedestrian push buttons and signal heads at the major intersections. The extensive network of sidewalks within the study area would continue to provide students with a safe connection between Chabot College and the other surrounding land uses in the area.

Bicycle Facilities

As described in the Existing Conditions chapter, there are very few bicycle facilities in the project area. The proposed bike lanes and bike routes, according to the City of Hayward Bicycle Network Plan, would greatly improve the connectivity of the currently limited network of bicycle facilities. A reasonable assumption for bicycle commute trip generation would be a 1 percent mode share. This calculates to about 23 new daily bicycle trips, or 2 new peak hour bicycle trips. Since the proposed project would have very little effect on the existing bicycle facilities in the study area, no improvements would be necessary as a result of the project.

In summary, the proposed project would not have an adverse effect on the existing transit, pedestrian or bicycle facilities in the study area.

5.
2025 Cumulative Conditions

This chapter describes 2025 Cumulative traffic conditions with implementation of the Chabot College Facilities Master Plan project, and describes the procedure used to determine 2025 Cumulative traffic volumes. It is assumed in this analysis that the transportation network under 2025 Cumulative conditions, including roadways and intersection lane configurations, would be the same as that described under 2015 Project conditions.

2025 Cumulative Traffic Volumes

Additional trips generated by potential future developments in the project area beyond 2015 were estimated by applying an annual growth rate of 1 percent to 2015 No Project volumes, and then adding the Chabot College project trips generated by an increase in population of 2,250 students and 50 college staff. No increase in student or faculty population is expected to occur at Chabot College beyond 2015, so no traffic increases associated with Chabot College would be expected. The resulting 2025 cumulative traffic volumes were then assigned to the roadways based on the driveway locations proposed by the Master Plan project. 2025 Cumulative peak hour traffic volumes are shown on Figure 12. Traffic volumes for all components of traffic are tabulated in Appendix B.

2025 Cumulative Intersection Levels of Service

The results of the intersection level of service analysis under 2025 Cumulative conditions are summarized in Table 9. The results show that, measured against the City of Hayward level of service standards, the following signalized study intersection would operate at an unacceptable level of service under 2025 Cumulative conditions:

- Hesperian Boulevard and Winton Avenue – LOS F during the AM and PM peak hours

Figure 12
2025 Cumulative Traffic Volumes

Table 9
Intersection Levels of Service Under 2025 Cumulative Conditions

Study Number	Intersection	Peak Hour	2015 Project Conditions Ave. Delay [1]	LOS [1]	Incr. In Crit. Delay	2025 Cumulative Ave. Delay [1]	LOS [1]
1	Hesperian Bl / Winton Av	AM	47.2	E	0.0	74.2	F
		PM	46.1	E	2.5	74.9	F
2	Hesperian Bl / Southland Dr	AM	15.2	C	0.6	16.3	C
		PM	21.5	C	0.6	38.5	D
3	Hesperian Bl / Depot Rd	AM	24.9	C	3.0	30.8	D
		PM	18.9	C	1.5	21.1	C
4	Hesperian Bl / WB SR 92 Ramps	AM	16.5	C	0.2	23.5	C
		PM	16.1	C	0.2	17.5	C
5	Hesperian Bl / EB SR 92 Ramps	AM	10.3	B	0.7	15.1	B
		PM	21.4	C	1.1	28.5	D
6	Hesperian Bl / Sleepy Hollow Av	AM	8.6	B	-0.2	8.8	B
		PM	9.7	B	0.0	10.3	B
7	Hesperian Bl / Tennyson Rd	AM	19.1	C	0.0	20.1	C
		PM	27.2	D	0.6	34.3	D
8	Hesperian Bl / Turner Ct - DW#1	AM	11.4	B	0.9	11.5	B
		PM	7.6	B	0.0	7.7	B
9	Hesperian Bl / Chabot Ct - DW#2 [2]	AM	overflow	F	---	overflow	F
		PM	overflow	F	---	overflow	F
10	Hesperian Bl / Chabot DW#3 - LotA [3]	AM	n/a	n/a	n/a	n/a	n/a
		PM	n/a	n/a	n/a	n/a	n/a
11	Hesperian Bl / Chabot DW#4 - LotH	AM	27.4	D	---	63.1	F
		PM	18.2	C	---	28.9	D
12	Chabot DW#5 - LotG / Depot Rd [3]	AM	n/a	n/a	n/a	n/a	n/a
		PM	n/a	n/a	n/a	n/a	n/a
13	Chabot DW#6 - LotF / Depot Rd	AM	0.9	A	---	1.0	A
		PM	1.2	A	---	1.3	A
14	Chabot DW#7 - LotE / Depot Rd	AM	19.7	C	---	28.5	D
		PM	6.6	B	---	7.6	B
15	Chabot DW#8 - LotD / Depot Rd	AM	0.1	A	---	0.1	A
		PM	0.2	A	---	0.2	A

Notes:
Study intersections 9 through 15 are unsignaliized driveways.

[1] The average delay and corresponding level of service reported for each signalized intersection are based on the average stopped delay at the intersection.
The average delay and corresponding level of service reported for each unsignalized driveway are based on the average total delay at the intersection.

[2] "Overflow" = TRAFFIX is unable to calculate the average delay at these intersections due to oversaturated conditions.

[3] These driveways would not exist in the future with implementation of the Chabot College Facilities Master Plan.

The results show that, measured against the City of Hayward level of service standards, the following unsignalized study intersections (college driveways) would operate at an unacceptable level of service under 2025 Cumulative conditions:

- Hesperian Boulevard and Chabot Court/DW #2 – LOS F during the PM peak hour
- Hesperian Boulevard and Chabot DW #4 – LOS F during the AM peak hour

The unsignalized intersections listed above would operate at LOS F due to the excessive delays that the left-turn movements would experience as a result of the opposing through and left-turn volumes on Hesperian Boulevard. Both unsignalized intersections have three opposing movements, making it difficult for vehicles to turn left from the college campus.

The level of service calculation sheets are included in Appendix C.

Signal Warrant Analysis

Peak hour signal warrant checks (*Caltrans Traffic Manual*, Chapter 9, Warrant 11) were performed for the unsignalized Chabot College driveways to determine whether signalization would be justified on the basis of 2025 Cumulative peak hour volumes. The analysis revealed that the unsignalized intersection of Hesperian Boulevard and Chabot College DW#2 would warrant signalization. No other unsignalized driveway would warrant a traffic signal based on 2025 Cumulative AM and PM peak hour volumes. The signal warrant sheets are included in Appendix D.

6. Conclusions

The purpose of the traffic study was to identify any traffic-related impacts that would result from the proposed Facilities Master Plan. The college is located on the northwest corner of Hesperian Boulevard and Depot Road in the City of Hayward. The proposed Master Plan elements involve construction of seven new buildings, demolition of eight existing buildings, and renovation of thirty existing buildings. The Master Plan improvements would lead to traffic increases as they would support an increase in the population of students and college faculty. The project would eliminate one driveway on Hesperian Boulevard and one driveway on Depot Road, resulting in three access driveways on Hesperian Boulevard and three on Depot Road. A new ring road is proposed that would improve on-site circulation by linking the parking lots.

Project Intersection Analysis

The intersection level of service analysis results show that, measured against the City of Hayward level of service standards, none of the study intersections would be significantly impacted by the project.

Signal Warrant Analysis

The peak hour signal warrant checks (*Caltrans Traffic Manual*, Chapter 9, Warrant 11) revealed that the unsignalized intersection of Hesperian Boulevard and Chabot Court/College DW#2 would warrant signalization under 2015 Project conditions. This is because the Chabot driveway #3 will be eliminated, according to the Facilities Master Plan, and the outbound volumes from driveway #3 would then use driveway #2. No other unsignalized driveway would warrant a traffic signal based on 2015 Project AM and PM peak hour volumes. If signalized, this driveway would operate at LOS B during both the AM and PM peak hours of traffic.

The signal warrant was checked at the request of the City of Hayward. Although this unsignalized driveway would warrant a signal based on 2015 project traffic volumes, meeting the Caltrans signal warrant is not considered a significant adverse traffic impact according to CEQA guidelines. In addition,

according to Roxy Carmichael-Hart, the City's senior transportation planner, the City would have no desire to construct a traffic signal at this driveway location due to its close proximity (approximately 400 feet) to the signalized intersection of Hesperian Boulevard and Turner Court/DW #1. It would be difficult to coordinate the two signals.

Other Transportation Issues

The proposed Chabot College Facilities Master Plan project would not have a significant adverse effect on existing transit, pedestrian, or bicycle facilities in the study area.

Chabot College
Technical Appendices

Appendix A

Traffic Counts

Appendix B

Volume Summary Tables

Appendix C

Level of Service Calculations

Appendix D

Signal Warrant Sheets

Appendix E

Chabot College Facilities Master Plan
Circulation and Parking Design Study