4.6 CULTURAL RESOURCES

1. Environmental Issues

This Cultural Resources section assesses the project's potential to impact historic and prehistoric resources. The discussion is based on a cultural and archeological study of the project site conducted by Basin Research Associates. The full text of the study is contained in the Technical Appendices.

2. Existing Setting

History of the Area

The human history of the San Joaquin Valley, in which the project site is located, can be divided into three primary periods: the prehistoric period, in which the area was occupied by Native Americans; the Hispanic Period; and the American Period. The prehistoric period lasted until about 1806. The Hispanic Period began with Spanish exploration in 1769. It includes the period up until 1821 when the area was Spanish territory, as well as the subsequent period after Mexican independence, when California was part of Mexico. The Hispanic Period ended in 1847 with the Mexican American War, which resulted in California becoming American territory.

Prehistory

Little is known about the Native Americans who inhabited the San Joaquin Valley because of their decimation from the introduction of diseases, missionization, and displacement by gold seekers. There is some disagreement in the literature as to whether the project site is within the territory of the Coconoon tribelet of the Northern Valley Yokuts or within the Southern Miwok Territory. The Yokutsan-speaking people as a whole numbered approximately 18,000, and lived in tribelets of approximately 40-50 people. The Yokutsan language is believed to have contained 12 language groups and at least 21 dialects, which means that communication between nearby tribelets was possible, but the dialects of more distant Yokuts would have been unintelligible. The Yokuts were hunters and gatherers who subsisted on salmon and acorns, as well as waterbirds and tule roots. They engaged in a limited amount of big-game hunting. In addition, the Northern Yokuts traded dog pups for mussels and abalone shells with the Costanoan tribelet, and for baskets, bows, and arrows with the Miwok.

The aboriginal lifestyle of the Yokuts apparently disappeared by 1806 due to the introduction of new diseases, a declining birth rate, and the impact of the mission system. The aboriginal inhabitants of the San Joaquin Valley were transformed from hunters and gatherers into agricultural laborers who lived at the missions, including Missions San Jose, Santa Clara, Soledad, San Juan Bautista and San Antonio. Later on, as a result of the secularization of the missions by Mexico in 1834, most of the aboriginal population gradually moved to ranchos to work as manual laborers.

Hispanic Period

Spanish exploration in Alta California concentrated on the San Joaquin Valley. Between 1769 and 1776 a number of Spanish expeditions went through both the interior and the San Francisco Bay region, including those led by Portola, Fages, Fages and Crespi, Anza, Rivera, and Morage. The favorable reports of the parties led by Gaspar de Portola and Father Juan Crespi in 1769 and Juan Bautista de Anza and Father Pedro Font in 1776 resulted in the founding of the Mission Santa Clara and Pueblo San Jose de Guadalupe in 1777. In 1797 both the Mission San Jose and Mission San Juan Bautista were founded, the 14th and 15th of the 21 missions established in California. Missions were located to serve as a base for expeditions against hostile Indians, as well as a place to convert them.

During the 1830's and early 1840's the Miwok and Yokut tribes engaged in raids into Hispanic territory as part of physical resistance to the mission system, as well as to secure horses and cattle. These raids have been interpreted as a consequence of the mission system which entrapped and confined Indians to missions as laborers who endured punishment, abuse, and an inadequate diet.

In contrast to the Spanish philosophy of government, the Mexican policy stressed individual ownership of the land. After secularization by Mexico in 1833, vast tracts of mission lands were granted to individual citizens. The proposed project site is not within one of the five Mexican land grants or ranchos established at that time in what is now San Joaquin County.

In addition to the Missions, mountain men were important to the history of the area, as well as the west in general, because of the role they played in Anglo-American settlement. They first explored, trapped and traded; later, they "regularized" trails and escorted others who would eventually settle. The San Joaquin Valley was a favorite route of Anglo-American mountain men from the 1820's. Jedediah Smith, Joseph Reddeford Walker, and John Charles Fremont all traversed the area. As the influx of Anglo-Americans continued, they married into California families, and eventually outnumbered the Hispanic inhabitants.

American Period

In the mid-19th century, most of the rancho and pueblo lands and some of the ungranted land in California were subdivided as the result of population growth, the American takeover, and the confirmation of property titles. The initial population boom in the area was associated with the Gold Rush (1848), followed later by the construction of the transcontinental railroad (1869). Still later, the development of the refrigerator railroad car (1880's), used for the transport of agricultural produce to distant markets, had a major impact.

Ranching and farming were central activities in the area during this period. From the beginning of the Early American period, with the exception of the ranchos in the county, land was open and free for grazing. Sheep and cattle were herded to the Los Banos area, rested and

sold to wholesale butchers who, in turn, sold them to the slaughterhouses in San Francisco.

The three forces which had the greatest effect on the Merced area during this period were: the railroads, which enabled the population boom and the transport of agricultural products to distant markets: the partnership of Henry Miller and Charles Lux, the largest landowners in the area; and the Crocker-Huffman Land and Water Company. In 1888, Charles Crocker, the rail magnate, and C.H. Huffman, "King of Wheat," were responsible for the diversion of water from the Merced River, and the completion of the Lake Yosemite reservoir. At its zenith, the 400 miles of Crocker-Huffman canals could irrigate approximately 50,000 acres. In addition to irrigation canals and water, the company promoted and sold huge tracts of land for colonization, and as late as 1920 still held over 100,000 acres. Crocker-Huffman continued expanding its canal system until 1922 when it was purchased by the Merced Irrigation District.

By 1911 Bellevue Ranch was the Crocker-Huffman center of operations, including cattle, grain and meat packing. The ranch remained in the Crocker family until 1961.

In addition to agriculture, tourism was important to the area. By 1884-1885 the City of Merced, which was incorporated in 1889, was the terminus for Yosemite tourists. In November of 1905, workers began laying the Yosemite Valley Railroad track from the railroad headquarters in Merced. The railroad reached Merced Falls in 1906. The railroad relied on tourism as well as freight (e.g., lumber, portland cement, lead, and U.S. Mail), but could not survive the impact of local and world events, including the 1926 completion of a highway to Yosemite Valley, as well as the depression and World War II. The railroad was beset by problems: accidents; bankruptcy and reorganization in the mid-1930's; fires in 1929, 1937 and 1945; a major 1937 flood along the Merced River and another flood in 1945. The last scheduled run took place on August 24, 1945 with dismantling starting in late November 1945 and completed in 1946.

Regulatory Framework

Federal and State Policies

Both the Federal and State governments have established guidelines for determining a structure's or site's historical significance. At the Federal level, districts, sites, buildings, structures, and objects felt to be of significant historical, architectural, archaeological, engineering or cultural significance, which meet criteria established in the Historic Sites Act of 1935 and the National Historic Preservation Act of 1956, may be nominated for the National Register of Historic Places. The Secretary of Historic Sites also maintains a listing of districts, sites, buildings, structures or objects in public or private ownership which are of national significance in terms of American history, archeology, architecture, engineering and culture. These structures are designated as National Landmarks. Similarly, the California Office of Historic Preservation recognizes sites and structures of statewide significance by

designating State Landmarks. These designations trigger procedural requirements prior to the demolition of a designated structure.

Archeological and Cultural Resources

Archeological Resources

Project Vicinity - A record and literature search for known prehistoric and historic sites located on, or within one mile of the project site was conducted by the personnel of the Central Information Center, California Archaeological Site Inventory, California State University, Turlock. None of the reports on file of site surveys in the area in question reported the presence of archeological resources.

Project Site - An intensive archeological field reconnaissance of the project area was conducted in August of 1992 and January of 1993. No prehistoric archaeological sites or features were observed during the field reconnaissance.

Architectural Resources

The Bellevue Ranch Complex, which was the center of Crocker-Huffman operations is still located on the hill in the central portion of the project area. The complex consists of a total of 39 structures, including six residential structures which are dispersed throughout the ranch building complex, as well as barns, garages, sheds, and the Bellevue Ranch overhead entryway arch. Table 4.6-1 lists the buildings which make up the complex. Figure 4.6-1 shows the building locations.

The residential and farm utility buildings are constructed with a variety of materials and in a variety of imitative styles popular from about the 1870's through the 1940's. They include a Pioneer style residence, identified as structure number 19 in Figure 4.6-1, and a Craftsman Bungalow-like residence identified as structure number 35.

Table 4.6-1
BELLEVUE RANCH STRUCTURES

Structure No.	Description
1	Scale House
2	Cattle Loading Dock
3	Shed
4	Cattle Chute (with cattle squeeze and dehorning gate)
5	Barn (with hay hood)
6	Shed (part collapsed enclosing motor vehicles)
7	Fire Hose Shed (including reel)
8	Garage/Equipment Building
9	Fire Hose Shed (including hose on reel)
10	Single Family Residence
11	Maintenance Building (motor vehicle repair)
12	Multi-Purpose Building (with ranch office and storage)
13	Garage
14	Shed
15	Shed/Possible Chicken Coop
16	Garage (including small concrete grease pit)
17	Well Buildings (2)
18	Tank House (straight-box type; associated with #19)
19	Single Family Residence (probable main house)
20	Shed
21	Shed
22	Garage
23	Shed (probable milk house)
24	Blacksmith and other Machinery Building
25	Farm Implement Storage Shed
26	7-Unit Residential
27	Barn

28	Shed
29	Swimming Pool
30	Shed (possible pump house)
31	Shed
32	Single Family Residence
33	Garage
34	3-Car Garage
35	Single Family Residence
36	Shed
37	Single Family Residence
38	Garage
39	Garage (associated with residence since removed)

As indicated in the Cultural Resource Study for the proposed project, there are no National Register of Historic Place properties, or State or Federal Landmarks located adjacent to the proposed Bellevue Ranch project area. Neither the Bellevue Ranch Complex or any of the individual structures which make up the complex have received National Register or State or Federal Landmark designation.

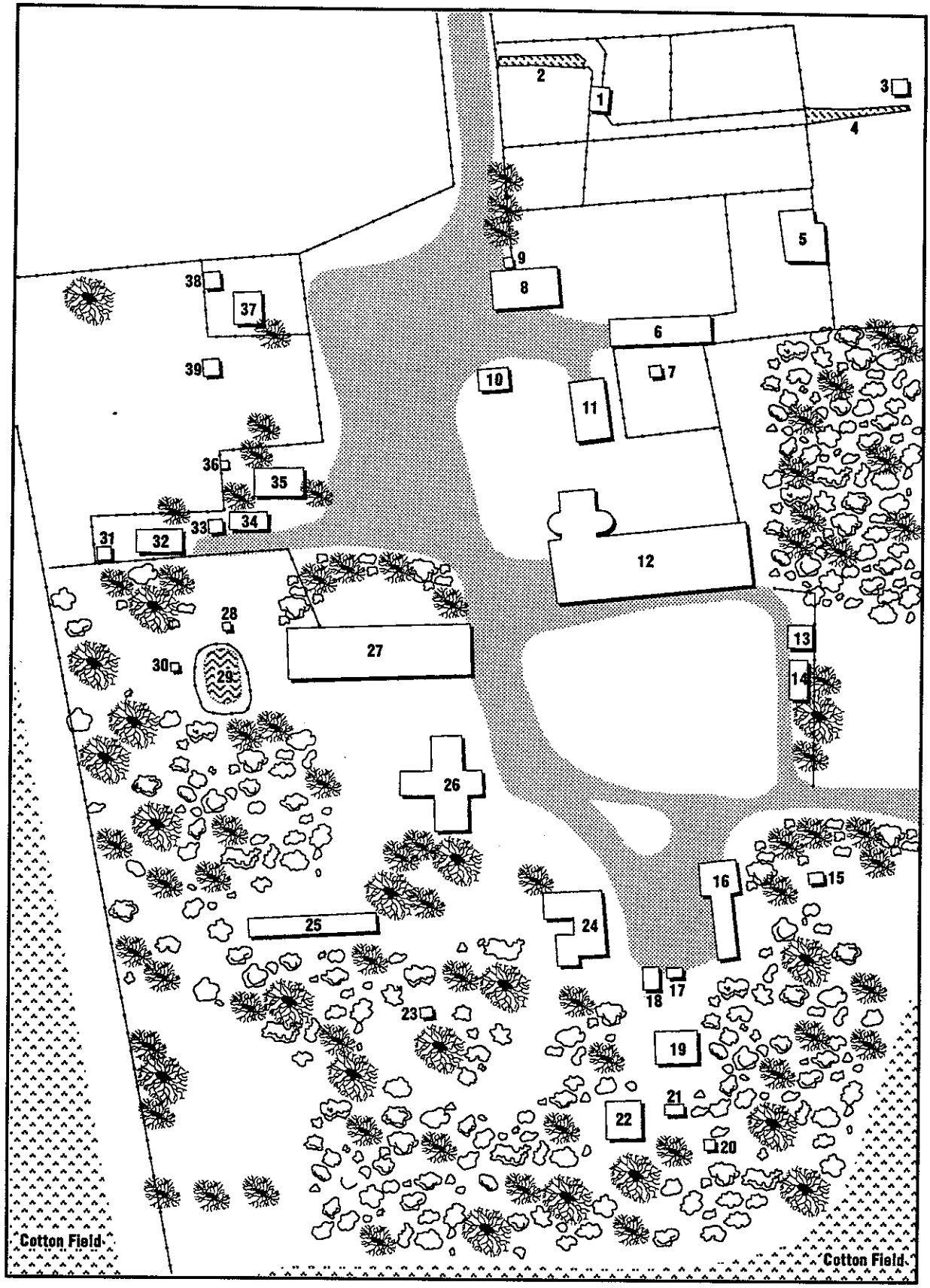
Cultural Resources

The now-abandoned Yosemite Valley Railroad track grade is situated along the far western boundary of the project area and forms the linear projection of the proposed project south to Bellevue Road.

General Plan Goals and Policies

The City has the following applicable historic and cultural conservation goals and policies:

- *Initiate and maintain an inventory of cultural, historic, and architecturally significant resources within the City and the planning area.*
- *Encourage programs and persons to maintain or restore historic or architecturally significant structures.*
- *Encourage the County and other public agencies to preserve and develop historic features within the planning area.*



N Not to Scale

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Figure 4.6-1
Bellevue Ranch Structures

- *Investigate and consider the possibility of using historic overlay zones in conjunction with an historic preservation ordinance to control the use or modification of significant historic areas in the community.*

The City has the following applicable historic preservation related design guidelines:

- *Support both private and public efforts to preserve and rehabilitate historic structures in the City. This should include the need to preserve or protect a site or area of historically or architectural significance from intrusion of surrounding land uses which are uncomplimentary or incompatible with the older structures.*

- *Initiate a program or support other programs which designate historic landmarks and architecturally significant structures in the community.*

3. Project Impacts

Standards of Significance

Project impacts are considered to be significant if they will result in the removal or destruction of significant architectural or cultural resources, or if the project site is found to contain, or is adjacent to properties known to contain archaeological resources.

Specific Impacts

Archeological Resources

According to Basin Research Associates, the preparers of the Cultural Resources Study, prehistoric cultural resources are not expected in the project area. Therefore, **no significant impacts** to prehistoric resources are anticipated to result from the proposed project.

Architectural Resources

The proposed project would result in the demolition of the Bellevue Ranch Complex. It is the opinion of Basin Research Associates that the ranch is of historical and potential architectural interest and may also yield archaeological material associated with specific buildings or activities (e.g., historic privies, trash dumps, etc.). This demolition of the complex is a **significant impact** which could be mitigated to a less-than-significant level through implementation of the mitigation measures described below. Demolition of this historic resource would be counter to City historic preservation goals.

The proposed project would result in the loss of an example of a ranch complex containing architecture dating from the 1870's to 1940. The project's contribution to the cumulative loss

of examples of early twentieth century ranch complexes constitutes a **significant cumulative impact** associated with the project.

Cultural Resources

The proposed project would have an impact on the segment of the abandoned Yosemite Valley Railroad bed which is situated along the far northwestern edge of the project area. This is a **significant impact** of the project, which could be mitigated to a less-than-significant level with implementation of the mitigation measures described below.

4. Mitigation Measures

Implementation of the mitigation measures listed below will reduce project impacts to a **less-than-significant level.**

MM 4.6.1 State of California Historic Resource Inventory Form(s) and an Archeological Site Record Form (State of California DPR 422 A (Rev. 4/86) Form) of the Bellevue Ranch complex shall be completed by a qualified architectural historian prior to the issuance of any grading, demolition, or building permits for the project. Copies of the Form(s) shall be filed with the local historical society, the Mercer County Museum and Historical Society, the Office of Historic Preservation, and the Central Information Center as appropriate.

MM 4.6.2 Archaeological monitoring of any demolition and subsurface construction in the vicinity of the Bellevue Ranch buildings shall be conducted by a qualified archaeological monitor and funded by the project applicant . Archaeological monitoring shall include the observation of all ground disturbing construction either on or in the near vicinity of a culturally sensitive area. The archaeological monitor shall have the authority to suspend or modify the intensity of the monitoring effort at his/her discretion depending on his/her perception of the field results at the time. The archeological monitor shall have the authority to temporarily halt construction operations in the immediate vicinity (defined as a 10 meter radius) of an archaeological find if significant or potentially significant cultural resources are exposed and/or adversely affected by the construction operations.

The archaeological monitor shall notify the City of any significant or potentially significant cultural resources exposed, in a timely fashion.

MM 4.6.3 If any significant cultural materials (artifacts, human burials, or the like) are exposed during demolition, excavation, grading or other construction activities in the vicinity of the Bellevue Ranch buildings or anywhere else on the project site, operations shall be ceased within 10 feet of the find, the City shall be

notified, and a qualified archaeologist contacted for further recommendations.

If the find is determined to be significant, then a representative of the construction and engineering firms, the archaeologist, City and agency officials and a representative of the local (i.e., most likely descendant) native American community (if the discovery is an aboriginal burial) will meet to determine an appropriate course of action. This shall focus on modifying the engineering and construction plans for resource avoidance, data recovery through excavation or preservation, or a combination of the two. The primary objective shall be to recommend alternative means for the preservation and/or controlled recovery of cultural resources without undue delay, wherever and whenever possible, to construction operations.

Any artifacts or samples collected as part of the initial discovery, monitoring, or mitigation phases shall be properly conserved, cataloged, analyzed, evaluated, and curated along with associated documentation in a professional manner consistent with current archaeological standards.

MM 4.6.4 A Historic American Building Survey (HABS; administered by the National Park Service) or HABS-like architectural recordation and narrative/descriptive report of all standing Bellevue Ranch structures shall be prepared by a qualified architectural historian, funded by the project applicant and filed with the City prior to the issuance of any grading, demolition, or building permits for the project that may impact existing structures. The report shall include a discussion of the degree to which Bellevue Ranch meets National Register criteria. The report shall also include identification of buildings or areas where potentially significant subsurface historic archaeological remains may be expected, to facilitate archaeological monitoring. The report shall be reviewed by the monitoring archeologist prior to acceptance by the City.

Prior to preparation of the survey and report, the architectural historian, based on his/her preliminary research, may make recommendations to the City regarding the scope of survey, including recommendations for the analysis of selected, rather than all, structures. Any reduction in the scope of the survey and report shall be subject to City Council or Planning Commission approval.

MM 4.6.5 An Archeological Site Record Form (State of California DPR 422 A (Rev. 4/86) Form) for the segment of the Yosemite Valley Railroad Grade shall be completed by a qualified architectural historian prior to the issuance of any grading, demolition, or building permits for the project that may impact the Yosemite Valley Railroad Bed. Copies of the Form(s) shall be filed with the Central Information Center.

4.7 HYDROLOGY AND WATER QUALITY

1. Environmental Issues

This section of the EIR addresses hydrologic conditions related to drainage patterns and flooding, groundwater resources, and water quality for the proposed Bellevue Ranch development. Environmental impacts due to development of the proposed project and mitigation measures are detailed in the following components of this section.

2. Existing Setting

Drainage Patterns and Flooding

The City of Merced and the proposed Bellevue Ranch development project lies within the San Joaquin River/Merced River drainage basin or "watershed". A watershed is commonly defined as the area of land that drains water, sediment, and dissolved materials to a common outlet at some point along a stream channel. The Bellevue Ranch project site is relatively level with general site drainage to the southwest corner of the property. Major drainage features include Fahrens Creek, Parkinson Creek, and Cottonwood Creek.

Fahrens Creek is a natural drainage course that intersects the property boundary in the northeast corner and extends in a southwesterly direction to run adjacent to the western property boundary. Parkinson Creek intersects the project site near the center of the north property line and terminates at the intersection with Fahrens Creek near the center of the site. US Geological Survey maps from 1987 show Parkinson Creek as an intermittent stream which becomes channelized within the project boundaries before it intersects Fahrens Creek. This "creek" could be more accurately described as an irrigation channel within the project site. Cottonwood Creek flows westerly along the southern property boundary and intersects with Fahrens Creek near the southwestern corner of the site.

In addition to the natural drainage features, the project site is transected by numerous man-made irrigation canals. The most prominent is the Tower Lateral Canal which flows to the south along the eastern property boundary.

Almost the entire City of Merced is currently designated as lying within the 100-year floodplain as defined by the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM). Included in the 100-year flood-plain is approximately 60 percent of the proposed Bellevue Ranch development. Historically, flooding has occurred within the watershed of lower Fahrens Creek. However, the Merced Irrigation District (MID) has indicated that the source of flooding was the failure of the Bear Creek levees which allowed the flood waters to flow north and inundate the lower Fahrens Creek areas. MID has also indicated that the Fahrens, Parkinson, and Cottonwood Creeks in the vicinity of the proposed Bellevue Ranch development have not historically been problem flooding areas. This may be due to the extensive natural storage capabilities of these watersheds.

MID maintains an extensive system of canals, levees and ditches including the Main Canal, located north of the project site. The Main Canal was constructed in 1886 and intercepts flows from the upper Elendale, Parkinson, and Fahrens Creeks watersheds as well as several unnamed tributaries east of Main Canal. The Main Canal conveys a portion of those flows to Yosemite Lake located east of the proposed project. However, during a severe storm even, a breach is made by MID in the west levee of the Main Canal near Fahrens Creek allowing excessive flows from the upper Fahrens and Parkinson Creek watersheds to flow down the lower Fahrens Creek channel. Historically, the west levee of the Main Canal has been breached several times. It is these flows from the upper watersheds which constitute a large portion of the overall runoff from the Fahrens Creek watershed.

Merced County Streams Project

In September of 1983, the Sacramento District of the Army Corps of Engineers published Design Memorandum No. 11 entitled "Merced County Streams Levee and Channel Improvements" to develop a design to provide flood protection to the study area. The study area included the City of Merced and included a portion of the proposed Bellevue Ranch project. The document sets forth improvement plans for Cottonwood Creek, lower Fahrens Creek, and Black Rascal Creek. The planned improvements on lower Fahrens and Cottonwood Creeks include realignment, levee construction, and channel configuration of portions of the Creeks located within the southern portion of the Bellevue Ranch project.

The lower 5000 feet of Fahrens Creek will be affected by the Army Corps project. The Army Corps plans to widen and realign Fahrens Creek to maintain a trapezoidal channel configuration. The bottom width will be 120 feet and the side slopes will be 5(h):1(v) (5 feet horizontal to 1 foot vertical). Right of Ways will be maintained on each side of the channel and will extend 37 feet away from the top of the channel embankment. A bike and service road is proposed for each Right of Way. The total cross-section of the channel proposed by the Army Corps is approximately 290 feet wide. The Army Corps project does not involve any channel improvements or reconfiguration for the remainder of Fahrens Creek located within the proposed Bellevue project boundaries.

The proposed Army Corps project will include realignment and reconfiguration of the portion of Cottonwood Creek located near the southern property boundary. The entire Creek within the Bellevue project boundaries will be affected. The Army Corps proposes to widen and realign Cottonwood Creek to a trapezoidal channel with bottom width of 10 feet and side slopes of 2(h):1(v). Fifteen feet wide Right of Ways are proposed for each side of the new channel extending the entire affected area to a width of approximately 90 feet.

Water Quality

Surface Water

A number of studies have been conducted as part of the Nationwide Urban Runoff Program (NURP) to characterize urban runoff quality. Heavy metals were observed to be the most prevalent priority pollutant constituents. Concentrations of these metals in urban runoff were found to exceed EPA ambient water quality criteria and drinking water standards in many cases. Organic priority pollutants, such as nitrates and phosphates associated with lawn fertilizers were also identified. However, the frequency and concentrations were lower than those observed for the heavy metals.

Constituents found in urban runoff vary considerably. This variation depends on differences in rainfall intensity and occurrence, and on geographic features and land-use of a particular site. Merced is characterized by a natural weather pattern of a long dry period from May to October. During this seasonal dry period pollutants contributed by vehicle exhaust and tire wear, crankcase drippings, and spills accumulate within the watershed. Precipitation during the early portion of the wet season combines with this accumulation of pollutants into the storm water runoff resulting in high pollutant concentrations in the initial wet weather runoff. A study conducted by the Regional Water Quality Control Board in Sacramento, California revealed the during the rainy season, initial high pollutant concentrations of heavy metals and hydrocarbons occurred in the first five inches of seasonal rainfall. Trace metals and hydrocarbon concentrations then remained largely static in subsequent storm events.

The existing water quality of the Creeks are unknown at this time. However, due to the historic farming and cattle grazing activities it is anticipated that the Creeks contain some level of nitrates due to fertilizers, pesticides and cattle manure.

Groundwater

Groundwater is a very significant source of water in Merced County. It is generally supplied by runoff from the foothills and mountains which then percolates through the soil to the San Joaquin basin underground aquifer. Traditionally the City of Merced and the surrounding area has relied on its groundwater resources to supply all of its municipal and industrial water needs. The proposed Bellevue Ranch project will rely on large scale municipal wells to supply potable water. The City of Merced Water Master Plan (currently in Draft from, 1991) represents a general plan for overall water system expansion. Long range water supply planning has determined that the groundwater basins are capable of supplying 30,000 acre-feet of high quality groundwater per year. Utilizing realistic population projections, this limit may be reached by the year 2013. In 1992, however, the City of Merced entered into an agreement with MID for additional surface water supplies. Although use of this supply is contingent

upon the City's provision of a new water treatment facility, this source will extend the City's water resources beyond the year 2013.

The Merced County General Plan identifies groundwater problem areas based on data developed by the Merced County Division of Environmental Health. Figure 4.7-1 shows the problem areas identified within the County. Neither the project area nor the City of Merced is designated as lying within a groundwater problem area.

General Plan Goals and Policies

The City of Merced General Plan contains several policies to protect the community from flooding and to maintain good and adequate water quality. The City of Merced has adopted the following goals and objectives.

- *Continue support of floodplain regulation and control development where it may be dangerous to health, safety, or property due to flooding.*
- *Develop and support local water management programs, including the continued enforcement of all state codes, to ensure a sustained high quality and quantity of groundwater resources.*
- *Ensure that support of the Merced Stream Groups Project provides community-wide flood protection consistent with the policies of the Open Space and Conservation Elements of the General Plan (provided above).*
- *Continue participation in and support of the Federal Flood Insurance Program through enforcement of the local flood control ordinance.*
- *Continue to implement the "Merced County Critical Area Flooding and Drainage Plan". This plan provides for improvements to existing storm drainage facilities and storm techniques for urban expansion areas. Where possible, this should include consideration of using storm water detention ponds combined with open space functions.*

2. Project Impacts

Standards of Significance

For the purposes of this EIR, an impact is considered to be significant if any of the following conditions would result from implementation of the proposed project:

- Increase in potential for substantial flooding to occur.

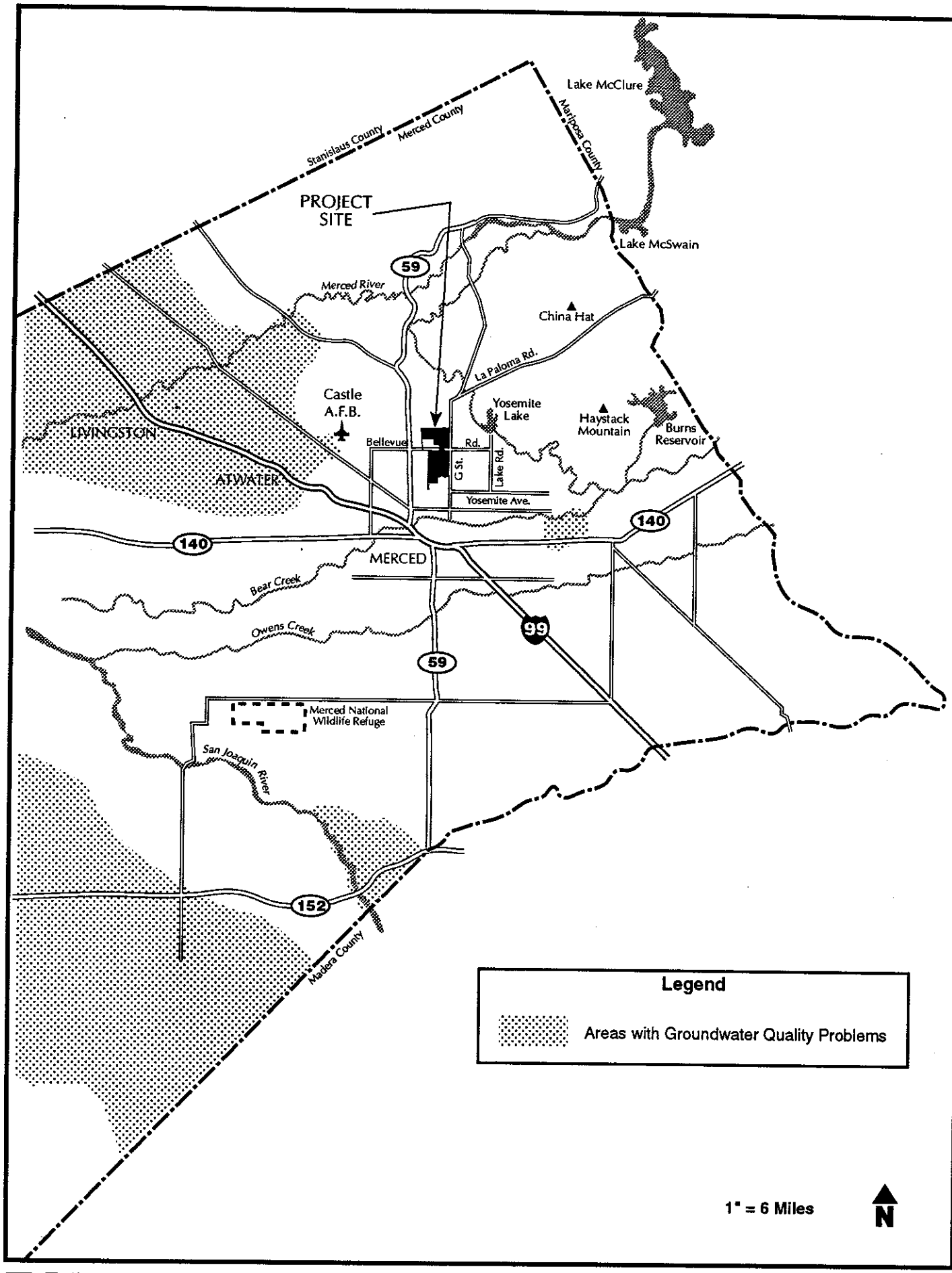

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Figure 4.7-1
Groundwater Quality

- Substantial erosion or siltation.
- Substantial degradation of water quality.

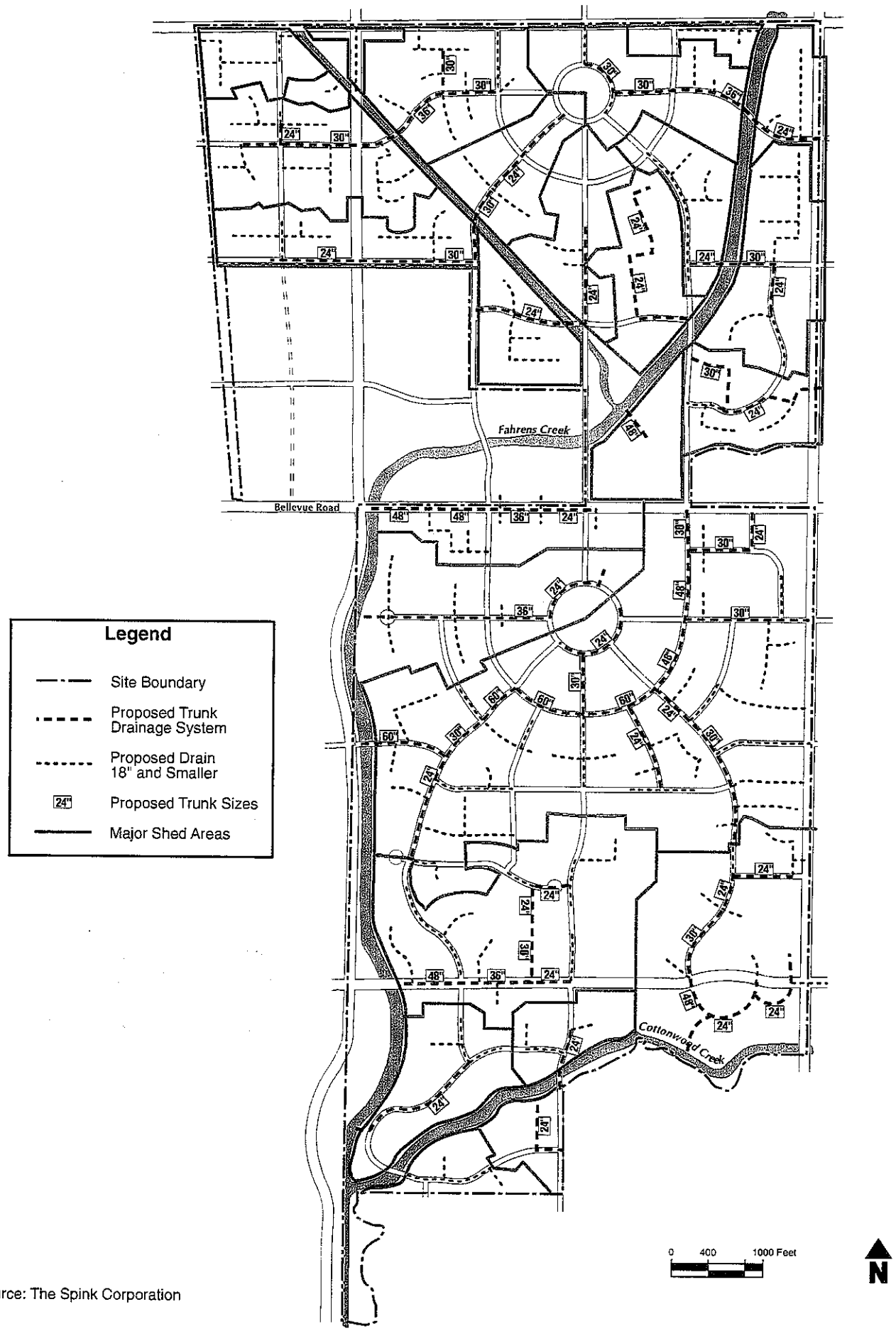
Flooding

The proposed Bellevue Ranch project will involve installation of a complete master storm drainage system consisting of underground pipes and open channels as well as alteration of Fahrens Creek, Cottonwood Creek, and Parkinson Creek to provide for storm drainage capacity. In general, storm water runoff will be diverted by curb and gutter, collected by drop inlets, and discharged into either Fahrens Creek, Cottonwood Creek, or the realigned Parkinson Creek. The preliminary drainage plan details major pipe sizes ranging from 24 to 60 inches. The proposed storm drainage system is shown on Figure 4.7-2.

The alterations and configurations of the open channels were developed by the Spink Corporation using the hydrologic model used by the Army Corps to evaluate flooding problems within the area. Spink's analysis, however, expanded on the Army Corps of Engineer's base model by dividing the subbasin area within the project boundaries into five smaller areas. The subdivision of the subbasin was performed to further refine actual flow volumes anticipated during peak storm events. The further refinement of flows is the basis for the proposed alterations of Fahrens, Parkinson, and Cottonwood Creeks. In addition, the peak flow rate for Fahrens Creek from its confluence with Black Rascal Creek upstream to Cottonwood Creek is based on discussion with FEMA's contract engineering firm and is the FEMA 100 year flow rate for the lower portion of Fahrens Creek.

The Spink Corporation evaluated the change in peak flows that would occur due to the change in land use resulting from the proposed Bellevue Ranch development. The evaluation considered this project together with the nearby Fahrens Park development. The total impervious area represented by the two developments was estimated to be about 1.6 square miles. The Spink study evaluated the minimum channel configurations required to provide storm drainage capacity and flood protection for two cases. The first case assumed that a check structure located upstream on the Main Canal will be constructed. The Corps has recently awarded a contract for construction of the Main Canal Check Structure and construction is expected to begin in November, 1993. However, if the check structure is not built, the southwestern portion of Fahrens Creek between Bellevue and Cardella Roads will be subject to flooding during a 100 year storm event. The second case evaluated the peak flow rates for the "without check structure" condition.

The results of the analysis was that the existing Fahrens Creek channel does not have sufficient capacity to convey the 100-year peak flow rates after buildout of the project. However, realignment and reconfiguration of Cottonwood Creek and Fahrens Creek would provide flood protection for the 100-year storm event if the check structure is built. The required channel configurations are shown on Figure 4.7-3 and 4.7-4.



Source: The Spink Corporation

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Figure 4.7-2
Proposed Storm Drainage System

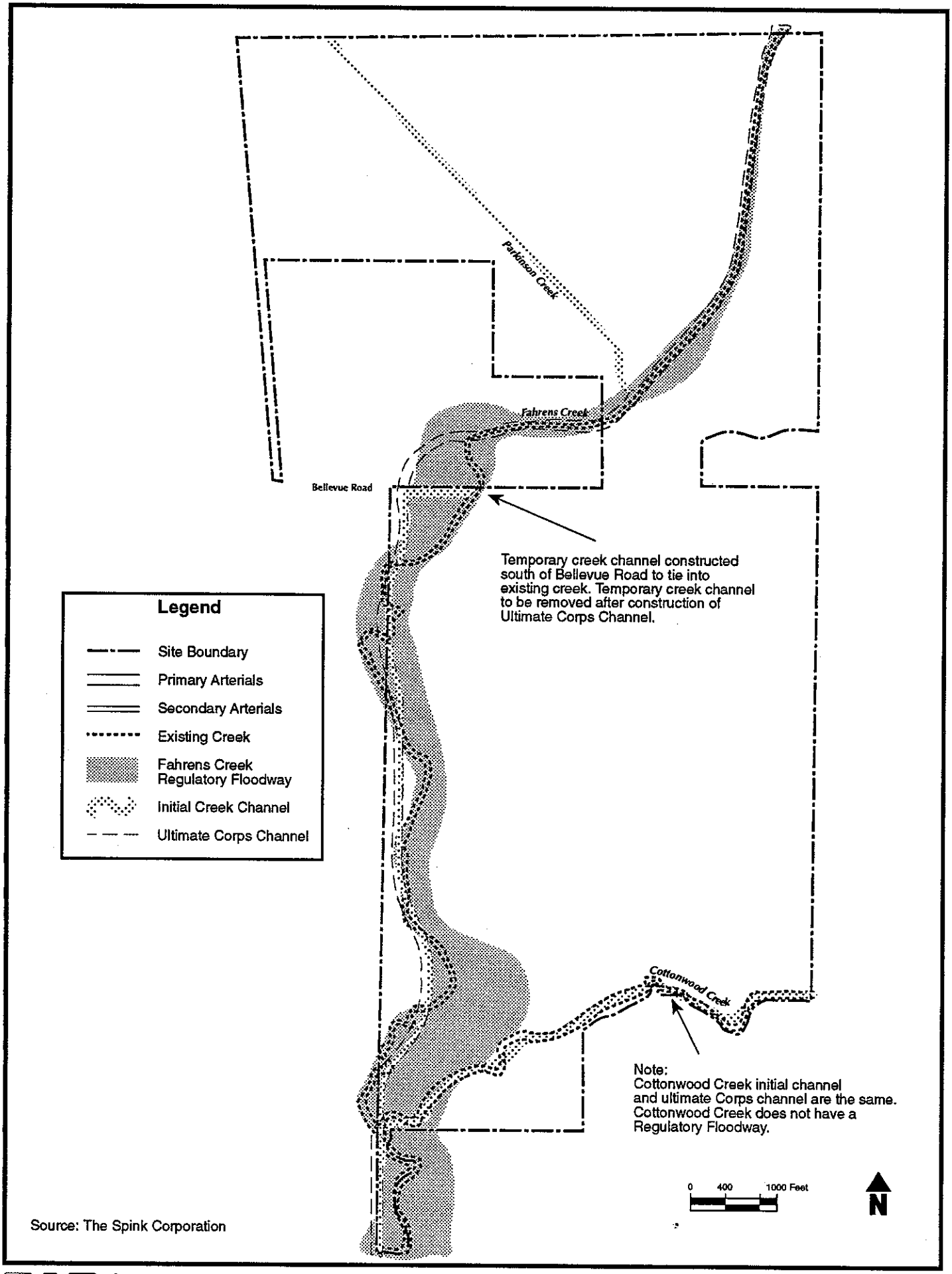

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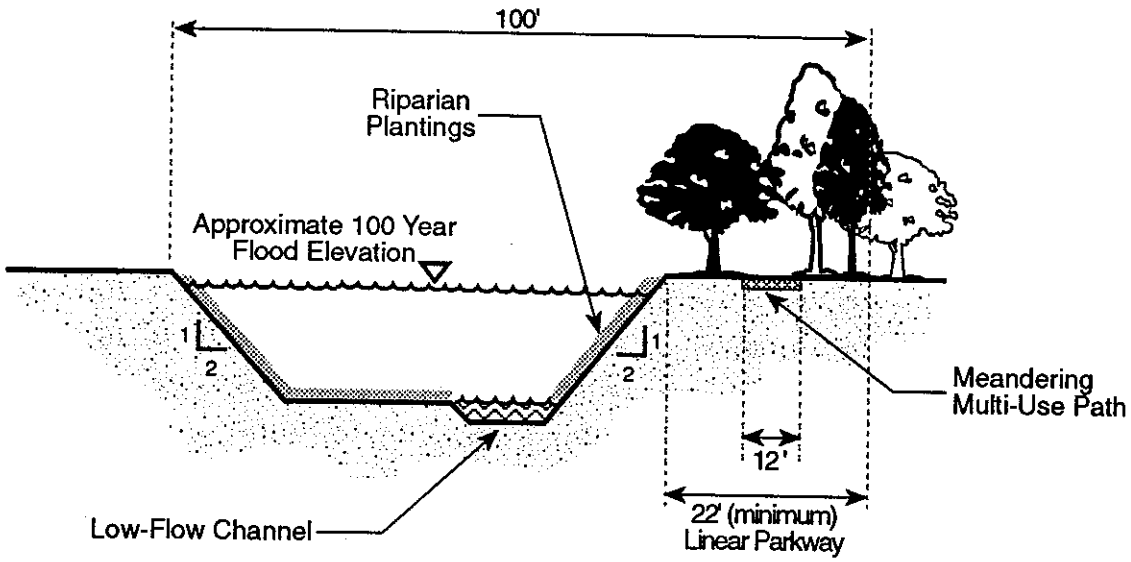
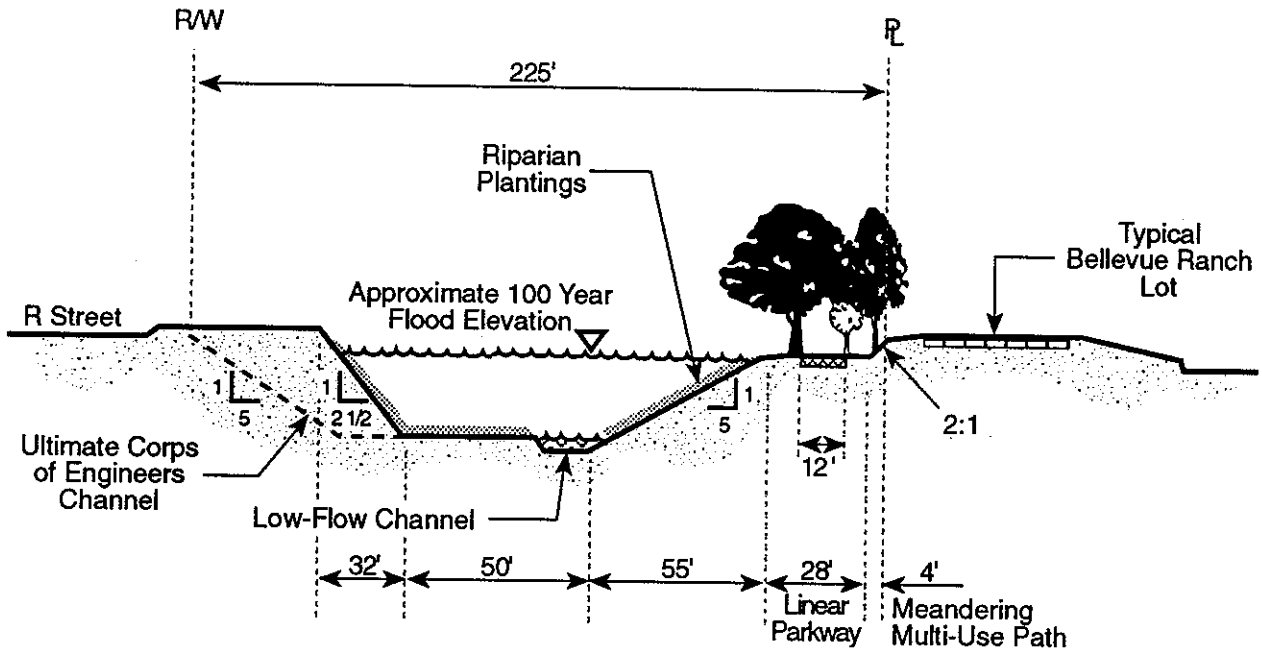
Figure 4.7-3
Initial Channel Impacts on Existing Creeks

Cottonwood Creek



Fahrens Creek



Not to Scale

Source: The Spink Corporation

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Figure 4.7-4
Channel Cross Sections

The implementation of the proposed storm water drainage plan will decrease the potential for substantial flooding to occur, but 100 year flood protection for southwestern portion of the site will not be provided by reconfiguration of the channels unless the Main Canal check structure is built. Since the structure is not yet completed, the potential for people and property to be exposed to flooding within the southwestern portion of the project is considered to be a **significant impact.**

Water Quality

Increased siltation and sedimentation could result from erosion and storm runoff during the construction-phases of the project. This is considered to be a **significant impact.**

The project will result in an increase of impervious surfaces resulting in increased runoff. Due to the increase of urban land use proposed by the project, there will be a corresponding increase in roadway contaminants such as heavy metals, hydrocarbons, nitrates and phosphates associated with landscaping. This is considered to be a **significant impact** as degradation of the surface water quality of the watershed may occur.

3. Mitigation Measures

Implementation of the following mitigation measures will reduce the drainage related impacts a to less-than-significant level.

MM 4.7.1 Prior to approval of the final tract map for a development within the Bellevue Ranch project area, the City will review the development proposal to ensure adequate provisions for flood control facilities consistent with the Bellevue Ranch master drainage plan and City of Merced engineering standards.

MM 4.7.2 Prior to approval of the tentative, the applicant shall obtain COE and City of Merced endorsement of the proposed creek channel designs. Prior to the issuance of building permits in FEMA designated floodplains, the project applicant shall obtain any necessary FEMA endorsements of the revised floodplain boundaries.

MM 4.7.3 Development will not be permitted within the southwestern portion of the project site within the regulatory floodway of Fahrens Creek unless building pad elevations are constructed to be above the 100-year flood elevation.

Implementation of the following Mitigation Measures *during construction* will reduce the water quality and erosion related impacts to a less-than-significant level.

MM 4.7.4 A comprehensive plan to prevent erosion, siltation and contamination of storm water during construction will be required for any development proposal within the Bellevue Ranch project area prior to approval of the improvement plans. This plan must be prepared in accordance with permit conditions and requirements of the State Water Resources Control Board.

MM 4.7.5 Grading operations should be targeted for the dry months of the year as directed by the City.

MM 4.7.6 If project construction occurs during storm events, sediment traps, barriers, covers or other methods approved by the City shall be used to reduce erosion.

MM 4.7.7 Cut and fill slopes shall not be steeper than that recommended by the project geotechnical engineer and approved by the City.

MM 4.7.8 Temporary mulching, seeding, or other suitable erosion stabilization measures approved by the City shall be used to protect exposed areas during construction activities.

MM 4.7.9 Excavated materials shall not be deposited or stored where the material could be washed away by stormwater runoff.

MM 4.7.10 Final slope grades shall be revegetated as soon as practical after completion of grading.

Implementation of the following Mitigation Measures *after occupancy* will reduce the water quality and erosion related impacts to a less-than-significant level.

MM 4.7.11 Final grades shall be graded so that runoff of surface water is minimized.

MM 4.7.12 Streets and parking lots shall be cleaned at least twice during the dry season and at least once during the rainy season, or other practices shall be used to limit the accumulation of "first flush" contaminants.

4.8 BIOTIC RESOURCES

1. Environmental Issue

This section provides a description of the biotic resources present within the project site, and examines the potential impact of the proposed project on those resources. The discussion is based on a report prepared by Sugnet & Associates on the biotic and wetlands resources on the project site. The full text of the report is contained in the Technical Appendices.

2. Existing Setting

Biotic and wetland surveys were conducted on the Bellevue Ranch site during September-October 1992. For the biotic field surveys, biologists walked transects and recorded species present in all areas of the project site, with special emphasis given to wetland features and riparian habitats. The following summarizes the results of those surveys, focusing on existing biotic resources, wetlands subject to U.S. Army Corps of Engineers jurisdiction, and special-status species.

Existing Biotic Communities, Vegetation and Wildlife

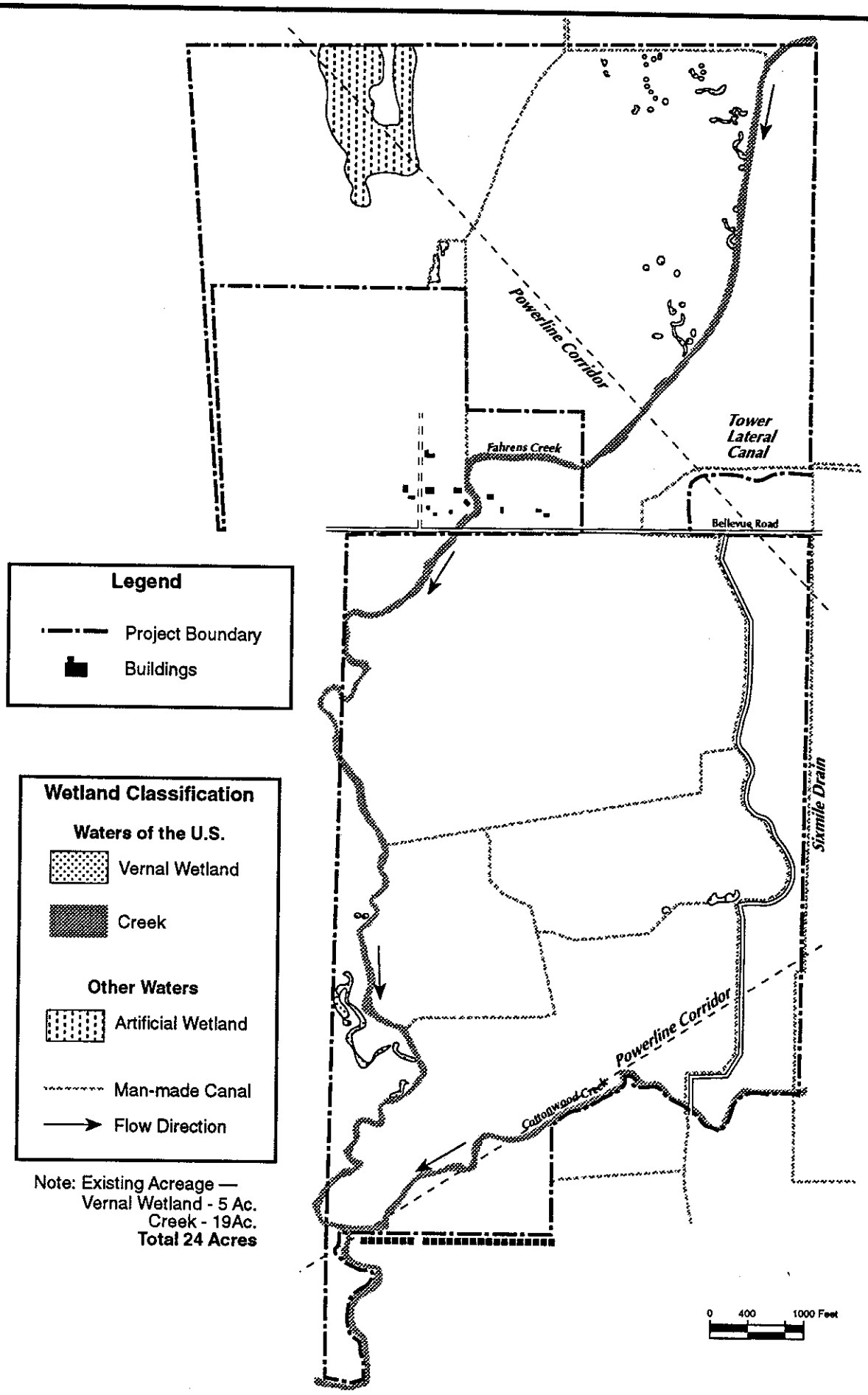
Vegetation types at the Bellevue Ranch Site are mapped in Figure 4.8.1. A list of plant species observed during field surveys is presented in Table 4.8.1. Plants associated with wetlands are marked with an asterisk.

Non-native grassland (dryland pasture) - The dominant plant community in non-irrigated upland areas is non-native grassland. These areas on the Bellevue Ranch site were heavily grazed, resulting in a relatively sparse plant community. The most conspicuous elements of the flora in these areas were wild oats (*Avena* sp.), soft chess (*Bromus mollis*), ripgut brome (*Bromus diandrus*) mediterranean barley (*Hordeum hystrix*), and ryegrass (*Lolium perenne*). While many of the species found in these habitats are California natives, most are introduced annuals.

Irrigated pasture - These areas support species such as dallisgrass (*Paspalum dilitatum*), soft rush (*Juncus effusus*), ryegrass (*Lolium perenne*), rabbitsfoot grass (*Polypogon monspeliensis*), sedge (*Cyperus* spp.), and curly dock (*Rumex crispus*). Although irrigated pasture supports lush vegetation, these areas are usually dominated by non-native species.

Row Crops - The majority of the southern portion of the site is in cropland. These areas were used for cotton production during 1992.

Vernal pools and seasonal wetlands - These wetlands support hydrophytic (wetland plants) vegetation during winter and spring, but are dry from summer through fall. These wetlands are found interspersed in the non-native grassland (dryland pasture) along Fahrens Creek. They are dominated by such plants as popcorn flower (*Allocarya stipitata*), coyote thistle (*Eryngium vaseyi*), and mediterranean barley (*Hordeum hystrix*).



WILLDAN ASSOCIATES
ENGINEERS & PLANNERS

Figure 4.8-1
Wetlands Distribution

Riparian scrub/woodland - Both creeks and some irrigation canals support riparian vegetation. The two creeks are:

Cottonwood Creek - Historically an intermittent drainage, Cottonwood Creek now carries water all year due to irrigation runoff. Vegetation within and along the creek includes: soft rush (*Juncus effusus*), bulrush (*Scirpus acutus*), smartweed (*Polygonum* spp.), Johnson grass (*Sorghum halepense*), field mustard (*Brassica* sp.), blackberry (*Rubus procerus*), California wild rose (*Rosa californica*), and Fremont's cottonwood (*Populus fremontii*).

Riparian vegetation is discontinuous along this creek. Mature cottonwood trees are the dominant feature, but no one species is really dominant in this disturbed habitat. In addition, no real riparian understory exists. Ruderal grasses including *Bromus* spp. dominate the understory of the cottonwood areas.

Fahrens Creek - This creek is more marsh-like in nature, although intense grazing limits the development of marsh vegetation. This creek supports such species as soft rush (*Juncus effusus)*, smartweed (*Polygonum* spp.), dallisgrass (*Paspalum dilatatum*), and goldenrod (*Solidago* sp.). Occasional willows (*Salix* spp.) also occur along the creek, but there is less riparian growth along this creek when compared to Cottonwood Creek. This may reflect heavier grazing pressure on Fahrens Creek.

Other trees - There are relatively few trees on the project site. The most abundant species is blue gum eucalyptus (*Eucalyptus globulus*). A grove of this ornamental tree is planted on top of the hill in the south-central potion of the site. It is also planted as a wind break along the project boundary south of the hill.

Wildlife - Evidence of beavers, including several dams and many chew-scarred trees, was observed along both creeks. Muskrats also occurred in both creeks. Many raccoon scats full of crayfish exoskeletons were seen adjacent to the creeks.

Birds observed along the waterways include red-winged blackbirds, green-backed heron, great egret, Bewick's wren, black phoebe, song sparrow, savanna sparrow, and white-crowned sparrow.

A list of wildlife species observed during surveys of the Bellevue Ranch site is presented in Table 4.8.2.

Regulatory Framework

Protected Habitat - Wetlands

Although definitions vary to some degree, wetlands are generally considered to be areas that are periodical or permanently inundated by surface or ground water, and support vegetation adapted for life in saturated soil. Wetlands are recognized as important features on a regional and national level due to their high inherent value to fish and wildlife, use as storage areas for storm and flood waters, and water recharge, filtration and purification functions. For this reason the California Department of Fish and Game (CDFG) and the United States Army Corps of Engineers (Corps) have jurisdiction over modifications to river banks, lakes, channels and other wetland features.

The jurisdictional authority of the Corps is established through the provisions of Section 404 of the Clean Water Act, which prohibits the discharge of dredged or fill material into "waters of the United States without a permit). The Corps specifies wetlands delineation procedures to determine its jurisdictional wetlands. The Corps typically does not exercise jurisdiction over irrigation and drainage channels unless historical evidence indicates they are not of man-made origin. However, the Corps reserves the right to review each potential wetland or "waters of the United States" on a case by case basis.

Jurisdictional authority of the CDFG over wetland areas is established under Fish and Game Code Sections 1601-1606, which pertains to activities that would disrupt the natural flow or alter the channel, bed, or bank of any lake, river, or stream. The United States Fish and Wildlife Service (USFWS) classification system is used by the CDFG to determine wetlands in the state. The Fish and Game Code stipulates that it is "unlawful to substantially divert or obstruct the natural flow or substantially change the bed, channel or bank of any river, stream or lake without notifying the CDFG, incorporating necessary mitigation, and obtaining a Streambed Alteration agreement with the CDFG. The Wetlands Resources Policy of the CDFG states that the Fish and Game Commission will "strongly discourage development in or conversion of wetlands...unless, at a minimum, project mitigation assures there will be no net loss of either wetland habitat values or acreage." The CDFG is also responsible for commenting on projects requiring Corps permits under the Fish and Wildlife Coordination Act of 1958.

Wetlands On-Site

As shown in Figure 4.8.1, the project site supports three types of wetlands subject to Corps jurisdiction. These include vernal pools, seasonal wetlands, and intermittent creeks. The acreage of vernal pools is estimated at 2.5 acres. The site contains approximately 4 acres of seasonal wetlands. Intermittent streams occupy approximately 20 acres of the project site. In

addition, a few artificial wetlands and several canals and manmade ditches occur on the site.

Fahrens Creek, the larger of the two creeks, enters the site from the northeast corner and travels southwest across the northern parcel and south along the southern parcel. The creek is channelized in the northern parcel but, except for short channelized reaches, has kept its meandering course in the southern portion of the site. The headwaters of Fahrens Creek are located approximately seven miles northeast of the site near China Hat Peak.

Most of the eastern half of the southern boundary of the site lies along Cottonwood Creek. This watercourse meanders primarily from east to west where it joins with Fahrens Creek in the southwest corner of the site. The watershed for Cottonwood Creek is much smaller than Fahrens Creek. Its headwaters are located approximately three miles east of the site near Lake Road.

Although the two creeks appear to carry water during all months of the year, they have been classified as intermittent creeks. The USGS map for the Merced 7.5' quadrangle lists both creeks as intermittent watercourses, and it is likely that most of the water carried by the creeks during the drier portions of the year is a result of urban/rural and agricultural runoff. The creeks themselves are relatively small and would not be expected to contain high flows. In the vicinity of the project site, creeks of this size are usually dry in summer and fall months unless they convey runoff from agricultural or urban activities.

Two vernal pool/seasonal wetland areas are present on the site. These are located in the northeastern portion of the northern parcel in the dry pasture area, and in the western portion of the southern parcel, also in a dry pasture area. These areas are characterized by former channels of Fahrens Creek (cutoff oxbows, swales, etc.) and shallow depressions that support vernal pool and seasonal wetland vegetation. All of the vernal pools and seasonal wetlands are located in non-irrigated pasture areas that receive very high amounts of disturbance from cattle.

A large cattail/common rush marsh occurs in the west-central portion of the northern parcel. This marsh appears to have been excavated to about three feet below the surrounding grade and the soils pushed laterally to create a low berm. In 1990, the Soil Conservation Service (Merced office) made a wetland determination of the entire Bellevue site. The cattail marsh was determined to be an "artificial wetland," maintained by the heavy summer irrigation schedule. An artificial wetland, as defined by the SCS, is "...an area that was formerly non-wetland or prior converted cropland, but now exhibits wetland characteristics because of human activities." At the current time, it can be assumed that if irrigation ceased the wetland would revert to upland. However, because a portion of the area has been excavated below surrounding grade and the site occurs on a poorly drained soil, the theory of reversion may need to be tested to determine jurisdiction.

In addition to the areas mentioned, many areas on the site contain common rush. This perennial plant is a wetland species that, once established, is often able to survive under drier conditions or in irrigated pastures. It is currently able to persist in upland areas due to the poorly drained nature of the soils and the high amount of irrigation water received.

The project site is crossed by several manmade canals that carry irrigation water to and from fields and pastures. These canals are noted in Figure 4.8.1, although widths, flow regime, and hydrologic function of these canals were not investigated. It is the opinion of Sugnet & Associates that these canals are not subject to U.S. Army Corps of Engineers jurisdiction. However, as previously explained, although these are clearly excavated features, the U.S. Army Corps of Engineers may claim jurisdiction over these canals.

Related Projects

The Corps has developed plans for major flood control improvements in the Merced and project area. Planned improvements would affect portions of Fahrens Creek and Cottonwood Creek. The Corps design includes replacing the portion of Fahrens creek which extends from the southwest corner of the project site to a point north of what is planned to be Cardella Road with a channel in order to accommodate flooding. According the Corps plans, the eastern channel of Fahrens Creek is to have flat side slopes (5 to 1) in order to accommodate passive uses and be aesthetically pleasing. The Corps is also considering extending the Fahrens Creek channel improvements to G street, through the project site. The Fahrens Creek and Cottonwood Creek improvements planned by the Corps are scheduled for completion by the year 2000.

Protected and Special-Status Species

Regulatory Framework

Special status species include those listed by the Federal or State governments as endangered, threatened, rare, or candidate for listing, or listed by the California Native Plant Society (CNPS) as rare or endangered. These species have varying degrees of legal protection under both Federal and California Endangered Species Acts (FESA and CESA), and the California Environmental Quality Act (CEQA). The United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) share responsibility for management and protection of natural resources in the proposed project area. Under separate State and Federal legislation, each agency conducts a detailed review of any project that could affect a special status plant or animal species. If a listed species may be affected, the lead agency must initiate a formal consultation with the USFWS and/or CDFG, as applicable under Federal or State law.

Section 7 of the Federal Endangered Species Act requires formal consultation on those species currently listed as threatened or endangered. The USFWS recommends that candidate species

also be considered because they may become listed during the design and construction phases of a project. Section 9 of the Act prohibits the "take" of listed species. If incidental take might occur from a project, that is if individuals of a listed species would be inadvertently harmed, harassed, or collected, or would suffer significant habitat modification, consultation with the USFWS is required. Additionally, a formal consultation process must be initiated with the CDFG for projects that the State lead agency has determined may or will have an adverse effect on a State listed species. As with the USFWS policy, candidate species are not subject to the same consultation requirements as listed, endangered, or threatened species. The California Endangered Species Act does encourage informal consultation for candidate species that may become officially listed prior to completion of the CEQA process.

In addition to providing formal and informal consultation, the CDFG has also established the California Natural Diversity Data Base (CNDDB), a program that inventories the State's rare species and natural communities, and also provides information on their current listing status.

The California Native Plant Society (CNPS) publishes and regularly updates the Inventory of Rare and Endangered Vascular Plants of California. CNPS gathers information from the CNDDB, the CDFG, and amateur and professional botanists throughout the State. The Inventory has become the standard reference on California's rare and endangered plants. Plants listed by CNPS but not officially listed by the State, nevertheless receive protection under CEQA; that is, impacts to CNPS-listed species are considered to be significant.

In addition to the protected species designations, the CDFG has developed a list of "Species of Special Concern." These species are defined as having California breeding populations that are of special concern in that they may face extinction within the State in the near future. By so listing a species, the CDFG draws attention to the potential for future designations of such species to a more protected status.

Special Status Species On-Site

Representatives of the U.S. Fish and Wildlife Service (Dale Garrison, Los Banos, CA; Becky Keck, Sacramento, Ca) and the California Department of Fish and Game (Holman King) were contacted regarding wetlands and special-status species on the Bellevue Ranch site. The California Department of Fish and Game's Natural Diversity Database (NDDB) for the Merced and Yosemite Lake 7.5' quadrangles and Merced County was accessed to provide preliminary information on potential special status species in the project vicinity. The information received is included in an appendix to the biotic resources study for the project included in the Technical Appendices of this EIR.

Field surveys were conducted in September/October 1992. Biologists walked the site, concentrating on wetland features, drainage and canals, and the creeks. In general, most of the northern portion of the site is used for grazing, either dryland or irrigated pasture. Most of

the southern portion of the parcel is in cotton. The degree of disturbance over most of the site reduces the likelihood of any special-status species occurring on site.

Table 4.8.3 lists the potential special-status species for Bellevue Ranch and vicinity. It also contains an assessment of the likelihood of each species occupance on the project site.

Two special status species were found on the site. They are described below:

Fairy and Tadpole Shrimp - These species are currently proposed for listing under the federal Endangered Species Act. A decision on whether to list fairy shrimp and tadpole shrimp as endangered species will probably occur sometime between May and November of 1993. These animals inhabit vernal pools, as well as other ephemeral waterbodies throughout portions of the Central Valley. Surveys for fairy shrimp and tadpole shrimp were conducted at Bellevue Ranch during February of 1993.

Two species, Vernal Pool Fairy Shrimp (*Branchinecia lynci*) and California Linderiella (*Linderiella occidentalis*) were found together in vernal pools in the northern portion of the project site. California Linderiella was also found in the southwest portion of the site west of Fahrens Creek.

Two other species, Conservancy Fairy Shrimp (*Branchinecta conservatio*) and Vernal Pool Tadpole Shrimp (*Lepidurus packardi*) were not found on-site. Conservancy fairy shrimp are known from the Haystack Mountain Preserve, Merced County, located east of the project site. However, since this species is generally associated with relatively large, deep vernal pools, it is unlikely that it occurs on the project site. Vernal Pool Tadpole Shrimp have been recently reported from Merced County, but this species also prefers larger, deeper pools.

Fairy shrimp eggs can be transplanted from an impacted wetland habitat to newly created wetlands as part of seasonal wetland and vernal pool mitigation. Fairy shrimp hatched from these eggs readily colonize the new habitat.

General Plan Goals and Policies

- *Encourage and support efforts by Merced county and other public agencies to undertake inventories of existing natural areas within the County for the purpose of taking actions to preserve, enhance, or restore such areas.*

- *Maintain existing natural resources in and around the City by establishing programs such as the parks system, urban expansion boundaries, special conservation programs, and other appropriate steps to preserve natural areas.*

- *Discourage active recreational uses in and adjacent to significant natural areas which may harm natural resources or wildlife habitat, and to consider means of controlling overuse.*

- *In areas designated for development, endeavor to preserve and enhance natural areas through proper site planning.*

- *Within the urbanized area, encourage the use of landscaping materials for homes, businesses, and publicly-owned property which could serve wildlife for food, cover, and nesting.*

- *Support flood control proposals which demonstrate a reasonable ability to protect the natural resources of the community.*

- *Strongly resist concrete channeling of existing creeks and streams as part of any flood project and to support more natural flood control alternatives.*

3. Project Impacts

Standards of Significance

Impacts to biotic resources are considered significant under the California Environmental Quality Act if they:

- Disturb a significant natural vegetation type;

- Disturb or degrade waters or wetlands subject to U.S. Army Corps of Engineers jurisdiction;

- Adversely affect a population or the critical habitat of special-status plants or animals;

- Interfere with the movement of resident or migratory fish or wildlife;

- Constitute a substantial reduction in habitat for fish, wildlife, or plants.

Specific Impacts

Vegetation

The site is predominately in agricultural production, irrigated pasture, or non-native grassland (dryland pasture). Project impacts to this resource would be in the form of conversion of agricultural land to residential development, commercial development, and limited open space.

The site also contains stands of mature eucalyptus trees which may be impacted by development. These stands of trees hold more aesthetic than biological importance, and are discussed in Section 4.3 for appropriate context. Impacts to vegetation resources are **less-than-significant.**

Wildlife

Implementation of the project would result in the displacement of the immediate resident wildlife species observed on site. Conversion of the Bellevue Ranch site to urban uses would, however, result in a **less-than-significant** impact to wildlife in the area, given the existing agricultural impacts to the site and the abundance of similar habitats in the region.

Wetlands and Waters of the United States

As previously explained, Fahrens and Cottonwood Creeks are part of a proposed levee and channel improvement project for the Merced area, proposed by the U.S. Army Corps of Engineers (U.S. Army Corps of Engineers,Design Memorandum No. 11, September 1983). This project encompasses all of Cottonwood Creek in the southern portion of the project site, and part of Fahrens Creek in the southwestern portion of the site. The County of Merced has also requested that the U.S. Army Corps of Engineers consider additional improvements to the remainder of Fahrens Creek on the project site (Lauren Renning, personal communication).

The current site plan for Bellevue Ranch indicates that both Fahrens and Cottonwood Creeks will be realigned. Any levee or channel improvements or other project impacts to these creeks constitute **significant impacts.**

The current project plan indicates that all isolated wetlands (seasonal wetlands/vernal pools) will be filled. Any fill of vernal pools and seasonal wetlands is a **significant impact** to wetland resources.

Loss of artificial wetlands and irrigation canals are **less-than-significant** impacts.

Special-Status Plant Species

San Joaquin Orcutt Grass -- The project **may result in a significant impact** to San Joaquin Orcutt Grass, although the vernal pools on-site do not appear to contain this species based upon field observations.

Other Special-Status Plant Species -- It is unlikely that other special-status plants occur on site. Therefor potential impacts to other special status plant species are judged to be **less-than-significant.**

Special-Status Animal Species

Fairy Shrimp -- These invertebrates have been proposed for listing under the Federal Endangered species act. Two species, *Branchinecta lynchi* and *Linderiella occidentalis*, are known to occur on the Bellevue Ranch site. Since these two species have been proposed for listing, loss of their habitat is considered a **significant impact** under CEQA.

Other Special-Status Animal Species --

Due to agricultural impacts to the project site and the abundance of similar habitat locally, the project would have **no significant impacts** to other special-status animal species.

General Plan Goals and Policies

To the degree that the proposed project would result in the loss of sensitive habitat, the proposed project as currently designed is inconsistent with City General Plan Goals and Policies to maintain existing natural resources in and around the City, discourage active recreational use in and adjacent to significant natural areas, and to endeavor to preserve and enhance natural areas through proper site planning. This is a **significant impact** of the proposed project.

4. Mitigation Measures

The following mitigation measures are intended to reduce project impacts to a less-than-significant level.

Vegetation

No mitigation required.

Wildlife

No mitigation required.

Wetlands

MM 4.8.1 Prior to issuance of grading permits, the project applicant shall produce a wetlands delineation consistent with the 1987 Corps of Engineers Wetlands Delineation Manual (as occaisionally amended by the COE) and obtain verification of the wetlands delineation by the U.S. Army Corps of Engineers. The applicant shall consult with the City Planning Department and demonstrate compliance with the COE requirements.

MM 4.8.2 Prior to issuance of grading permits in wetland areas, the project applicant shall secure a permit to fill wetlands consistent with Section 404 of the Clean Water Act. Such a permit shall include a wetlands mitigation plan consistent with the policy of "no net loss in wetlands acreage or value". The applicant shall consult with the City and the COE during the preparation of this plan to develop a consolidated mitigation program, within the guidelines of the COE.

Due to the proposed U.S. Army Corps of Engineers levee and channel improvement plan, the project applicant has two options regarding modifications to Fahrens and Cottonwood Creeks. The applicant shall:

1) Postpone modifications to creek channels until U.S. Army Corps of Engineers begins the Merced-area project (estimated to be late 1996; Lauren Renning, personal communication). Mitigation for wetland impacts associated with this project would then be the responsibility of the U.S. Army Corps of Engineers.

or,

2) Make modifications to creek channels consistent with the Merced County streams project, subject to approval by the U.S. Army Corps of Engineers. Mitigation for wetland impacts associated with creek modifications shall be the responsibility of the project applicant. The mitigation plan for impacts to Fahrens and Cottonwood Creeks shall include a detailed native vegetation planting plan consistent with the Merced Streams Project (Merced Streams Project-Design Memorandum No. 11, 1983).

The mitigation plan for impacts to isolated wetlands shall include on-site preservation/compensation areas, off-site compensation areas, or a combination of the two with the intent of providing for a consolidated mitigation area. Compensation wetlands must be located in Merced County and meet the following success criteria:

1) Compensation wetlands will remain inundated or saturated for sufficient duration to support hydrophytic vegetation.

2) Compensation wetlands will exhibit plant and invertebrate species richness comparable to existing wetlands on site.

3) Compensation wetlands will be monitored each year for five years, and a report of monitoring results will be submitted to the U.S. Army Corps of Engineers for review.

Special-Status Plant Species

MM 4.8.3 Prior to the issuance of grading permits, the project applicant shall retain a qualified biologist to conduct late spring surveys of vernal pools for San Joaquin Orcutt grass and Dwarf Downingia. If these species are confirmed on the project site, mitigation measures consistent with the most current listing status of the species shall be prepared and submitted to the City for inclusion in the Mitigation Monitoring Program for the project.

Special-Status Animal Species

MM 4.8.4 A decision on whether to list fairy shrimp and tadpole shrimp as endangered species will probably occur sometime between May and November 1993. Once a decision regarding listing is reached and prior to the issuance of grading permits, the project applicant shall comply with the appropriate mitigation measure listed below:

1) If *Branshinecta lynchi* and *Linderiella occidentalis* are listed as threatened or endangered species under the Federal Endangered Species Act, the project sponsor shall initiate a Section 7 consultation with the USFWS as part of compliance with Section 404 of the Clean Water Act. Although the mitigation requirements under this scenario are not known at this time, they would likely take the form of wetlands habitat reconstruction.

or,

2) If *Branshinecta lynchi* and *Linderiella occidentalis* are not listed as threatened or endangered species under the Federal Endangered Species Act, a wetlands mitigation plan shall be submitted as part of compliance with Section 404 of the Clean Water Act. This mitigation plan shall include language that specifically addresses fairly shrimp impacts and, as part of the wetlands mitigation monitoring plan, will monitor fairy shrimp populations in compensation wetlands. Fairy shrimp species richness in compensation will equal or exceed that of historic wetlands.

TABLE 4.8-1
BELLEVUE PLANT SPECIES LIST -- FALL 1992

Scientific Name	Common Name
Allocarya stipitata	Slender popcorn-flower*
Avena spp.	Wild oat
Brassica spp.	Mustard
Bromus diandrus	Ripgut brome
Bromus mollis	Soft brome
Centaurea solstitalis	Yellow star-thistle
Cirsium spp.	Thistle
Convolvulus arvensis	Morning glory
Cynodon dactylon	Bermuda grass
Cyperus eragrostis	Tall flatsedge*
Echinochloa crusgalli	Barnyard grass*
Eleocharis macrostachya	Creeping spikerush*
Eremocarpus setigerus	Turkey mullien
Eryngium vaseyi	Vasey's coyote-thistle*
Eucalyptus spp.	Eucalyptus
Grindellia spp.	Gummy weed
Hemizonia fitchii	Fitch's spikeweed
Holocarpha virgata	Sticky tarweed
Hordeum hystrix	Mediterranean Barley*
Hordeum leporinum	Barley
Juncus effusus	Soft rush*
Lactuca serriola	Prickly lettuce
Leptochloa fascicularis	Sprangletop*
Lolium perenne	Ryegrass*
Ludwigia repens	Creeping seedbox*
Lythrum hyssopifolia	Hyssop loosestrife*

Malva parviflora	Cheeseweed
Marrubium vulgare	Common horehound
Paspalum dilatatum	Dallisgrass*
Paspalum distichum	Joint paspalum*
Phalaris spp.	Canary grass
Polygonum aviculare	Prostrate knotweed
Polygonum spp.	Smartweed*
Populus fremontii	Fremont's cottonwood*
Psilocarphus brevissimus	Dwarf woolly-heads*
Rosa californica	California rose
Rubus procerus	Himalaya blackberry
Rumex crispus	Curly dock*
Salix spp.	Willow*
Scirpus acutus	Hard-stem bulrush*
Solidago spp.	Goldenrod
Sorghum halepense	Johnson grass
Typha latifolia	Broad-leaf cattail*
Verbena bonariensis	South African vervain*
Xanthium strumarium	Rough cockle-bur*

* plants associated with wetlands

TABLE 4.8-2
BELLEVUE RANCH WILDLIFE -- FALL 1992

AMPHIBIANS	
Rana catesbiana	Bullfrog
Hyla regilla	Pacific Tree Frog
Thamnophis elegans	Western Terrestrial Garter Snake
BIRDS	
Phalacrocorax auritus	Double-crested Cormorant
Ardea herodias	Great Blue Heron
Casmerodius albus	Great Egret
Butorides striatus	Green-backed Heron
Nycticorax nycticorax	Black-crowned Night-heron
Anas platyrhynchos	Mallard
Cathartes aura	Turkey Vulture
Circus cyaneus	Northern Harrier
Buteo lineatus	Red-shouldered Hawk
Buteo jamaicensis	Red-tailed Hawk
Falco sparverius	American Kestrel
Charadrius vociferus	Killdeer
Zenaida macroura	Mourning Dove
Ceryle alcyon	Belted Kingfisher
Colaptes auratus	Northern Flicker
Sayornis nigricans	Black Phoebe
Sayornis saya	Say's Phoebe
Aphelocoma coerulescens	Scrub Jay
Pica nuttalli	Yellow-billed Magpie
Thryomanes bewickii	Bewick's Wren
Cistothorus palustris	Marsh Wren
Mimulus polyglottos	Northern Mockingbird

Lanius ludovicianus	Loggerhead Shrike
Passerella sandwichensis	Savannah Sparrow
Melospiza melodia	Song Sparrow
Zonotrichia atricapilla	Golden-crowned Sparrow
Agelaius phoeniceus	Red-winged Blackbird
Sturnella neglecta	Western Meadowlark
Xanthocephalus xanthocephalus	Yellow-headed Blackbird
Euphagus cyanocephalus	Brewer's Blackbird
Carpodacus mexicanus	House Finch
Carduelis pinus	Pine Siskin
Carduelis psaltria	Lesser Goldfinch
Passer domesticus	House Sparrow
MAMMALS	
Castor canadensis	American Beaver
Sylvilagus audubonii	Audubon's Cottontail
Spermophilus beecheyi	Beechey Groundsquirrel
Microtus californicus	California Vole
Lepus californicus	Black-tailed Jackrabbit
Ondatra zibethicus	Muskrat
Procyon lotor	Raccoon
Mephitis mephitis	Striped Skunk

TABLE 4.8-3
POTENTIAL SPECIAL-STATUS SPECIES -- BELLEVUE RANCH, MERCED COUNTY

Scientific Name	Common Name	Likelihood of Occurance	Status*
Invertebrates			
Branchinecta conservatio	Conservancy Fairy Shrimp	Unlikely	FPL
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Known to Occur On-site	FPL
Lepidurus packardi	Vernal Pool Tadpole Shrimp	Unlikely	FPL
Desmocerus californicus dimorphus	Valley Elderberry Longhorn Beetle	Unlikely	FT
Linderiella occidentalis	California Linderiella	Known to Occur On-site	FPL
Lytta molesta	Molestan Blister Beetle	Unlikely	C2
Vertebrates -- Reptiles and Amphibians			
Thamnophis gigas	Giant Garter Snake	Unlikely	FPL/ST
Ambystoma tigrinum californiense	California Tiger Salamander	Unlikely	C2/SSC
Scaphiopus hammondi	Western Spadefoot Toad	Unlikely	SSC
Vertebrates -- Birds			
Agelaius tricolor	Tricolored Blackbird	Unlikely	C2
Buteo swainsoni	Swainson's Hawk	Unlikely	C3c/ST
Speotyto cunicularia	Burrowing Owl	Moderate	SSC
Vertebrates -- Mammals			
Perognathus inornatus	San Joaquin Pocket Mouse	Unlikely	C2
Taxidea taxus	American Badger	Unlikely	SSC
Vulpes macrotis mutica	San Joaquin Kit Fox	Unlikely	FE/ST
Plants			

Downingia humilis	Dwarf Downingia	Low	C3c/1B
Orcuttia inaequalis	San Joaquin Valley Orcutt Grass	Unlikely	C1/SE/1B
Orcuttia pilosa	Hairy Orcutt Grass	Unlikely	C1/SE/1B
Orthocarpus campestris var. *succulentus*	Succulent Owl's Clover	Unlikely	C2/SE/1B
Phacelia ciliata var. *opaca*	Merced Phacelia	Unlikely	C2/1B

* Status Abbreviations

C1 – Federal Category 1 (sufficient information to support listing)
C2 – Federal Category 2 (insufficient information to support listing)
C3c – Federal Category 3c (not threatened or endangered)
FPL– Federal Proposed for Listing under the Endangered Species Act
FE – An Endangered Species under the Federal Endangered Species Act
FT – A Threatened Species under the Federal Endangered Species Act
ST – A Threatened Species under the California Endangered Species Act
SSC – A California Department of Fish and Game Species of Special Concern
1B – A California Native Plant Society Rare, Threatened, or Endangered Plant

4.9 PUBLIC FACILITIES AND SERVICES

Environmental Issues

This section of the EIR addresses the provision of public services and facilities, including water, sewer, police and fire protection, schools, telecommunications and related utilities.

A. Water System

1. Existing Setting

Currently, domestic water service to the project site is provided by water wells owned and operated by individual property owners within the project area, including one well which serves the existing residential farmhouse on-site. In this regard, there are no existing community serving water lines within the project site.

In anticipation of future growth and annexation of the SUDP area, the City of Merced has extended water lines as far north as Yosemite Avenue adjacent to the project area. A 16-inch transmission line exists within the Yosemite Avenue extension to "G" Street. Water mains are also located within "M" and "R" Streets.

The City also has two wells south of the Bellevue site which may be able to supply a limited quantity of water for the initial phase of site development.

General Plan Policies

The following polices are contained within the Merced General Plan to guide the use of water supply resources:

- *Continue support of long-range groundwater studies to evaluate the quantity and quality of water supplies in the area.*
- *To develop and implement a water facilities master plan for the City.*
- *To investigate and promote the development of water system management techniques which will encourage water conservation and reduce excess water use.*
- *Continue to support polices and programs which discourage the use of private wells and water systems, except within acceptable areas such as the County's designated Rural Residential Centers.*
- *Water supply facilities shall be designed to serve the SUDP area, reducing the size and capacity of sewer lines as they extend from the center of the city out towards the east and west boundaries of the SUDP.*

- *The City shall not extend water service outside the City limits into the agricultural buffer zones or beyond the Specific Urban Development Plan (SUDP) boundary except in emergency cases where the public health and safety are jeopardized.*

2. Project Impacts

Standards of Significance

The impacts of project on the supply and distribution of water depend on the availability of water and the local and regional infrastructure intended to serve the project site. A significant impact will occur if the proposed sources and distribution system for water are inadequate.

Future Water Supply

As part of the proposed project, the applicant intends to annex the project site into the City of Merced. The City of Merced owns and operates a water system consisting of water wells, reservoirs and water transmission lines throughout the community serving water for both domestic and fire protection purposes. Historically, the City has relied on underground aquifers, located beneath the City, as a source of water supply. A recent Water Master Plan for Merced (CH2M Hill, draft-October, 1991) concluded that a safe yield of approximately 30,000 acre feet of water per year may be safely drawn from this aquifer. Based on realistic population growth projections of approximately 16,000 additional persons, the Master Plan indicates that the community can be assured of adequate water through the year 2013.

Estimated Water Demands

The total water demand for the project has been estimated based on the mix and intensity of uses proposed in the Bellevue Ranch Master Development Plan. Assumptions of water use by land use category are listed on Table 4.9-1, below.

Table 4.9-1
WATER DEMAND FACTORS

Land Use	Density Category	Average Flow (GPD/DU)	Max. Day Flow (GPD/DU)
Single Family (detached)	5 du/ac. (avg.)	625	1,500
Single Family (patio)	6.5 du/ac. (avg.)	555	1,332
Multi Family	22 du/ac (avg.)	155	372
		(GPD/DU)	
Commercial		2,856	6,854
Elementary School		2,856	6,854
High School		3,035	7,284
Park/Transit Station		3,035	7,284
Park		3,035	7,284
Open Space/Creek		0	0
Fire Station		3,035	7,284

Source: The Spink Corporation

Based on the unit demand factors listed in Table 4.9-1, Table 4.9-2 lists estimated water demands for the project. The table includes estimates for both phase one and phase two of project development.

Table 4.9-2
PROJECT WATER DEMANDS

Project Phase	Maximum Day Demand (MGD)
Phase 1	5.424
Phase 2	4.092
Total Build Out	9.516

Source: The Spink Corporation

To deliver this quantity of water, either five (5) new wells, pumping at a rate of 2400 to 2600 gallons per minute, or six (6) new wells pumping at a rate of 2000 gallons per minute will be required to serve the project.

Proposed Water Facilities

In order to supply water for domestic and fire flow requirements, a series of improvements to the existing water system will be required. Such improvements will include construction of new interconnected transmission lines, ranging in size from 10 inches to 16 inches (Figure 4.9-1), as well as smaller laterals to provide water service to individual development areas. A number of new wells will also be required, as noted in the previous section.

Specific Impacts

Based on the adequacy of the water improvements, and assuming the incorporation of the mitigation measures listed below, sufficient long-term water resources exist to serve the proposed project. **No significant** impacts related to the availability of water services to the are anticipated.

With respect to the implementation and phasing of improvements, the project will require the extension of existing water lines, the provision of additional wells, and the placement of water lines to serve future urban uses. Although the City anticipates extending facilities to the site, the provision of new water facilities constitutes a **significant** impact given that no master plan for water improvements has been approved for the area.

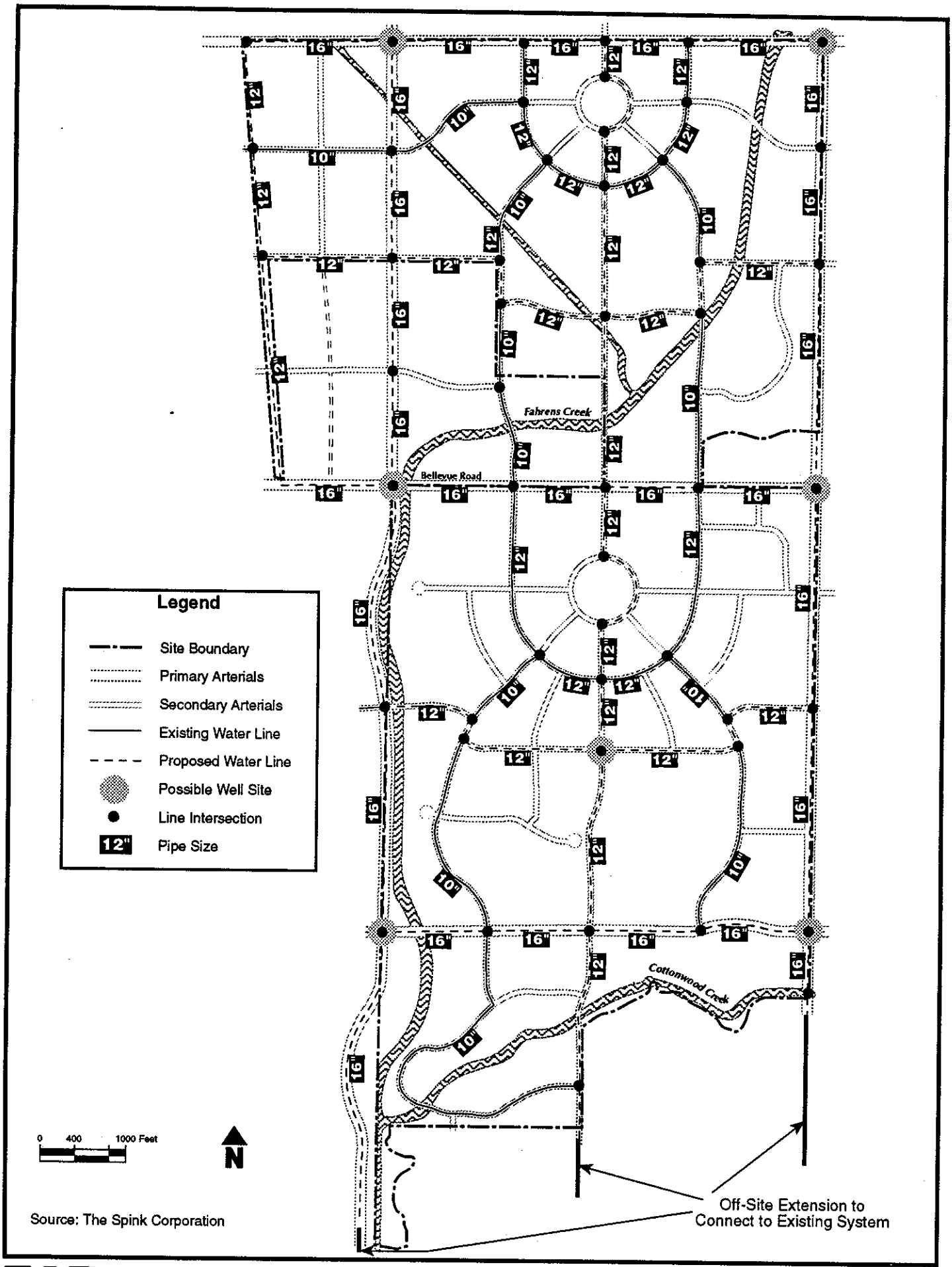
3. Mitigation Measures

MM 4.9.1 Prior to the approval of a tentative map, the project applicant shall submit to the City of Merced Public Works Department detailed water supply and delivery plans for review and approval. This shall include the location of proposed wells, water lines, hook-ups with existing water mains, phasing and water zone delineation to ensure adequate water pressure, as well as appropriate financing mechanisms for all on- and off-site improvements.

MM 4.9.2 The following water conservation measures shall be implemented as required by state law:

- All buildings shall include low-flow fixtures to conserve water.
- Insulation of hot water lines in water recirculating systems.

MM 4.9.3 Prior to the approval of a tentative map, the project applicant will submit to the City Planning Department for review and approval detailed landscape plans for



Source: The Spink Corporation

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Figure 4.9-1
Water Transmission System

specified by the City's CUP submittal requirements) for common areas and commercial areas as well as for on- and off-site landscaping to include native and drought resistant (low water usage) plant materials.

MM 4.9.4 The project applicant, as approved by the City Public Works Department and Fire Department, will demonstrate that the water system proposed for the project is designed to meet the projected water capacity and fire flow requirements as well as all City specifications, prior to the approval of the first final map.

B. Sewer System

1. Existing Setting

Presently, no sanitary sewer facilities exist on the project site since the level of development is low. Sewage needs are met through the use of privately owned and maintained septic systems

The City of Merced owns and operates a municipal wastewater collection and treatment system, which consists of a series of major sewage transmission pipelines and a wastewater treatment plant. The treatment plant is located approximately 3 miles south of Merced and has a maximum design capacity of 10 million gallons per day (mgd). The plant is presently operating at a flow of approximately 7 mgd. Plans are currently being formulated to expand the plant by 5 mgd, which is expected to begin construction in 1994.

The City also maintains major regional sewer lines within Yosemite Avenue and G Street on the boundaries of the project site.

The City completed a sewer master plan for the northerly portion of Merced known as the North Merced Wastewater Master Plan for the purpose of identifying the most timely and cost-efficient manner in which to provide sewage collection and transmission for the full build-out of the Merced General Plan.

General Plan Goals and Policies

The following policies relate to the provision of sewer service within Merced:

- *Continue to update and review the Merced Wastewater Master Plan. As changes or amendments to the Master Plan are considered, the City should ensure that trunk line extensions or expansion of wastewater treatment facilities are consistent with the land use patterns or polices established in the General Plan. The Master Plan should be expanded to analyze the entire City.*

- *All wastewater planning activities should be closely coordinated with the County to minimize the impacts from septic tank systems or development of special districts within the planning area.*

- *Continue to support wastewater management techniques such as land application for agricultural uses, production of methane gas as an energy source, and other techniques that prove practical.*

- *Sewer facilities shall be designed to serve the SUDP area, reducing the size and capacity of sewer lines as they extend from the center of the city out towards the east and west boundaries of the SUDP.*

- *The City shall not extend sewer services outside the City limits into the agricultural buffer zones or beyond the Specific Urban Development Plan (SUDP) boundary except in emergency cases where the public health and safety are jeopardized.*

2. Project Impacts

Standards of Significance

A project impact would be considered significant if:

- There is increased wastewater generation above the capacity of the City's wastewater treatment plant, or

- There is substantial increased sewer flows within existing interceptors and service lines above design capacity, or

- There is a substantial expansion or alteration of the community wastewater collection and treatment system, or

- There will be substantial wastewater flows not accounted for in local sewer master plans.

Specific Impacts

Estimated Sewage Flows

Based upon sewage generation factors used to prepare the North Wastewater Master Plan, the following maximum sewage flows can be expected from the project.

Table 4.9-3
SEWAGE GENERATION AT PROJECT BUILDOUT
(Average Daily Flows)

Land Use	Acreage	Factor (gal/ac.)	Avg. Daily Flow (gal)
Single Family	924	1,155	1,067,220
Multi Family	82	2,728	223,696
Com/Office	112	3,000	336,000
Schools Parks	127	550	69,850
Total	**1,245**	n/a	1,696,766

Source: North Merced Wastewater Master Plan. Calculations do not include open space.

Proposed Sewage Facilities

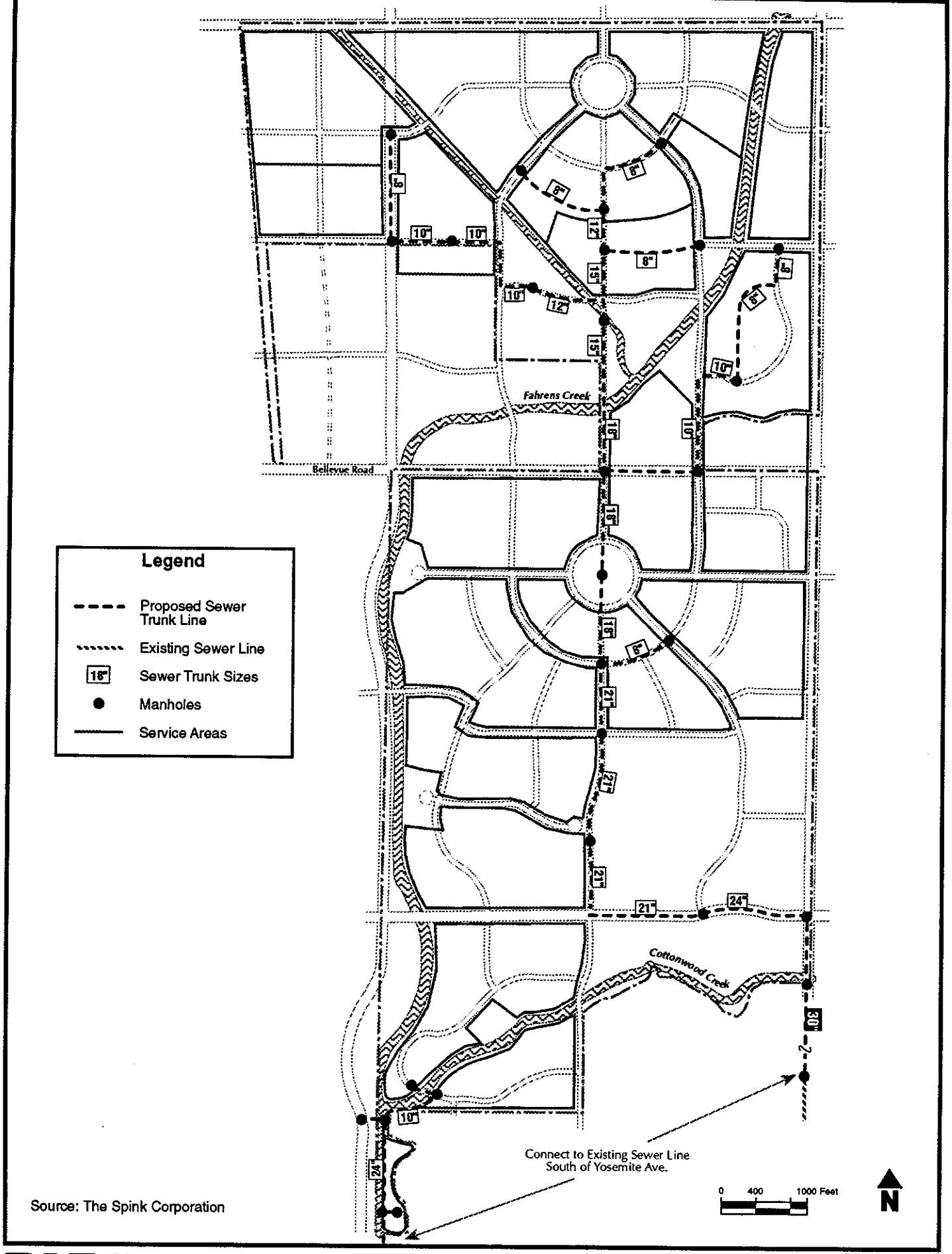
It is the intent of the project applicant to annex the Bellevue Ranch property to the City of Merced and to connect to the City's sewage system. Planned improvements to the local sewage system to serve this project will include a new gravity interceptor which will extend from the existing trunk sewer at Yosemite Avenue and G Street. Planned improvements are illustrated in Figure 4.9-2.

The proposed project will generate substantial wastewater flows, as summarized in Table 4.9-3, and will require local expansion of the collector system. The waste water collection system proposed to serve the project are, however, consistent with the North Merced Wastewater Master Plan. With respect to wastewater treatment capabilities, the City has indicated that through existing capacity and programmed improvements, adequate treatment capacity is available to serve the project.

Provided that the mitigation measures noted below are implemented, the proposed project will have a **less-than-significant** impact on the City's wastewater delivery and treatment capabilities.

3. Mitigation Measures

MM 4.9.5 Prior to the approval of a tentative map, the project applicant will submit to the City Public Works Department detailed wastewater service plans for review and approval. This will include the sizing and location of collection lines in conformance with the City's Master Plan, and provide for the appropriate financing mechanism for both on- and off-site improvements.



Source: The Spink Corporation

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Figure 4.9-2
Proposed Sewer System

C. Electrical and Natural Gas Service

Electrical

1. Existing Setting

Electrical service to the project site is provided by Pacific gas and Electric Company, a publicly regulated private utility. No natural gas service is presently available.

Existing electrical facilities include a 12 kilovolt overhead line within G Street to serve existing residences on the site, a 220 kv line northwest of Bellevue Road within a 75-ft. right-of-way and a 110 kv south of Cardella Road located within an 80 ft. right of way. Several small overhead transformers exist on the boundary of the project site.

Natural Gas

Natural gas facilities exist within the immediate vicinity of the project site to serve existing uses, including Cardella Road and University Avenue.

2. Project Impacts

Standards of Significance

Significant impacts will result if the project requires substantial increases in current demand necessitating new or extended services and impacts to service providers.

Specific Impacts

Existing electrical and natural gas facilities are inadequate to serve the land uses proposed within the Bellevue Ranch Master Plan, and constitute a **significant** impact. According to representatives of Pacific Gas and Electric, service extensions will be planned with the project developer and necessary construction coordinated with the construction of major and minor streets within the project. One of the improvements which may be required is reservation of approximately five to ten acres on the project site for construction of a natural gas regulating facility.

3. Mitigation Measures

The following mitigation measures are proposed to reduce project impacts to a less-than-significant level:

MM 4.9.6 Prior to the approval of a tentative map, the project applicant will demonstrate to the City that they have coordinated with PG & E regarding the location and phasing of natural gas and electrical facilities to serve the project.

MM 4.9.7 Prior to the issuance of building permits, the project applicant shall demonstrate to the City that their architect(s) have consulted with PG & E regarding the incorporation of energy conservation techniques into building and landscape design. Consideration shall be given to the following:

- Architectural and design, to the extent feasible, shall take full advantage of such concepts as natural heating and/or cooling through sun and wind exposure and solar energy collection systems.

- Landscape design should be tailored, where feasible, to the use requirements of individual structures, with the intent to minimize heat gain in the summer, maximize heat gain in the winter, and promote air circulation for both heating and cooling purposes.

- Domestic hot water systems, to the extent feasible, should be designed to utilize alternative energy sources. Should such systems be deemed infeasible by the City at the time of initial construction, building design should incorporate provision to allow them to be easily accommodated at a later date.

- All building construction shall comply with Title 24 of the Uniform Building Code.

D. Telecommunication Service

1. Existing Conditions

Telephone and telecommunication service to the site is provided by Pacific Bell, which has a regional headquarters in Fresno.

2. Project Impacts

Standards of Significance

Significant impacts will result if the project requires substantial increases in current telecommunication service demand necessitating new or extended services and impacts to service providers.

Specific Impacts

According to representatives of Pacific Bell, adequate facilities and services presently exist to serve the proposed Bellevue Ranch project. Such facilities will need to be extended to serve new development within the site. The extension of telecommunication service for the project is a **significant** impact.

3. Mitigation Measures

MM 4.9.8 Prior to the approval of a tentative map, the project applicant will demonstrate to the City that they have coordinated with Pacific Bell regarding the extension, location and phasing of telecommunication facilities to serve the project.

E. Police Protection

1. Existing Setting

The Bellevue Ranch property is presently under the jurisdiction of the Merced County Sheriff's Department, which is located at 700 West 22nd Street in Merced, approximately 2.5 miles from the project site. The Sheriff's Department presently employs approximately 70 sworn deputies to provide police protection for the unincorporated portions of the County, with six deputies and a sergeant on duty at any one time.

The Merced Sheriff's Department provides patrol and crime prevention services as well as maintaining the County jail, operating a SWAT team and dive team and providing identification and fingerprinting services.

Upon completion of annexation to the City of Merced, the site would fall within the jurisdiction of the City of Merced Police Department. Police Department headquarters is located at 611 West 22nd Street, which is approximately 2.5 miles south of the Bellevue Ranch site.

Presently, the Merced Police Department has a budgeted augmentation of 74 sworn officers and 32 non-sworn positions. Three sworn positions are currently vacant. The Patrol Division of the Department staffs four to six officers, on the average, throughout the community on 24-hour watches. In calendar year 1992, the Department responded to 42,345 calls for service.

The Police Department maintains a ratio of 1.25 sworn officers per 1,000 population as a standard level of service.

General Plan Goals and Policies

The following policies are contained in the Merced General Plan regarding the provision of police services:

- *Appropriate City departments should continue to work together and coordinate development of specific design criteria to reduce potential policing problems and improve police protection and security.*

- *Police equipment and personnel should be sufficient in number to ensure quick response times to emergency calls.*

- *Continue participation in and support of the City's Neighborhood Watch Program.*

2. Project Impacts

Standards of Significance

Significant impacts will result to police services if additional personnel or equipment are required to maintain acceptable service ratios.

Specific Impacts

Based upon an increased project population of approximately 21,371, there will be an increased demand for up to 17 additional sworn officers. There will also be a need for additional equipment, such as patrol vehicles, for use by the additional officers. This could vary somewhat depending on the ability of Police Department management to restructure existing patrol beats. Based upon the above, the project will have a **significant** impact on police services.

3. Mitigation Measures

Implementation of the following mitigation measures will reduce police impacts to a level of insignificance

MM 4.9.9 The project applicant shall pay all CRIS (Cost Revenue Impact System) fees, or other applicable program fees as defined by the City, which are intended to cover all Police Department costs for purchase of new or replacement vehicles, substation space, personnel costs and general overhead.

MM 4.9.10 The developer for each subdivision within the Bellevue Ranch shall meet with the Merced Police Department prior to issuance of building permits. Specific security mitigations as agreed between the Police Department representative and the developer shall be incorporated into the construction plans.

F. Fire Protection

1. Existing Setting

The project site is presently provided fire protection by the Merced County Fire Department, which contracts with the California Division of Forestry (CDF) for actual delivery of service.

The nearest fire station to the Bellevue Ranch site is County Station No. 85, located at 3360 North McKee Road, which is approximately four to four and one-half miles away from the project site. Station No. 85 is manned by one full-time, professional fire fighter on a 24-hour basis, with a paid volunteer staff of 25 available on an as-needed basis. Two pumper trucks are maintained at the station.

Upon annexation to the City of Merced, fire service will be provided by the Merced Fire Department. Department stations are sited in the following locations:

- Station 1: 560 W. 18th Street
- Station 2: 1400 Falcon Way
- Station 3: 700 Loughborough Drive
- Station 4: 1425 E. 21st Street

Upon annexation to the City, the Loughborough Drive station will be the closest City operated station to the project site.

Services offered by the Merced Fire Department include fire suppression, emergency medical services, fire prevention inspections and disaster planning. In 1992 (calendar year) the

department responded to 1,812 calls for service. The average response time to emergency incidents was 4.03 minutes, as calculated by Fire Department personnel.

General Plan Goals and Policies

The following policies have been included within the Merced General Plan related the provision of fire services:

- *Fire fighting equipment and companies of personnel should be sufficient in number and adequately distributed throughout the planning area to ensure:*
- *Quick response time to all calls within the primary service area of a fire station.*
- *Prompt availability of the additional number of companies for serious or simultaneous fires.*
- *The primary service area for a fire station shall be determined by a maximum travel distance from the fire station as determined by the Insurance Service Office standards. This service area should be a major determination in site location for future facilities. In addition, sites should be selected based on the distribution of land uses and population projected when the area is fully developed. Fire stations should be located so that no development in the City is outside the primary response area of at least one firehouse.*
- *Ease of access should be a primary consideration in selecting a fire station site, based on the following guidelines:*
- *Fire stations should be located on streets close to and leading into major or secondary thoroughfares.*
- *Fire stations should be so located as to minimize delays caused by incomplete street patterns.*
- *A fire station should be near the center of its primary service area, measured in terms of driving time to the periphery of this area.*
- *Fire stations should be convenient to high value areas of commercial or industrial areas, but not located in them unless such a location is necessary to maintain the required service area.*
- *Fire stations should not be located disturbingly close to schools or parks, bur should be close to major streets leading to schools.*

- *Fire stations and their sites should be designed to fit in with their surroundings, including consideration of open spaces, off-street parking, landscaping and general appearances. These considerations are particularly important when a fire station is located in a residential district.*

- *In service areas which are residential, fire stations should be located in or near those sections which have the highest density.*

2. Project Impacts

Standards of Significance

Significant impacts are those which result in the requirement for the provision of additional personnel or equipment to maintain acceptable response times, or which would require additional or enlarged fire stations to handle anticipated emergency situations.

Specific Impacts

Construction of the Bellevue Ranch project will result in the following impacts:

- Calls for emergency services attributable to the project will increase by approximately 850 per year.

- Distances between the project site and existing fire stations will result in maximum response times for emergency situations to be exceeded.

- Additional Fire Department personnel will be required for fire suppression and inspection services. Using current ratios between total City population and the estimated project population (approximately 21,000 people), an additional 20 professional fire fighters will be needed to provide the level of service currently being provided to the City of Merced.

Based upon the Standards of Significance criteria, there will be a **significant impact** to fire protection services.

As noted in the Project Description of this report, the project proposes to provide a 1.6 acre fire station site on R Street adjacent to Parkinson Creek in the northwest quadrant of the property. The applicant has indicated that this site is intended to serve the northern portion of the project (defined as north of Bellevue Road), while a second fire station would be provided on an adjacent property (within the City limits) to serve the southern portion of the project. In this regard, City staff has indicated that the location of the second fire station is speculative and not guaranteed in relationship to the development of the Bellevue Ranch project.

Corresponding to the above, the City of Merced Fire Department has indicated that their existing level of service provides for an average emergency response time of 4.03 minutes. Based upon the locational question and existing service levels in the City, the project does not provide for adequate fire facilities specifically for future residents south of Bellevue Road. This is considered to be a **significant** impact.

3. Mitigation Measures

Implementation of the following mitigation measures will reduce fire protection impacts to a less-than-significant level:

MM 4.9.11 Prior to approval of the Bellevue Ranch Master Development Plan, the applicant shall provide a second fire station site within the project to serve future residents south of Bellevue Road. This site shall be located south of Bellevue Road near G Street, as reviewed and approved by the Merced Fire Department with the concurrence of the City of Merced Planning Department and the Insurance Service Office in order to maintain existing City response times. The provision of this station will remain as a Master Plan requirement unless and until the possibility of a station site at a location adjacent to the project site is planned and confirmed by the City.

MM 4.9.12 Payment of CRIS impact fees or other applicable fees as determined by the City of Merced, which will finance necessary new substations, new fire apparatus, vehicle maintenance, station maintenance and personnel costs to adequately serve the proposed project.

MM 4.9.13 Construction of exterior and interior water lines as outlined in Section 4.9-A (Water) along with fire hydrants (with the design and spacing of hydrants to be approved by the Merced Fire Department) with sufficient water pressure as determined by the Merced Fire Department.

MM 4.9.14 Prior to submittal of individual subdivision maps within the project, each applicant shall meet with representatives from the Merced Fire Department to mutually outline necessary fire prevention requirements.

G. Educational Facilities

1. Existing Setting

The project site is presently served by two school districts. Elementary school instructional services (grades K-8) are provided by the Merced City Elementary School District, which serves the northerly portion of Merced and immediately surrounding unincorporated areas, and is headquartered at 444 West 23rd Street. The project site is presently served by Peterson School, which has a 1993 enrollment and a maximum student capacity of 930 students. Peterson school currently operates on a year round school schedule.

The Merced Union High School District provides instructional services for grades 9-12. The District, which has administrative offices at 3105 G Street, serves the entire community of Merced as well as well as the nearby, smaller communities of Atwater, Livingston, Dehli and others. The District presently operates four school facilities: Atwater High, Merced North High, Merced East High and Livingston High. Merced North High is the nearest facility to the Bellevue Ranch project site. The high school has a present enrollment of 2,935 students and a maximum capacity of 1,986 students. The existing overcapacity is accommodated through the use of portable classroom facilities.

Both Districts charge the maximum school impact fee presently permitted under state law. The Elementary District levies a $2.10 fee per square foot of development fee and the High School district levies fees in the amount of $1.55 per square foot of development. This amount ($3.65) is actually $1.00 higher than the total permitted by State law. Recognizing that state law governing school finance is changing, both Districts have been depositing $1.00 per square foot into an escrow account until more definitive school financing methods are put into place. The most current information now available indicates that the $1.00 per square foot shall be refunded.

General Plan Goals and Policies

These policies have been adopted as part of the Merced General Plan related to the provision of educational services:

- *Continue to work closely with the school districts in all facets of school site and facility planning.*

- *Work with the various districts in solving problems that affect the location, design and type of schools needed to best serve the community; and incorporate these solutions in the General Plan.*

- *Explore new ways of using school facilities for "non-school activities" during non-school hours and on a year-round basis.*

- *Promote the maximum use of new facilities by incorporating the school/park concept in site planning.*

- *Future school sites should have as many sides fronting on streets as possible, and ensure public access with pedestrian-ways where only non-street frontage is available.*

- *In order to maximize the use of existing school facilities and minimize the necessity for facility construction, the City should encourage revisions in the alignment of school district boundaries to better reflect natural constraints and probable future urban growth patterns.*

- *Future school sites shall be encouraged to locate on collector streets, not on major streets.*

2. Project Impacts

Standards of Significance

A significant impact will result if it is determined that additional school facilities are required to accommodate the students generated from the proposed project.

Specific Impacts

Two recent reports have been prepared by the firm of Michael Paoli and Associates to assess the demand for educational services within both Districts and to determine if development impacts fees are justified. These reports are the Development Fee Justification Study, prepared for the Merced Union High School District (September, 1990), and the Development Fee Justification Study, prepared for the Merced City Elementary School District (October, 1990).

Both reports contain standards student generation rates for various types of residential types, which are based on actual analyses of recently completed developments. These generation rates are displayed on Table 4.9-4, below, by land use type. Single family detached represents the traditional housing type. Single family attached represents such housing types as patio homes and multi-family residences include apartments and condominiums.

Table 4.9-4
STUDENT GENERATED RATES

	Single Family Detached	Single Family Attached	Multi Family
Elementary (K-6)	.558	.380	.220
High School (9-12)	.219	.079	.160

Source: Michael Paoli and Associates

Based on the above generation rates, the Bellevue Ranch, at full build-out, is expected to generate the following number of elementary students.

Table 4.9-5
GENERATION OF K-8 STUDENTS

Unit Type	No. of Dwellings	Generation Rate	No. of Students
Single Family Detached	2,384-2,981	.558	1,330-1,663
Single Family Attached	1,790-2,116	.380	680-804
Multi Family	1,797	.220	395
Total	**5,971-6,894**	**n/a**	**2,405-2,862**

Source: Willdan Associates

Based on District standards of one elementary school serving approximately 745 students (non-year round basis), the Bellevue Ranch will generate the need for between two and three schools, depending on the ability of the District to adjust attendance boundaries of existing schools and the use of school facilities on a year round basis.This is at full build out of the project. This is a **significant** impact.

Table 4.9-6 below, summarizes the expected number of high school students to be generated from the Bellevue Ranch project, at full build out.

Table 4.9-6
GENERATION OF GRADES 9-12 STUDENTS

Unit Type	No. of Dwellings	Generation Rate	No. of Students
Single-Family Detached	2384-2981	.219	522-653
Single-Family Attached	1790-2116	.079	141-167
Multi-Family	1797	.160	288
Total	**5971-6894**	**n/a**	**951-1108**

Source: Willdan Associates

Thus, the project impact on the High School District will be the need to have one high school campus to serve the needs of the project, at full build out. This is a **significant** impact.

3. Mitigation Measures

The following mitigations are recommended to reduce school impacts to a less than significant level:

MM 4.9.15 The developer of each subdivision within the Bellevue ranch shall pay the maximum impact fee to the respective districts as permitted by State law.

MM 4.9.16 The developer of the Bellevue Ranch project shall reserve one 40-acre minimum high school site to the Merced Union High School District, and shall also reserve two to three 10-acre minimum elementary school sites for aquisition the Merced City Elementary School District. The actual number of elementary school sites will depend upon the District's ability to adjust attendance boundaries of existing schools. In each instance, sites to be reserved shall be mutually agreed to by the developer and the respective school district.

4.10 TRAFFIC AND CIRCULATION

1. Environmental Issues

The following is a review of existing traffic conditions in the area of the project site which identifies streets, highways and transit serving the area, and traffic volumes and traffic conditions at the study intersections and roadways in the vicinity of the site.

2. Existing Setting

Streets and Highways

Regional access to the Project is provided by State Routes 99, 59, and 140. State Route 99 is an important north/south highway connecting the major cities of the Central Valley. It is a 4 to 6 lane facility extending from Interstate 5 south of Bakersfield to Interstate 5 south of Redding, passing through the cities of Bakersfield, Visalia, Fresno, Merced, Modesto, Stockton, and Sacramento. State Route 99 serves as the primary farm-to-market route for the transportation of agricultural products, as a major commuter route in the cities it services, and as a popular route for recreational traffic.

State Route 59 is a north/south facility extending from Route 152 near Los Banos to Snelling north of Merced. This 2 lane route primarily serves local and truck traffic. A portion of State Route 59 uses the local streets of "V" Street and West 16th Street through Merced. State Route 140 is an east/west facility connecting Interstate 5 with Yosemite National Park. It is a 2 lane highway serving local traffic and a high volume of recreational traffic.

The three routes combine as a single facility for several miles in Merced along the Route 99 right-of-way. Interchanges provide access to Merced at West 16th Street, V Street, R Street, J Street, Yosemite Park Way, and Child's Avenue. Primary access to the proposed Project site will be via the West 16th Street, R Street, and Yosemite Park Way interchanges.

Local access from the freeway to the proposed Project site is provided by State Route 59, and R, M, and G Streets. Currently, only G Street extends into the Project site, but R and M Streets will ultimately be extended north to Old Lake Road or beyond. R, M, and G Streets are major 4 lane arterials through Merced. G Street is a primary route to the agricultural and rural residential areas north of the city. M Street is the primary route to Merced College, and R Street serves a large residential area south and west of the college.

The east-west streets of Yosemite Avenue and Olive Avenue provide cross travel between some of the major north-south facilities. West Olive Avenue connects State Route 59, R, M, and G Streets. Yosemite Avenue currently only connects M and G Street. West Olive Avenue is a 6 lane facility which primarily serves a commercial corridor, but also connects the northern part of Merced to the City of Atwater, Castle Air Force Base, and indirectly, State Route 99. The segment of West Olive Avenue between SR 59 and R Street is designated as an expressway. This segment requires stricter control over access. East of G Street, Olive

Avenue transitions from 4 lanes to 2 lanes and provides access to one of Merced's largest residential areas.

Yosemite Avenue is a 2 lane road extending from west of San Jose Avenue to Arboleda Road east of the city. East of Gardner Avenue, Yosemite Avenue is a rural highway. West of Gardner Avenue, Yosemite Avenue is being improved to a collector adjacent to residential subdivisions currently under construction. Yosemite Avenue, between G Street and San Jose Avenue, is an established collector street providing access to Merced College and surrounding residential areas.

Transit Services

The Merced Area Regional Transportation System (MARTS) provides regional transit service. With countywide fixed route and "dial-a-ride" service, MARTS is the primary transit connection between rural communities and urban centers. Several routes stop at the Merced Transpo Center, located between M and O Streets along West 16th Street. The Transpo Center, a renovation of Merced's historic Southern Pacific Depot, is a central interchange for City and County bus systems, Greyhound and Trailways Lines, and potentially Amtrak rail service. The nearest MARTS fixed route to the Project site is from the community of Snelling to Merced along G Street.

The Merced Transit System (MTS) provides local transit service in the form of a fixed route system and "dial-a-ride" service for seniors and handicapped persons. MTS has six fixed routes within the city, four of which have stops at Merced College, the nearest existing bus stop to the proposed Project site. Since the Project site is currently outside of the City limits, the MTS "dial-a-ride" service is not available in this area. Dial-a-ride service in this area is provided by the county system.

Train and Air Service

Amtrak schedules three northbound and three southbound trains through Merced daily, providing service between Los Angeles and the San Francisco Bay Area. The Amtrak station is located near K and 24th Streets, with access to the local bus transit system.

The Merced Municipal Airport, located in southern Merced, provides three flights daily to San Francisco and Los Angeles via United Express commuter airlines. The City plans shuttle service from the airport to the Transpo Center.

Existing Volumes

Morning and afternoon peak hour traffic counts were performed on Wednesday, August 12, 1992, and Thursday, August 13, 1992 to establish existing conditions at the following intersections:

- West Olive Avenue/State Route 59
- West Olive Avenue/R Street
- West Olive Avenue/M Street
- Yosemite Avenue/M Street
- Yosemite Avenue/G Street
- Yosemite Avenue/San Jose Avenue
- University Drive/M Street

The City provided a.m. and p.m. peak hour traffic counts performed in October 1990 for the intersection of West Olive Avenue/G Street to reflect school season traffic conditions because of the proximity of Merced High School to the intersection. School season conditions are more severe than summer conditions at this intersection, particularly in the morning peak hour. The summer counts taken at intersections near Merced College have been adjusted to reflect peak season traffic conditions. The location of the study intersections and their existing lane configurations are shown on Figure 4.10-1. Existing peak hour intersection turning volumes and average daily roadway volumes are given in the technical appendix of this report.

Existing Levels of Service

Intersection Levels of Service

Table 4.10-1 provides a summary of level of service (LOS) definitions, while Table 4.10-2 shows the results of the intersection service level analysis. All of the signalized study intersections operate at good service levels of LOS C or better in the a.m. peak hour. Except for West Olive/SR 59 and West Olive/G, the volume to capacity ratios of the study intersections are less than 0.50 (LOS A) indicating that these intersections are operating at less than half of their capacity in the a.m. peak hour. West Olive/SR 59 operates at a LOS C (v/c=0.71), and West Olive/G operates at a LOS C (v/c=0.76) in the a.m. peak hour.

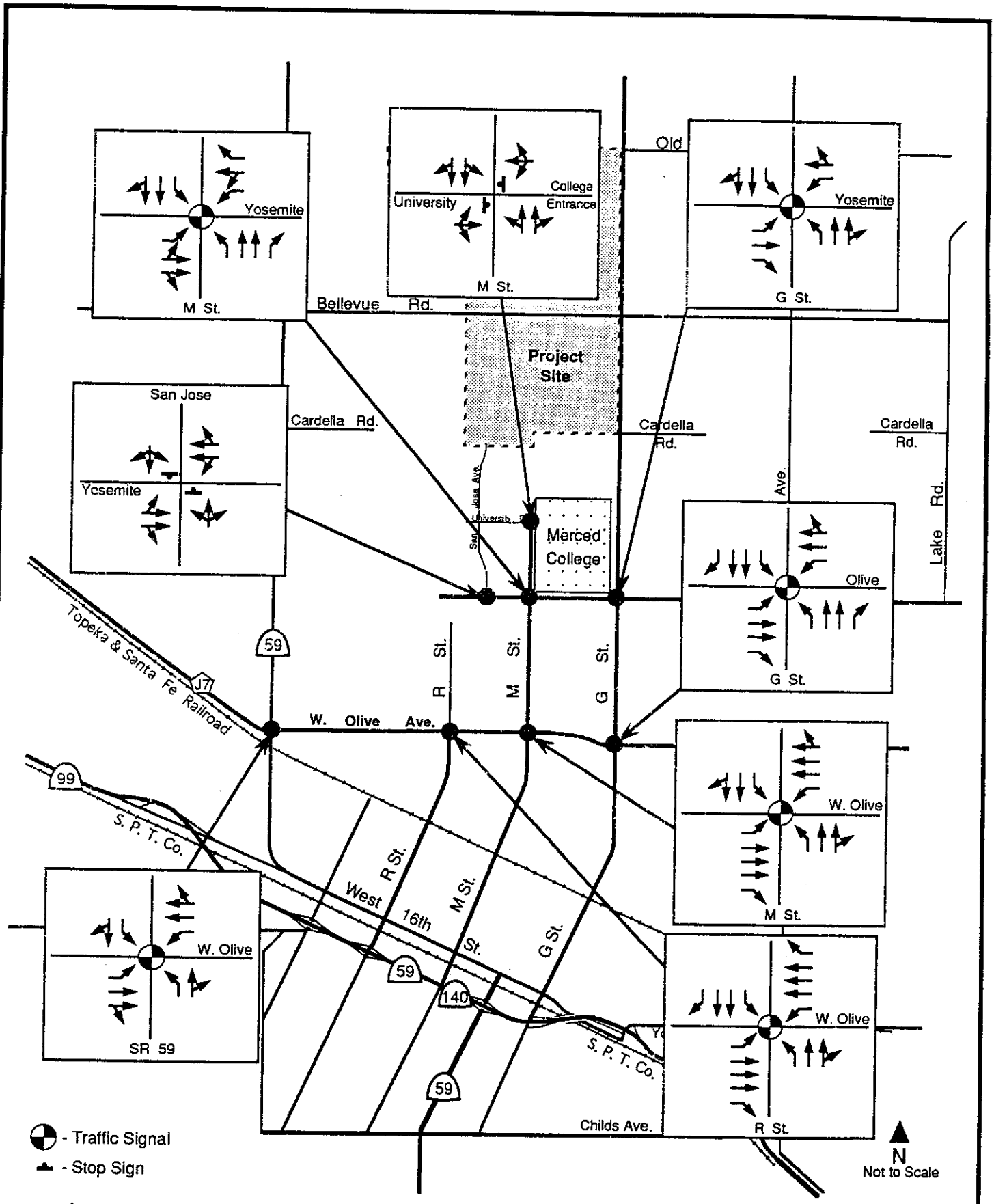

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Figure 4.10-1
Location and Geometry of Study Intersections

Table 4.10-1

LEVEL OF SERVICE DEFINITIONS

Level of Service	V/C	Signalized Intersection Description	Reserve Capacity	Unsignalized Intersection Description
A	< 0.60	Uncongested operations, all queues clear in a single-signal cycle. (Average stopped delay less than five seconds per vehicle.)	≥ 400	Little or no delay.
B	0.61-0.71	Uncongested operations, all queues clear in a single cycle. (Average delay of 15-25 seconds.)	300-399	Short traffic delay.
C	0.71-0.80	Light congestion, occasional backups on critical approaches. (Average delay of 15-25 seconds.)	200-299	Average Traffic delay.
D	0.81-0.90	Significant congestion of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed. (Average delay of 25-40 seconds.)	100-199	Long Traffic delay.
E	0.91-1.00	Severe congestion with some long standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es). (Average delay of 40-60 seconds.)	0-99	Very long traffic delay, failure, extreme congestion.
F	> 1.00	Total breakdown, stop-and-go operation. (Average delay in excess of 60 seconds.)	< 0	Intersection blocked by external causes.

Based on Highway Capacity Manual, Special Report 209, by Transportation Research Board, Washington, D.C., 1985.

Table 4.10-2

EXISTING INTERSECTION LEVELS OF SERVICE

Signalized Intersections[1]

	AM Peak		PM Peak	
Intersection	V/C Ratio	LOS	V/C Ratio	LOS
West Olive/ SR 59	0.71	C	0.95	E
West Olive/ R St.	0.39	A	0.65	B
West Olive/ M St.	0.43	A	0.69	B
West Olive/ G St.	0.76	C	0.95	E
Yosemite/ M St.[2]	0.28	A	0.38	A
Yosemite/ G St.[2]	0.25	A	0.40	A

Unsignalized Intersections[3]

	AM Peak		PM Peak	
Intersection	Reserve Capacity	LOS	Reserve Capacity	LOS
Yosemite/ San Jose (Southbound left)	657	A	582	A
University/ M St. (Westbound left)	605	A	399	B

[1] Signalized intersections are analyzed using the Transportation Research Board Circular 212 Planning Technique.

[2] Service levels given are for traffic conditions during the summer when Merced College was not in session. Levels of Service when school is in session (1990 counts) are:
Yosemite/M a.m. peak: V/C = 0.60, LOS B p.m. peak: V/C = 0.38, LOS A
Yosemite/G a.m. peak: V/C = 0.50, LOS A p.m. peak: V/C = 0.37, LOS A

[3] Unsignalized intersections controlled with a two-way stop are analyzed using the 1985 Highway Capacity Manual Reserve Capacity Method. The reserve capacity is the additional vehicles per hour that can be accommodated by the worst movement (in parentheses) from the minor street to the major street.

In the p.m. peak hour, the intersections of West Olive/SR 59 and West Olive/G deteriorate to LOS E, both with volume to capacity ratios of 0.95. The remaining intersections continue to operate at good service levels of LOS B or better in the p.m. peak hour.

Service levels at the intersections of Yosemite/M and Yosemite/G are affected by the increase in traffic volumes during the school season. Because these intersections operate with substantial excess capacity, the additional school season traffic does not change the service level from the summer conditions of LOS A in both time periods except the intersection of Yosemite/M.

Major Arterial Roadway Levels of Service

Table 4.10-3 shows the existing Levels of Service on major roadways and freeways in the City of Merced. The north-south major arterials of R, M, and G Streets operate within acceptable service levels ranging from LOS A to LOS D, except for G Street south of West Olive which operates at a LOS E. G Street south of West Olive operates at LOS E due to its high volume of traffic.

Table 4.10-3

EXISTING LEVELS OF SERVICE OF MAJOR ROADWAYS IN MERCED

Roadway/Segment	Existing Daily Traffic Volume[1]	Max. Daily Traffic Volume[2]	LOS
R Street			
North of W. 16th	16,600	32,015	D
South of W. Olive	19,500	35,070	B
North of W. Olive	11,100	35,700	A
M Street			
North of W. 16th	11,600	32,015	D
South of W. Olive	19,780	35,070	A
North of W. Olive	20,300	35,070	A
South of Yosemite	13,200	35,070	A
North of Yosemite	8,800	35,700	A
G Street			
North of W. 16th	16,400	30,495	D
South of W. Olive	27,800	33,705	E
North of W. Olive	16,200	35,070	A
South of Yosemite	9,300	31,730	A
South of Cardella	4,100	13,685	A
Yosemite Avenue			
West of G St.	8,700	35,070	A
West Olive Avenue			
East of SR 59	29,300	52,815	B
West of R St.	27,000	52,815	B
West of M St.	25,600	52,710	C
West of G St.	26,200	52,710	C
East Olive Avenue			
East of G St.	11,100	32,300	A

[1] Daily traffic volumes on Merced streets are from 24 hour counts performed in September 1990 by the Merced County Association of Governments (MCAG). State route traffic volumes are from Caltrans, District 10, and the Caltrans publication "Traffic Volumes on California State Highways", 1991.

[2] The maximum daily traffic volumes represent the capacity of the facility (LOS E/F) according to the Florida Department of Transportation (FDOT) capacity tables.

Table 4.10-3 (cont.)

Roadway/Segment	Existing Daily Traffic Volume	Max. Daily Traffic Volume	LOS
State Routes			
SR 59			
North of W. Olive	13,200	24,200	D
North of W. 16th	10,400	23,300	D
SR 99			
North of W. 16th	34,200	61,100	C
Between V and R	39,000	61,100	C
South of Yosemite Parkway	30,500	61,100	B
San Jose Avenue[3]			
N. of Yosemite	2,560	12,900	C
University Drive[3]			
W. of M Street	4,390	12,900	C

The east-west arterial of Yosemite Avenue has a high capacity of about 35,000 vehicles daily, but is utilized by only 8,700 vehicles daily experiencing LOS A. The east-west arterial of West Olive Avenue, which experiences some of the highest traffic volumes in the City, operates at good service levels of LOS B and LOS C. West Olive Avenue has more capacity than any other roadway in Merced because it is a six lane divided road, with left and right turn bays, deceleration lanes, and restricted access across the median. Olive Avenue experiences a substantial decrease in traffic volumes east of G Street easily accommodated by the four lane capacity immediately east of G Street, resulting in a LOS A.

State Highway Levels of Service

State Route 59, classified as a two lane rural highway, has a capacity of 23,000 to 24,000 vehicles daily. North of West 16th Street SR 59 operates at a LOS D. North of West Olive Avenue SR 59 also operates at LOS D. Within the city SR 59 has two railroad crossings, the Southern Pacific Line which runs south of and parallel to West 16th Street, and the Santa Fe Line which crosses SR 59 south of West Olive Avenue. The Southern Pacific Line is a major

[3] Daily traffic volumes derived from existing peak hour traffic counts based on a 8.7% peak hour factor as determined using City's 24 hour traffic counts on major roadways. These streets (San Jose Avenue and University Drive) are not considered major roadways, but are analyzed here because of potential impacts by Project traffic.

freight line in the Central Valley, and the Santa Fe Line carries both freight and Amtrak passenger trains. Currently, no severe traffic problems exist on SR 59, but as development occurs in northern Merced (including the Project) the route will experience considerable growth in traffic and pressure for development along its length. As part of the Village Concept Guidelines study, SR 59 was proposed as a future expressway or freeway bypass around the city with a direct connection to Route 99.

State Route 99 through the City of Merced currently serves between 30,000 and 40,000 vehicles daily which corresponds to a LOS B and LOS C. Caltrans has defined SR 99 in its "Ultimate Route Concept" (UTC) as an eight lane freeway through the City of Merced. This would increase its maximum capacity to about 122,000 vehicles daily. However, the City has reservations that SR 99 can ever be widened to eight lanes given the physical constraints that exist at many locations adjacent to the freeway. Widening to six lanes is feasible since the additional lanes will be located within the existing 46 foot wide median strip, and this widening is currently part of Caltrans' 20-year route concept. A six lane SR 99 will provide a maximum capacity of about 92,000 vehicles daily. Caltrans forecasts traffic volumes on SR 99 near the junction of SR 59 to increase to about 50,000 by 1995 and 107,000 by 2015, with peak hour volumes of about 4,200 to 8,600 respectively. By interpolating these forecasts, a six lane SR 99 will reach capacity by the year 2010. Daily service levels for state routes are given in Table 4.10-3.

Collector Roadway Levels of Service

Table 4.10-3 shows the results of the analysis of two residential collector streets in the northern part of the city. San Jose Avenue and University Drive, although not major roadways, are analyzed because of their potential for impacts by the Project. San Jose Avenue may potentially connect directly with the southernmost residential portion of the Project, and University Drive provides direct access from San Jose Avenue to M Street and Merced College. These two lane collector streets have capacities of about 13,000 vehicles daily, but currently experience of about 2,500 to 4,400 vehicles daily which corresponds to a LOS C.

The collector street capacities given above are practical capacities, the maximum number of daily vehicles the streets can physically accommodate before experiencing extreme congestion. This is in contrast to the environmental capacity of the street, which is the maximum traffic volume before residents on the streets consider it a nuisance in terms of safety and noise during peak periods. The environmental capacity of a typical two lane residential street is about 1,500 vehicles daily, nearly 12% of the practical capacity. Both San Jose Avenue and University Drive have residential driveways which back out onto them, and existing traffic volumes on these streets already exceed the environmental capacity.

General Plan Goals and Policies

The City of Merced General Plan has established the following policies in order to provide a balanced, comprehensive transportation and circulation system. This system is intended to be coordinated with land use that adequately accommodates the total travel needs of the community.

- *Ensure that the existing and proposed circulation systems accommodate the many traffic functions they are intended to serve with a minimum adverse impact on the environment in the planning area. Coordinate all circulation systems to maximize safety and efficiency and minimize conflicts.*

- *Implement the circulation system proposed whereby the design of each street is consistent with the character and use of adjacent land or the transportation function of street, and the function of the street is readily identifiable through a consistent hierarchy of street design.*

- *Closely coordinate the review and updating of the major street systems with county, regional, and state agencies.*

- *Land use proposals shall continue to be approved subject to meeting the requirement necessary to implement the circulation plan.*

- *Use the street classification system to cost effectively design and integrate all modes of transportation that use the street system, including pedestrian, bicycle, and transit.*

- *Wherever economically feasible, or wherever made possible by approval of development proposals, designate and reserve adequate rights-of-way to meet anticipated traffic volumes to be consistent with the street classification system, and to provide for the needs of traffic safety.*

- *Locate and design major streets in such a manner as to complement the residential neighborhoods, business centers and other homogeneous areas served, to minimize related aesthetic problems, and to maximize the possible use of solar energy techniques.*

- *Promote and use methods for minimizing noise and air pollution associate with heavily traveled traffic corridors.*

- *Develop and require better landscaping, beautification, and maintenance standards for all streets and freeways as outlined in the street classification system.*

- *Improve the appearance and traffic flow of all new major streets by the use of median strips and the exclusion of unnecessary on-street parking; improve the appearance of existing major streets through the construction of planned median strips whenever feasible.*

- *Design and improve streets to minimizer impacts on residential neighborhoods and other adjacent land uses.*

- *Design standards and proposed improvements to existing streets shall be consistent with the goals and policies of the Scenic Highways and Open Space elements of the General Plan.*

- *Promote increased traffic safety with special attention to hazards which could cause personal injury.*

- *Every effort should be made to eliminate unnecessary cross-traffic and curb cuts, and to improve traffic flow along major streets and expressways.*

- *Continue to identify, in accordance with State warrant procedures, intersections which are congested and make the necessary provision to improve intersections before they become significant safety hazards.*

- *Minimize the impacts of major thoroughfares on adjacent residential neighborhoods.*

- *Intersections on other than expressways should be spaced to provide for future synchronization of signals (recommended spacing for these intersections is on-quarter mile). Expressway spacing should be one mile or more.*

- *Make a stronger commitment to increase the number of people per vehicle so that the existing street system is utilized to its fullest (e.g., car pools).*

- *Reduce street capacities as they extend out from the center of the city towards the eastern and western SUDP boundaries, consistent with expected traffic flows in the service areas.*

In addition to the street and highway policies above, the General Plan also outlines a number of policies specific to public transit:

- *Continue to pursue the development of the Southern Pacific Depot located at 16th and N Streets as a "Transpo-Station" - a multi-use transportation center, combining both private and public transit.*

- *Continue to seek federal, state, and other funding sources which provide major funding for transit equipment, maintenance and operation. Support legislation which will provide additional funding.*

- *Continue to review routes, scheduling and vehicle operations of Merced Transit System with the aim of increasing transit patronage and improving the level of service.*

- *Continue to evaluate and recommend land use proposals and site design criteria which will support and enhance the use of public transit within the overall circulation system.*

- *Major streets should have turnouts for transit stops.*

Merced Villages Design Guidelines Roadway and Transit Goals and Policies

As a supplement to the General Plan policies outlined above, the Merced Villages Design Guidelines provide the following goals and policies relative to future village concept circulation and transit systems:

Basic Goals

- *Create pedestrian-oriented environments to encourage pedestrian travel and to reduce reliance on the automobile.*

- *Link land use with proposed transit routes of expanded bus service as well as a potential light rail system.*

Guiding Principles

- *Create a transit-oriented development pattern, able to be served by autos, but not intended to be reliant on thoroughfare travel.*

- *Develop M Street as a transitway with Village Centers at three transit stops.*

- *Establish a pedestrian, bike, and open space network taking advantage of environmentally constrained areas, power line easements and the Yosemite Valley Railroad rights-of-way.*

- *Allow residents to get to a Village Center without traveling along an arterial street.*

- *Link public facilities to open space and circulation networks.*

- *Allow for transit and road systems to serve potential University of California campus.*

3. Project Impacts

Standards of Significance

The Standards of Significance are used in the circulation element of the EIR to differentiate between a significant and insignificant impact to a roadway or intersection caused by the addition of Project traffic. The criteria we propose to use for specifying if a facility is significantly impacted by the Project is described below:

Determination of Significant Impacts

- Roadways and intersections experiencing Project traffic volume increases over "existing" or "existing plus cumulative" volumes and a Level of Service change from acceptable to unacceptable levels are considered significantly impacted. For this EIR, acceptable Levels of Service for roadways and intersections are LOS A-D. Levels of Service below LOS D (E or F) require mitigation.

- Roadways and intersections experiencing Project traffic volume increases of 5% or greater than "existing" or "existing plus cumulative" volumes, but already operate at unacceptable Levels of Service even without the Project are considered significantly impacted.

Any study facility operating below the minimum acceptable Level of Service will be mitigated whether the facility meets the above criteria or not. The above criteria is used to indicate whether the Project itself causes the significant impact.

Determination of Insignificant Impacts

- Roadways and intersections experiencing Project traffic volume increases less than or greater than 5% of "existing" or "existing plus cumulative" volumes, but do not experience a change in Level of Service letter grade are considered insignificantly impacted.

- Roadways and intersections experiencing Project traffic volume increases less than or greater than 5% of "existing" or "existing plus cumulative" volumes, and experience a change in Level of Service, but still operate at acceptable Levels of Service are considered insignificantly impacted.

- Roadways and intersections experiencing Project traffic volume increases less than 5% of "existing" or "existing plus cumulative" volumes, and operate at unacceptable

Levels of Service without Project traffic, but do not experience a change in Level of Service letter grade with the addition of Project traffic are considered insignificantly impacted. These facilities, however, will be mitigated.

Future Development Levels

City staff identified the years 2000, 2005, and 2010 for analysis. These planning horizons correspond to the anticipated buildout years of the Project's three major phases. Staff also identified the location and amount of land anticipated to be built out by the years 2000, 2005, and 2010, including cumulative ("future base") and Project land use.

Future land use is located within a portion of the area covered in the General Plan Update (in progress). The "planning area" in this study is bounded by North Bear Creek to the south, Lake Road to the east, Thorton Road to the west, to about 1/2 mile north of Old Lake Road. The future land use scenario is designated as the Village Plan - 1 (VP-1), and is generally consistent with the land use plan adopted in the Village Concept Plan. The geographic location of the areas expected to build out within the three planning horizons is shown in Figure 4.10-2.

The City identified the specific location and number of dwelling units and acres of commercial, office, and industrial land use assumed to build out north of Bear Creek within the three planning horizons. Table 4.10-4 summarizes the projected future base land use (without Bellevue Ranch) by residential and nonresidential categories.

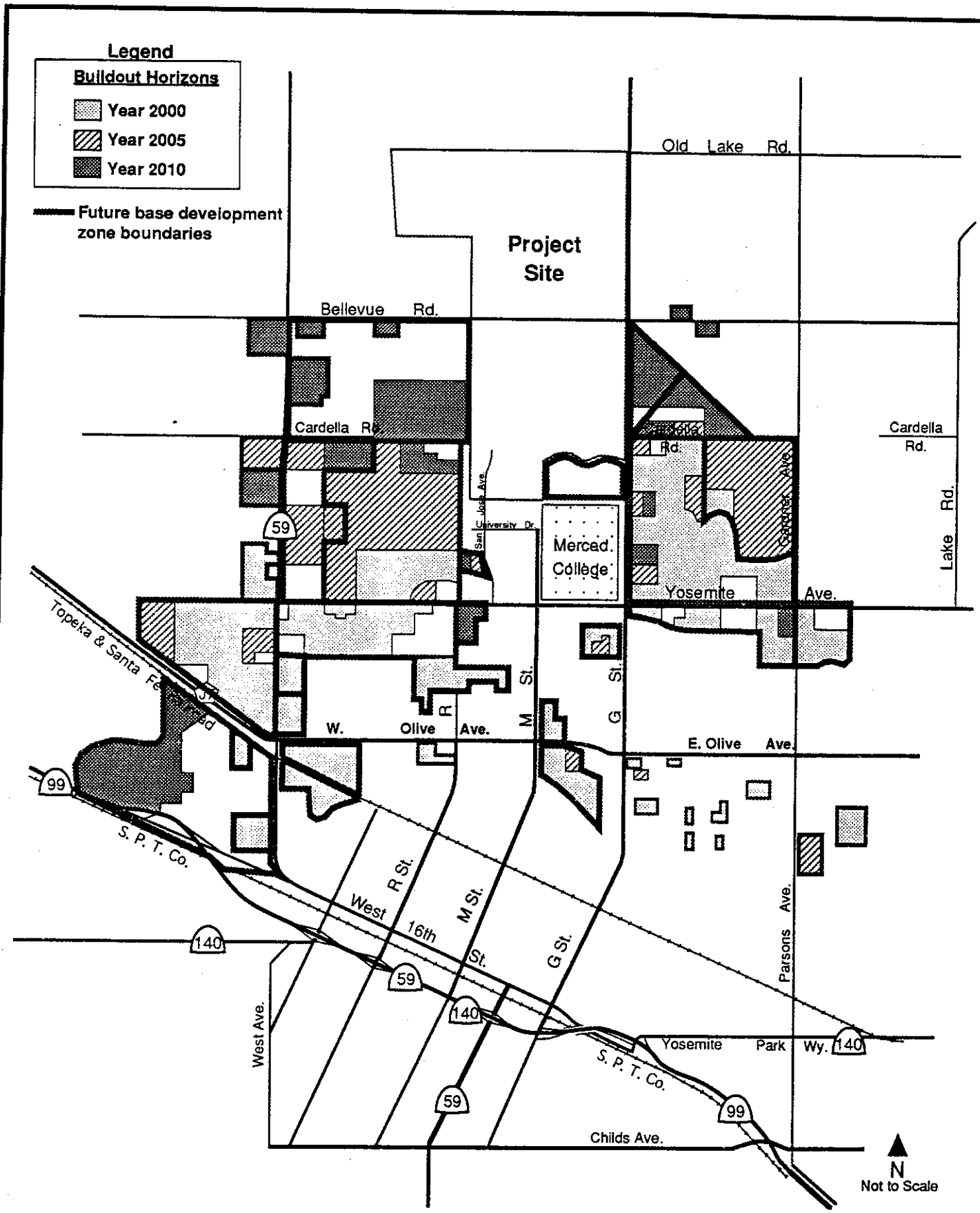

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Figure 4.10-2
Location of Future Base Land Use by Planning Horizon

Table 4.10-4
SUMMARY OF FUTURE BASE LAND USE BY PLANNING HORIZON

		Land Use Buildout[1]					
		2000		2005		2010	
Land Use Designation	Code	Acres	DUS	Acres	DUS	Acres	DUS
Residential							
Low Density	LD	--	2,703	--	1,396	--	1,236
Low Medium Density	LMD	--	250	--	229	--	272
Medium Density	MD	--	100	--	241	--	141
Medium High Density	HMD	--	952	--	414	--	582
High Density	HD		0		40		40
Subtotal:			4,005		2,320		2,271
Commercial/Office							
Neighborhood Commercial	NC/C	108.3	--	54.0	--	35.0	--
Thoroughfare/Travel	TC	--	--	--	--	10.0	--
Comm.	RC/H	58.9	--	--	--	--	--
Regional/Heavy Comm.	C	--	--	--	--	21.0	--
Convenience Commercial	CV	139.5	--	41.0	--	30.0	--
Professional Office	OO	--		25.0		65.0	
Office Park	OP	306.7		120.0		161.0	
Subtotal:							
Industrial							
Light Industrial	IL/IND	134.6	--	130.0	--	132.0	--
Institutional							
Elementary School	ES	10	--	--	--	--	--
High School	HS	18.1	--	--	--	--	--
Subtotal:		28.1					
Total:		469.4	4005	250.0	2,320	293.0	2271

[1] Source: Future base land use locations and amounts provided by the City of Merced Planning Department.

The balance of the projected population and employment north of Bear Creek will occur within the Bellevue Ranch Project. Table 4.10-5 summarizes the Bellevue Ranch land use within each planning horizon. The Project will produce about 1,500, 1,900, and 2,400 dwelling units by the years 2000, 2005, and 2010 respectively. Employment in Bellevue Ranch consists of commercial and office land use with about 5 acres built out by 2000, 78 acres between 2000 and 2005, and 44 acres between 2005 and 2010. An elementary school and a high school will be developed in Bellevue Ranch by the year 2000. The total future land use in the study area (future base + Bellevue Ranch) is shown at the bottom of Table 4.10-5.

Future Circulation Improvements

Planned Roadway Improvements

This analysis considers planned roadway improvements on travel patterns, route selection, and avoidance of congested areas. The City has identified roadway improvements which are planned to be implemented within the three planning horizons. The roadway improvements (described below) are not implemented as part of specific developments, but are included in the future base land use for the area. The planned roadway improvements are:

Year 2000

1) Extension of "R" Street to Yosemite Avenue and further north. Assumes "R" Street as a four lane arterial meeting current right-of-way standards for major divided arterials.

2) Extension of Buena Vista Drive to SR 59. Buena Vista Drive will provide access from Fahrens Creek development to the west. Assumes Buena Vista Drive as a two lane major collector street.

3) Extension of Cardella Road to Gardner Road. Assumes Cardella Road as a four lane undivided minor arterial street.

4) Extension of Yosemite Avenue to SR 59. Assumes Yosemite Avenue as a four lane undivided minor arterial.

5) Extension of Gardner Road to Bellevue Road. Assumes Gardener Road as a two lane rural road.

6) Extension of Cardella Road to SR 59. This extension will complete the connection between "R" Street and SR 59 once the first phase of Bellevue Ranch is developed. Assumes Cardella Road as a two lane rural road.

Table 4.10-5

SUMMARY OF BELLEVUE RANCH LAND USE BY PLANNING HORIZON

Land Use Designation	Code	Land Use Buildout [2] 2000 Acres	2000 DUS	2005 Acres	2005 DUS	2010 Acres	2010 DUS
Residential							
Low Density	LD	--	1,245	--	538	--	900
Low Medium Density	LMD	--	150	--	0	--	1,200
Medium Density	MD	--	0	--	600	--	0
Medium High Density	HMD	--	72	--	800	--	330
High Density	HD	--	0	--	0	--	0
Subtotal:			1,467		1,938		2,430
Commercial/Office							
Neighborhood Commercial	NC/C	5.0	--	54.0	--	30.0	--
Professional Office	CO	--	--	23.0	--	--	--
Subtotal:		5.0		77.0		30.0	
Institutional							
Elementary School	ES	9.6	--	--	--	--	--
High School	HS	40.0	--	--	--	--	--
Subtotal:		49.6					
Total:		54.6	1,467	77.0	1,938	30.0	2,430
Bellevue Ranch + Future Base Land Use:		524.0	5,472	327.0	4,258	323.0	4,701

[2] Source: Future base land use locations and amounts provided by the City of Merced Planning Department.

Year 2005

No planned roadway improvements will occur between 2000 and 2005.

Year 2010

1) Connection of Parsons Avenue between East Olive Avenue and Yosemite Avenue. This connection will provide a by-pass of "G" Street for development north of Yosemite Avenue. Assumes Parsons Avenue as a four lane undivided minor arterial.

2) Mission Avenue/SR 99 Interchange. This improvement to the SR 99 corridor will benefit traffic conditions in southern Merced, but does not have a direct affect on the travel patterns in the northern growth areas.

In assigning future base traffic volumes to Merced's street network, the above improvements were considered part of the path from an origin to a destination if it provided a more direct route than existing paths, or could be used as a by-pass of an severely congested segment of road. This technique of "capacity-restraint" traffic assignment is described in the technical appendix of this report. Figure 3 shows the location and type of roadway improvements by planning horizon. The planned roadways are designated with a (P) in the figure and are identified by functional classification and number of lanes.

Assumed Roadway Improvements

This section describes the basic infrastructure system assumed to be implemented with the development of future base land use and phases of the Bellevue Ranch Project. These facilities are assumed to provide paths for assignment of future base and Project traffic for analysis of impacts. This section does not identify the ultimate size of the roadways nor indicate any development's share in funding improvements.

The facilities assumed during the planning phases are shown in Figure 4.10-3. The new or improved roadways are designated with an (A) and are identified by their functional classification and number of lanes. The assumed roadways in Figure 4.10-3 show the major streets used in the distribution and assignment of future base and Project traffic. These, of course, do not represent all of the streets that will exist. Bellevue Ranch will provide a hierarchy of streets such as local residential and commercial streets, and minor and major collectors not shown in the figure.

Improvements are assumed at several future intersections for the intersection service level analyses. These intersections will be constructed or improved as part of the development served by the roads adjacent to or accessing the site. The assumed intersection improvements, shown in Figure 4.10-4, may not provide enough capacity for projected traffic. These

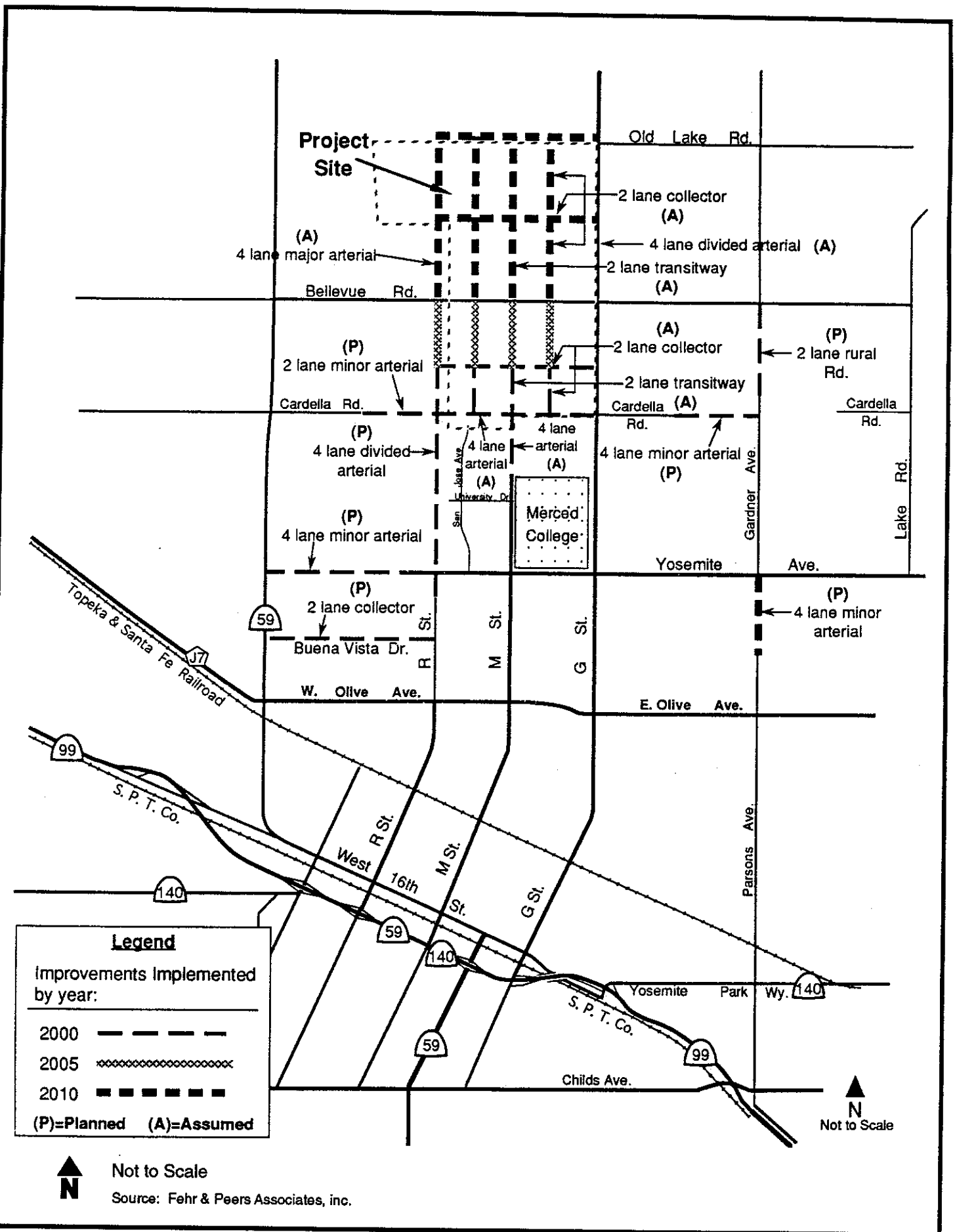

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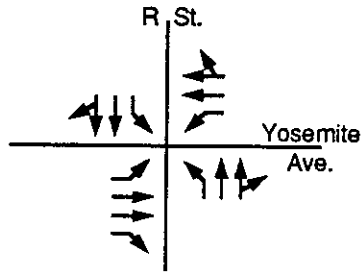
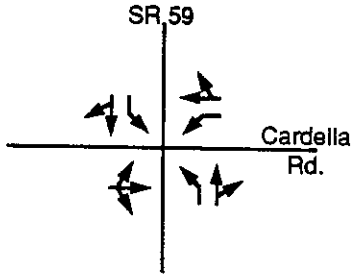
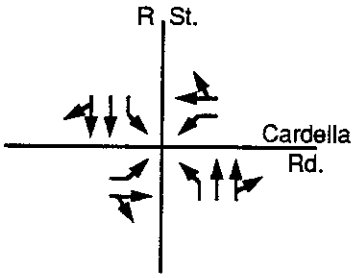
Figure 4.10-3
Planned and Assumed Improvements to Merced Circulation System



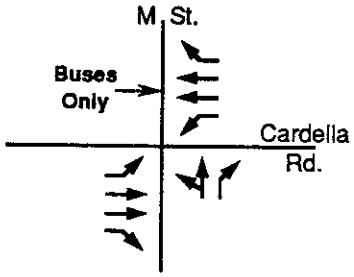
Yosemite / R



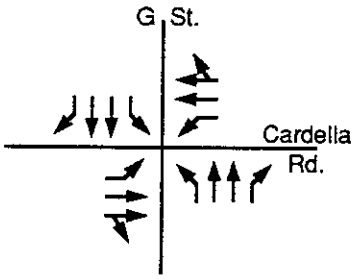
SR 59 / Cardella



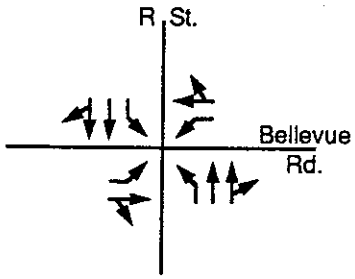
Cardella / R



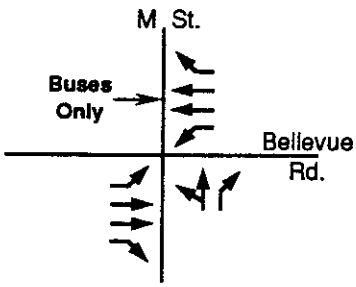
Cardella / M



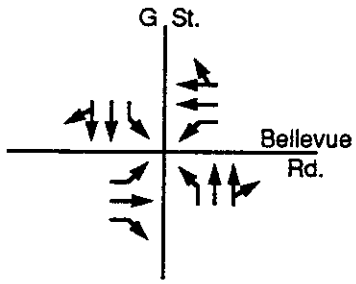
Cardella / G



Bellevue / R



Bellevue / M



Bellevue / G

Not to Scale

Source: Fehr & Peers Associates, inc.

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Figure 4.10-4
Assumed Lane Configurations for Future Intersections

intersections will be modified to improve service levels section if they are found to operate over-capacity.

Trip Generation

Future base and Bellevue Ranch traffic volumes are estimated using trip generation rates from two standard sources; the Institute of Transportation Engineers, Trip Generation, 5th Edition and the San Diego Association of Governments, Traffic Generators. The trip generation rates for the a.m. and p.m. peak hour and average daily traffic are shown in Table 4.10-6. Rates are given for the 14 land use categories identified in the VP-1 land use alternative consisting of five residential density ranges, four commercial categories (from neighborhood to regional commercial), two office categories (from general to office park), light industrial, and schools.

The trip generation for commercial retail land uses have been reduced to reflect "pass-by" trips. Pass-by reductions used in this study are from the Institute of Transportation Engineers Trip Generation, 5th Edition which has compiled numerous pass-by studies of various commercial land uses. An average pass-by reduction of 40% is used in this study.

Future Base Land Use Trip Generation

The estimated trip generation of the future base land use is presented in Table 4.10-7. For each planning horizon, 2000, 2005, and 2010, the trip generation is summarized by Traffic Analysis Zones (TAZ's). Figure 4.10-5 shows the location and boundaries of each TAZ. Development between now and the year 2000 (excluding Bellevue Ranch) will generate about 6,300, 11,100, and 107,000 trips in the morning, afternoon, and on an average weekday respectively. The trip generation between 2000 and 2005 is about 4,100, 6,300, and 58,000 in the three daily time periods. And the trip generation between 2005 and 2010 is about 4,800, 7,100, and 61,000. In total, by the year 2010, the projected future base land use will generate about 15,200 trips in the morning, 24,600 trips in the afternoon, and 226,000 trips on an average weekday 24 hour period.

Bellevue Ranch Trip Generation

The estimated trip generation of the Bellevue Ranch Project is presented in Table 4.10-8. Figure 4.10-5 shows the TAZ's used to disaggregate the Project land use. The Project will generate about 1,600, 1,900, and 18,000 trips in the morning, afternoon, and on an average weekday between now and the year 2000. The trip generation between the year 2000 and 2005 is about 2,100, 3,900, and 36,500 in the three daily time periods. And the trip generation between the year 2005 and 2010 is about 2,200, 3,500, and 34,200. The total trip generation at build out of the Project is estimated at 5,800 in the a.m. peak hour, 9,300 in the p.m. peak hour, and 89,000 on an average weekday. Bellevue Ranch generates about 30% of the traffic generated by future base land use at build out (2010).

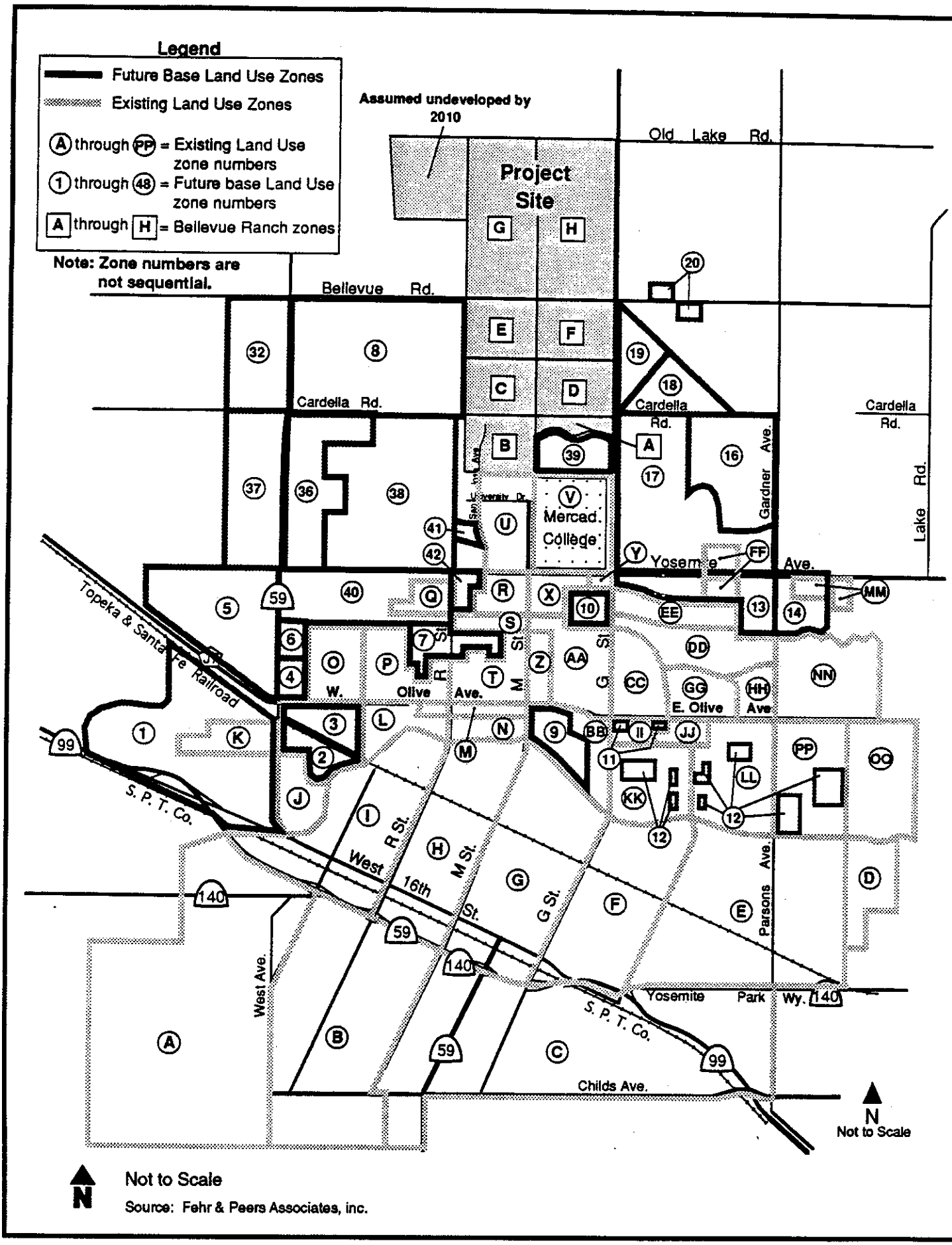

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Figure 4.10-5
Zone System for Use in Distributing Future Traffic

Bellevue Ranch trip generation has been estimated using standard trip generation rates in this study. It is anticipated, though, that Bellevue Ranch will experience a reduction in the number of trips generated by single family residential because the land use planning

Table 4.10-6
TRIP GENERATION RATES

Land Use Designation	Code	Source[3]	AM Peak In	AM Peak Out	AM Peak Total	PM Peak In	PM Peak Out	PM Peak Total	Daily[4]	
Residential (Trips/dwelling unit)										
Low Density	LD	A	0.19	0.55	0.74	0.66	0.35	1.01	10.0	
Low Medium Density	LMD	A	0.19	0.55	0.74	0.66	0.35	1.01	10.0	
Medium Density	MD	A	0.19	0.55	0.74	0.66	0.35	1.01	10.0	
High Medium Density	HMD	A	0.13	0.51	0.64	0.56	0.24	0.80	5.86	
High Density	HD	A	0.09	0.42	0.51	0.43	0.20	0.63	6.87	
Commercial/Office (Trips/acre)										
Neighborhood Commercial[5]	NC/C	B	12.6	8.4	21.0	35.0	35.0	70.0	700	
Thoroughfare/Travel comm.[3]	TC	B	7.2	4.8	12.0	18.0	18.0	36.0	400	
Regional/Heavy Comm.[3]	RC/HC	B	7.0	3.0	10.0	22.5	22.5	45.0	500	
Convenience Commercial[3]	CV	B	28.8	19.2	48.0	66.0	66.0	132.0	1,200	
Professional Office	CO	A	5.18	0.64	5.82	1.02	4.98	6.00	44.17	
Office Park	OP	A	22.83	2.82	25.65	4.24	24.04	28.88	195.11	
Industrial (Trips/acre)										
Light Industrial	IL/IND	A	6.23	1.28	7.51	0.87	6.39	7.26	51.80	
Institutional (Trips/acre)										
Elementary School	ES	B	9.36	6.24	15.60	0.90	2.10	3.00	60.0	
High School	HS	B	8.00	2.00	10.00	2.10	4.90	7.00	50.0	

3 Source of trip generation rates are designated as follows:

A: Institute of Transportation Engineers, Trip Generation, 5th Edition.
B. San Diego Association of Governments (SANDAG), Traffic Generators, 1992.

4 Daily Trip generation assumes 50% inbound and 50% outbound.

5 All commercial land uses will have a pass-by trip reduction applied to the trip generation rate. Pass-by reductions vary depending on the size of the retail use. The ITE Trip Generation Manual indicates that retail centers under 100,000 square feet of gross leasable area have an average pass-by reduction of 60%. Centers over 100,000 square feet have an average pass-by reduction of 25%. For the purpose of this study, since the future base land use contains many various sizes of retail, an average pass-by reduction of 40% is used.

Table 4.10-7
ESTIMATED TRIP GENERATION OF FUTURE BASE LAND USE

TAZ Zone (See Figure 5)	Land Use Code [1]	Units [2]	Trip Generation AM Peak	PM Peak	Daily
Year 2000					
2	LD	100 DU	74	101	1,000
	HMD	404 DU	259	323	2,367
Subtotal:			333	424	3,367
10	LD	138 DU	102	139	1,380
	LMD	60 DU	44	61	600
	CN	12.8 AC	161	536	5,355
	CO	5.1 AC	30	31	225
Subtotal:			337	767	7,560
13	LD	867 DU	642	876	8,670
	LMD	111 DU	82	112	1,110
	HMD	150 DU	96	120	879
	CN	2.5 AC	32	105	1,050
Subtotal:			852	1,213	11,709
17	LD	1040 DU	770	1,062	10,410
	HMD	261 DU	167	209	1,529
	ES	8.5 AC	133	26	479
	HS	15.4 AC	154	108	938
	CN	3.4 AC	43	143	1,428
Subtotal:			1,267	1,548	14,784
38	MD	100 DU	74	101	1,000
	C	12.8 AC	161	536	5,355
	C	21.3 AC	268	893	8,925
	CO	6.8 AC	40	41	300
Subtotal:			543	1,571	15,580
12	LD	89 DU	66	90	890
	LMD	79 DU	58	80	790
Subtotal:			124	170	1,680
40	LD	468 DU	346	473	4,680
	HMD	137 DU	88	75	803
	C	10 AC	126	420	4,200
	CO	3 AC	17	18	133
Subtotal:			577	986	9,816
4	CO	12.8 AC	74	77	565
6	CO	10.7 AC	62	64	473
1	IND	23.5 AC	176	170	1,216
3	RC	40.5 AC	243	1,094	12,150
	CO	14.7 AC	86	88	649
Subtotal:			329	1,182	12,799
7	RC	18.4 AC	110	497	5,520
	CO	11.7 AC	68	70	517
Subtotal:			178	567	6,037
9	CO	15.2 AC	88	91	671
11	CN	6.8 AC	86	286	2,856
5	IND	91.0 AC	683	660	4,712
	CO	23.4 AC	136	140	1,033
	C	25.5 AC	321	1,071	10,710
Subtotal:			1,140	1,871	16,455
36	CO	25.5 AC	149	153	1,126
Year 2000 Total:			6,315	11,140	106,694

Table 4.10-7 (continued)

TAZ Zone (See Figure 5)	Land Use Code [1]	Units [2]	Trip Generation AM Peak	PM Peak	Daily
Year 2005					
12	LMD	90 DU	67	91	900
	HMD	54 DU	35	43	316
Subtotal:			102	134	1,216
10	LMD	57 DU	42	58	570
16	LMD	700 DU	518	707	7,000
	C	12.8 AC	161	536	5,355
Subtotal:			679	1,243	12,355
17	LD	82 DU	61	83	820
	HMD	285 DU	184	228	1670
Subtotal:			245	311	2,490
36	LD	82 DU	61	83	820
	IL	39.1 AC	293	284	2,026
	CO	30.6 AC	179	184	1,352
	OP	21.3 AC	545	601	4,146
Subtotal:			1,078	1,152	8,344
38	LD	614 DU	454	620	6,140
	MD	241 DU	178	243	2,410
	HD	40 DU	20	25	275
	ES	8.5 AC	133	26	510
Subtotal:			785	914	9,335
41	HMD	75 DU	48	60	440
5	IL	71.4 AC	536	519	3,698
	C	25.5 AC	321	1,071	10,710
Subtotal:			857	1,590	14,408
18	CN	7.7 AC	96	321	3,213
16	C	12.8 AC	161	536	5,355
12	CO	4.3 AC	25	26	188
Year 2005 Total:			4,118	6,345	57,914

Table 4.10-7 (continued)

TAZ Zone (See Figure 5)	Land Use Code [1]	Units [2]	Trip Generation AM Peak	PM Peak	Daily
Year 2010					
1	IND	112.2 AC	843	815	5,812
8	LD	596 DU	441	602	5,960
	CV	5.1 AC	147	404	3,672
	TC	8.5 AC	61	184	2,040
	C	12.8 AC	161	538	5,376
	OP	12.8 AC	328	370	2,497
Subtotal:			1,138	2,098	19,545
13	LMD	159 DU	118	161	1,590
17	LMD	46 DU	34	46	460
	HMD	130 DU	83	104	762
Subtotal:			117	150	1,222
18	LD	150 DU	111	152	1,500
	HMD	300 DU	192	240	1,758
Subtotal:			303	392	3,258
19	LD	350 DU	259	354	3,500
20	C	25.5 AC	321	1,071	10,710
32	CO	25.5 AC	148	153	1,126
	C	4.3 AC	54	181	1,806
Subtotal:			202	334	2,932
36	LD	140 DU	104	141	1,400
37	OP	42.5 AC	1,090	1,227	8,292
38	MD	141 DU	104	142	1410
	HD	40 DU	20	25	275
Subtotal:			124	167	1,685
41	HMD	75 DU	48	60	440
42	LMD	67 DU	50	68	670
	HMD	77 DU	49	62	451
			99	130	1,121
Year 2010 Total:			4,766	7,100	61,507
Grand Total:			15,199	24,585	226,115

Footnotes:

[1] Land Use Codes:
LD=Low Density Res. LMD=Low Medium Density Res. HMD=High Medium Density Res. MD=Medium Density Res. HD=High Density Res. CN=Neighborhood Commercial C=General Commercial TC=Travel Commercial CV=Convenience Commercial RC=Regional Commercial CO=Professional Office OP=Office Park IND or IL=Light Industrial ES=Elementary School HS=High School

[2] The gross acreage of commercial, office, and industrial land use in currently undeveloped parts of Merced's Growth Areas have been reduced by 15% to reflect net acreage for trip generation purposes. Net acreage is the gross acreage minus land used for infrastructure such as collector streets, access roads, utility easements, etc. An example of future base land use that has not been reduced to reflect net acreage is the commercial and office land use in Zone 3 (south of West Olive between SR 59 and R Street) which is in a developed area and has a street and utility system in place.

Table 4.10-8
ESTIMATED TRIP GENERATION OF BELLEVUE RANCH

TAZ Zone (See Figure 5)	Land Use Code [1]	Units [2]	Trip Generation AM Peak	PM Peak	Daily
Year 2000					
A	LD	85 DU	63	86	850
	HMD	72 DU	46	58	422
	C	4.3 AC	54	181	1,806
Subtotal:			163	325	3,078
B	LD	210 DU	155	212	2,100
	LMD	150 DU	111	152	1,500
Subtotal:			266	364	3,600
C	LD	450 DU	333	455	4,500
	HS	34.0 AC	340	238	1,700
	ES	8.2 AC	128	25	492
Subtotal:			801	718	6,692
D	LD	500 DU	370	505	5,000
Year 2000 Total:			1,600	1,912	18,370
Year 2005					
E	LD	269 DU	199	272	2,690
	HMD	400 DU	256	320	2,344
	MD	300 DU	222	303	3,000
	C	23.3 AC	294	979	9,786
Subtotal:			971	1,874	17,820
F	LD	269 DU	199	272	2,690
	HMD	400 DU	256	320	2,344
	MD	300 DU	222	303	3,000
	C	23.3 AC	294	979	9,786
	CO	19.6 AC	114	118	866
Subtotal:			1,085	1,992	18,686
Year 2005 Total:			2,056	3,866	36,506
Year 2010					
G	LD	450 DU	333	455	4,500
	LMD	600 DU	444	606	6,000
	C	12.8 AC	161	538	5,376
	CO	11.9 AC	69	71	526
Subtotal:			1,007	1,670	16,402
H	LD	450 DU	333	455	4,500
	LMD	600 DU	444	606	6,000
	HMD	330 DU	211	264	1,934
	C	12.8 AC	161	538	5,376
Subtotal:			1,149	1,863	17,810
Year 2010 Total:			2,156	3,533	34,212
Grand Total:			5,812	9,311	89,088

Footnotes:

[1] Land Use Codes:
LD=Low Density Res. LMD=Low Medium Density Res. HMD=High Medium Density Res. MD=Medium Density Res. HD=High Density Res. CN=Neighborhood Commercial C=General Commercial TC=Travel Commercial CV=Convenience Commercial RC=Regional Commercial CO=Professional Office OP=Office Park IND or IL=Light Industrial ES=Elementary School HS=High School

[2] The gross acreage of commercial, office, and industrial land use in currently undeveloped parts of Merced's Growth Areas have been reduced by 15% to reflect net acreage for trip generation purposes. Net acreage is the gross acreage minus land used for infrastructure such as collector streets, access roads, utility easements, etc. An example of future base land use that has not been reduced to reflect net acreage is the commercial and office land use in Zone 3 (south of West Olive between SR 59 and R Street) which is in a developed area and has a street and utility system in place.

incorporates "NeoTraditional Neighborhood Design (NTND)". NTND community design is the basis of the City's long range planning efforts documented in Merced 2030-How Should We Grow? and the Merced Villages Design Guidelines. Bellevue Ranch is the first project in Merced to incorporate the village concept. The village concept provides beneficial measures to reduce traffic. These are:

Mixed land use located in high density "town centers" designed to encourage walking, bicycling, and combining of trip purposes to reduce auto travel.

A central "transitway" located in the "M" Street corridor designed to provide accessible, convenient, and efficient transit services as well as an attractive corridor for pedestrians and bicyclists.. Some of the background, goals, and benefits of the transitway concept are:

- The transitway and its associated pathways are intended to promote and encourage alternatives to the automobile, link transit to public facilities and high density village cores, provide "multi-modal" transportation centers at the "town centers", and provide a corridor for a potential light rail system. Segments of the transitway provide for automobile traffic for local intra-village trips, but discourage its use for through traffic.

- The transitway is a deviation from the historical plans of "M" Street which has been perceived as an extension of a central major arterial through Merced. The concept of the transitway is based on the unique linear distribution of lands use formulated in Merced's Growth Study. The study determined that "M" Street was the only major road which did not naturally fit within the one-mile grid pattern of other major streets, and would bring significant traffic through rather than around residential neighborhoods, This finding led to the decision to use the "M" Street corridor for a Transitway.

- The transitway, and essentially the "Village Concept", is dependant on providing sufficient roadway capacity around the villages removing major obstacles to transit, pedestrians, and bicyclists.

- The transitway benefits the community by encouraging a change in the lifestyle and commuting patterns which have caused the significant increase in automobile use seen in modern suburbs. It helps reduce automobile emissions and is beneficial in meeting the air quality and transit requirements of the Merced Congestion Management Plan, the Air Quality Attainment Plan, and the Merced County Regional Transportation Improvement Program. The current transitway concept is flexible and provides a balance between effective transit and vehicle capacity. It would provide the key functions of improving transit level of service, and discouraging through traffic and congestion while providing a moderate level of

capacity and access for internal circulation. A detailed discussion of the transitway's history, benefits, and operational aspects are included in the technical appendix.

A unique spatial distribution of housing, commercial, employment, and recreational land use connected with a network of pedestrian and bicycle paths located within attractive "greenbelts".

A detailed description of the Project's automobile and transit circulation system is presented in the technical appendix of this report.

This analysis, however, is based on the potentially worst case scenario of Project trip generation equal to that of traditional sub-divisions because the NTND concept is a relatively new planning trend and no engineering studies have been performed to measure actual NTND travel characteristics.. A sensitivity analysis measuring the effect of reduced trip generation is presented in the technical appendix of this report.

Future Traffic Volumes

Intersections

Study intersections were increased from eight analyzed in existing conditions to fourteen in future conditions to account for new intersections and to evaluate existing intersections operating well now but become impacted in the future. Tables 4.10-9 through 4.10-11 show the contribution of future land use to the study intersection traffic volumes. The tables present this in terms of the percentage of existing, future base, and Project traffic components to the total projected intersection volumes in the a.m. and p.m. peak hours. In the year 2000 without Bellevue Ranch, future base traffic will average more than 50% to 60% of the total traffic at the 14 study intersections. The future base component of traffic at individual intersections ranges from about 20% at existing intersections to 100% at new intersections. Adding Project traffic dilutes future base traffic somewhat to an average of 40% to 50% while the Project averages about 15% to 18% of the total intersection traffic. Project traffic at individual intersections ranges from a low of 2% at distant intersections to as high as 65% within Bellevue Ranch. At the key existing intersections (R,M, and G at West Olive Avenue) the Project contributes between 6% and 10% of the year 2000 traffic.

In 2005 without Bellevue Ranch, future base land contributes an average of 70% to 75% of the total intersection volumes. Project traffic added in 2005 averages about 32% and

Table 4.10-9
YEAR 2000 FUTURE LAND USE CONTRIBUTION TO TOTAL INTERSECTION VOLUMES

	Year 2000 Without Project-PM Peak Hour				Year 2000 With Project-PM Peak Hour				
Intersection	Total Intersection Volume	Percent Existing Volume	Percent Added Volume	Total	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	6159	48.70%	51.30%	100%	6194	48.40%	49.70%	1.90%	100%
West Olive/R	6354	53.50%	46.50%	100%	6737	50.40%	41.90%	7.70%	100%
West Olive/M	5515	63.00%	37.00%	100%	5774	60.20%	29.70%	10.10%	100%
West Olive/G	5534	66.40%	33.60%	100%	5901	62.30%	31.60%	6.10%	100%
Yosemite/R	1996	0.00%	100.00%	100%	2495	0.00%	82.60%	17.40%	100%
Yosemite/M	2785	36.00%	64.00%	100%	3644	27.70%	44.30%	28.00%	100%
Yosemite/G	3508	32.00%	68.00%	100%	2934	38.20%	53.40%	8.40%	100%
Cardella/SR 59	598	49.10%	50.90%	100%	838	35.10%	60.10%	4.80%	100%
Cardella/R	124	0.00%	100.00%	100%	809	0.00%	39.10%	60.90%	100%
Cardella/M	128	0.00%	100.00%	100%	1441	0.00%	44.80%	55.20%	100%
Cardella/G	741	72.80%	27.20%	100%	1501	36.10%	47.50%	16.40%	100%
Bellevue/R	306	78.60%	21.40%	100%	305	78.80%	21.20%	0.00%	100%
Bellevue/M	306	78.60%	21.40%	100%	305	78.80%	21.20%	0.00%	100%
Bellevue/G	718	75.30%	24.70%	100%	735	73.50%	24.10%	2.40%	100%
Average:		46.71%	53.29%			42.11%	42.23%	15.66%	

	Year 2000 Without Project-AM Peak Hour				Year 2000 With Project-AM Peak Hour				
Intersection	Total Intersection Volume	Percent Existing Volume	Percent Added Volume	Total	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	4040	48.00%	52.00%	100%	4082	47.50%	50.20%	2.30%	100%
West Olive/R	3335	54.80%	45.20%	100%	3685	49.70%	38.50%	11.80%	100%
West Olive/M	3218	62.80%	37.20%	100%	3531	57.30%	30.40%	12.30%	100%
West Olive/G	4421	63.50%	36.50%	100%	4457	63.00%	30.20%	6.80%	100%
Yosemite/R	966	0.00%	100.00%	100%	1400	0.00%	72.00%	28.00%	100%
Yosemite/M	1536	44.10%	55.90%	100%	2318	29.40%	43.20%	27.40%	100%
Yosemite/G	2474	25.50%	74.50%	100%	2036	31.10%	57.40%	11.50%	100%
Cardella/SR 59	1070	80.10%	19.90%	100%	1284	66.70%	31.00%	2.30%	100%
Cardella/R	106	0.00%	100.00%	100%	675	0.00%	35.00%	65.00%	100%
Cardella/M	119	0.00%	100.00%	100%	1215	0.00%	40.50%	59.50%	100%
Cardella/G	416	58.30%	41.70%	100%	1030	23.60%	53.60%	22.80%	100%
Bellevue/R	37	2.60%	97.40%	100%	34	5.60%	94.40%	0.00%	100%
Bellevue/M	37	2.60%	97.40%	100%	34	5.60%	94.40%	0.00%	100%
Bellevue/G	349	69.50%	30.50%	100%	363	66.90%	29.20%	3.90%	100%
Average:		36.56%	63.44%			31.89%	50.00%	18.11%	

Table 4.10-10
YEAR 2005 FUTURE LAND USE CONTRIBUTION TO TOTAL INTERSECTION VOLUMES

	Year 2005 Without Project-PM Peak Hour				Year 2005 With Project-PM Peak Hour				
Intersection	Total Intersection Volume	Percent Existing Volume	Percent Added Volume	Total	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	8018	37.40%	62.60%	100%	9016	33.20%	58.50%	8.30%	100%
West Olive/R	7921	42.90%	57.10%	100%	8647	39.30%	45.50%	15.20%	100%
West Olive/M	6141	56.60%	43.40%	100%	5852	59.40%	23.80%	16.80%	100%
West Olive/G	6223	59.00%	41.00%	100%	6928	53.10%	36.90%	10.00%	100%
Yosemite/R	4077	0.00%	100.00%	100%	4682	0.00%	75.20%	24.80%	100%
Yosemite/M	2979	33.60%	66.40%	100%	3655	27.50%	39.70%	32.80%	100%
Yosemite/G	4115	27.20%	72.80%	100%	4106	27.30%	53.70%	19.00%	100%
Cardella/SR 59	2336	12.80%	87.20%	100%	3136	9.30%	81.00%	9.70%	100%
Cardella/R	1201	0.00%	100.00%	100%	2845	0.00%	53.80%	46.20%	100%
Cardella/M	1514	0.00%	100.00%	100%	2794	0.00%	55.70%	44.30%	100%
Cardella/G	2389	22.70%	77.30%	100%	3822	14.10%	50.30%	35.60%	100%
Bellevue/R	501	47.90%	52.10%	100%	1582	15.10%	16.90%	68.00%	100%
Bellevue/M	501	47.90%	52.10%	100%	1961	12.10%	13.70%	74.20%	100%
Bellevue/G	1071	50.40%	49.60%	100%	1716	31.40%	30.10%	38.50%	100%
Average:		31.31%	68.69%			22.99%	45.34%	31.67%	

	Year 2005 Without Project-AM Peak Hour				Year 2005 With Project-AM Peak Hour				
Intersection	Total Intersection Volume	Percent Existing Volume	Percent Added Volume	Total	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	5324	36.50%	63.50%	100%	5908	32.90%	59.00%	8.10%	100%
West Olive/R	4575	39.90%	60.10%	100%	5082	36.00%	47.30%	16.70%	100%
West Olive/M	3711	54.50%	45.50%	100%	3447	58.60%	23.60%	17.80%	100%
West Olive/G	4453	63.00%	37.00%	100%	4939	56.80%	34.30%	8.90%	100%
Yosemite/R	2670	0.00%	100.00%	100%	3017	0.00%	74.80%	25.20%	100%
Yosemite/M	2044	33.40%	66.60%	100%	2356	28.90%	38.90%	32.20%	100%
Yosemite/G	2718	23.40%	76.60%	100%	2598	24.40%	56.70%	18.90%	100%
Cardella/SR 59	2249	38.10%	61.90%	100%	2909	29.40%	63.90%	6.70%	100%
Cardella/R	835	0.00%	100.00%	100%	1889	0.00%	53.00%	47.00%	100%
Cardella/M	1059	0.00%	100.00%	100%	1866	0.00%	53.30%	46.70%	100%
Cardella/G	1484	16.40%	83.60%	100%	2258	10.80%	52.70%	36.50%	100%
Bellevue/R	179	0.60%	99.40%	100%	783	0.30%	22.90%	76.80%	100%
Bellevue/M	179	0.60%	99.40%	100%	977	0.20%	18.40%	81.40%	100%
Bellevue/G	583	42.00%	58.00%	100%	933	26.40%	33.90%	39.70%	100%
Average:		24.89%	75.11%			21.76%	45.19%	33.04%	

Table 4.10-11
YEAR 2010 FUTURE LAND USE CONTRIBUTION TO TOTAL INTERSECTION VOLUMES

	Year 2010 Without Project-PM Peak Hour				Year 2010 With Project-PM Peak Hour				
Intersection	Total Intersection Volume	Percent Existing Volume	Percent Added Volume	Total	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	10189	29.40%	70.60%	100%	10615	28.20%	60.40%	11.40%	100%
West Olive/R	10008	33.90%	66.10%	100%	10696	31.80%	50.10%	18.10%	100%
West Olive/M	9091	38.20%	61.80%	100%	9931	35.00%	52.60%	12.40%	100%
West Olive/G	7810	47.00%	53.00%	100%	8118	45.30%	37.20%	17.50%	100%
Yosemite/R	5303	0.00%	100.00%	100%	7288	0.00%	75.40%	24.60%	100%
Yosemite/M	3957	25.10%	74.90%	100%	6205	16.10%	69.60%	14.30%	100%
Yosemite/G	5982	18.70%	81.30%	100%	6961	16.10%	60.10%	23.80%	100%
Cardella/SR 59	4379	6.70%	93.30%	100%	6409	4.50%	79.20%	16.30%	100%
Cardella/R	1641	0.00%	100.00%	100%	4970	0.00%	52.90%	47.10%	100%
Cardella/M	2124	0.00%	100.00%	100%	3501	0.00%	69.90%	30.10%	100%
Cardella/G	4341	12.50%	87.50%	100%	6695	8.10%	57.70%	34.20%	100%
Bellevue/R	1682	14.20%	85.80%	100%	3443	7.00%	40.00%	53.00%	100%
Bellevue/M	1530	15.60%	84.40%	100%	2957	8.20%	35.70%	56.10%	100%
Bellevue/G	3435	15.70%	84.30%	100%	4425	12.20%	52.60%	35.20%	100%
Average:		**18.36%**	81.64%			15.18%	56.67%	28.15%	

	Year 2010 Without Project-AM Peak Hour				Year 2010 With Project-AM Peak Hour				
Intersection	Total Intersection Volume	Percent Existing Volume	Percent Added Volume	Total	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	6686	29.00%	71.00%	100%	7308	26.60%	63.20%	10.20%	100%
West Olive/R	5923	30.80%	69.20%	100%	7082	25.80%	54.40%	19.80%	100%
West Olive/M	5166	39.10%	60.90%	100%	6298	32.10%	55.40%	12.50%	100%
West Olive/G	5251	53.40%	46.60%	100%	5735	49.00%	35.60%	15.40%	100%
Yosemite/R	3717	0.00%	100.00%	100%	4491	0.00%	68.10%	31.90%	100%
Yosemite/M	2626	25.90%	74.10%	100%	3667	18.60%	61.80%	19.60%	100%
Yosemite/G	3670	17.20%	82.80%	100%	3635	17.50%	54.30%	28.20%	100%
Cardella/SR 59	3426	25.00%	75.00%	100%	4796	17.90%	77.70%	4.40%	100%
Cardella/R	1186	0.00%	100.00%	100%	3397	0.00%	53.30%	46.70%	100%
Cardella/M	1490	0.00%	100.00%	100%	2834	0.00%	68.10%	31.90%	100%
Cardella/G	2470	9.70%	90.30%	100%	4331	5.60%	61.70%	32.70%	100%
Bellevue/R	723	0.10%	99.40%	100%	2241	0.10%	34.80%	65.10%	100%
Bellevue/M	631	0.20%	99.40%	100%	2274	0.00%	24.50%	75.50%	100%
Bellevue/G	1528	15.80%	84.20%	100%	2371	10.30%	46.50%	43.20%	100%
Average:		17.59%	82.35%			14.54%	54.24%	31.22%	

reduces the future base component to about 45%. Project traffic at individual intersections ranges from 8% to 80% with about 8% to 18% of the total traffic at the three key intersections on West Olive Avenue.

In 2010 without Bellevue Ranch, future base traffic increases to an average of 80% of the total intersection volumes. Project traffic added in 2010 averages about 28% to 31% and reduces the future base component to about 55%. Project traffic at the key intersections on West Olive Avenue contributes between 12% and 19% of the total 2010 traffic.

The existing traffic component of the total intersection volumes gradually decreases as future development increases. In 2000, the existing component averages about 32% to 47% of the traffic at the 14 study intersections, decreasing to about 22% to 31% in 2005 and to about 15% to 18% in 2010. This underlines the magnitude of traffic generated by future development in Merced. Some intersections in the northern part of the City will experience an increase of traffic 5 to 6 times their existing volumes. Several intersections experience significantly high volumes between 8,000 and 11,000 vehicles in the peak hour, well in excess of the capacity of Merced's typical major intersection.

Project only and Project plus cumulative turning volumes at the study intersections are located in the technical appendix.

Roadways

Table 4.10-12 presents the Project's contribution to the daily traffic volumes on Merced's major roadways. On average, the Project will contribute an increasing proportion of the total traffic with each phase of its development, 13% in 2000, 22% in 2005, and 23% in 2010. The Key streets within the presently developed region of the City (south of Yosemite Avenue) will experience Bellevue Ranch traffic ranging from a low of 5% on SR 59 south of West Olive to a high of 32% on R Street north of West Olive. Generally, Bellevue Ranch will contribute less to east-west streets than north-south streets reflecting the primary travel pattern of future traffic toward the south. The Project's share of traffic on streets within Bellevue Ranch ranges between 16% and 81%. Traffic generated by future base land use contributes a large proportion to the east-west arterials, particularly Cardella Road (about 75% to 90%). This indicates the magnitude of traffic from northeast Merced traveling to the concentration of employment in the SR 59 corridor, and to Atwater.

State Routes

Future development in Merced will add substantial amounts of traffic to the state highway system, particularly SR 59 and SR 99. Year 2010 volumes reach nearly 70,000 vehicles per day on SR 59 and nearly 100,000 vehicles per day on SR 99 north of the city. Traffic volumes on SR 59 north of SR 99 are discussed in detail in other sections of this study. This section focusses on the remaining state routes serving Merced, SR 99, SR 140, and SR 59 south of the

city. State highway traffic forecasts consist of existing traffic, future Merced traffic, and an estimate of traffic traveling through Merced (X-X travel). Existing traffic volumes are from Caltrans station counts. Future Merced traffic volumes are from the trip generation of future base and Bellevue Ranch land use assigned to the state highways based

Table 4.10-12
PROJECT CONTRIBUTION TO DAILY ROADWAY VOLUMES

Roadway Segment	Year 2000 ADT	Year 2000 Project ADT	Year 2000 Project Share	Year 2005 ADT	Year 2005 Project ADT	Year 2005 Project Share	Year 2010 ADT	Year 2010 Project ADT	Year 2010 Project Share
State Route 59									
S. of West Olive	30,100	600	2%	39,300	1,100	3%	37,100	1,800	5%
N. of West Olive	34,900	200	1%	54,500	2,100	4%	67,000	7,300	11%
N. of Yosemite	11,200	0	0%	30,300	2,000	7%	51,700	6,500	13%
N. of Cardella	8,000	400	5%	20,200	2,900	14%	36,000	5,100	14%
West Olive Avenue									
E. of SR 59	33,000	1,000	3%	39,400	5,100	13%	48,300	4,200	9%
W. of R Street	35,500	1,800	5%	41,400	7,200	17%	51,300	6,800	13%
W. of M Street	25,700	900	4%	30,600	1,600	5%	42,200	4,400	10%
W. of G Street	25,300	1,300	5%	25,700	600	2%	34,800	2,600	7%
East Olive Avenue									
E. of G Street	15,100	200	1%	16,000	600	4%	17,700	1,800	10%
R Street									
S. of West Olive	35,600	3,700	10%	47,800	5,400	11%	58,200	9,700	17%
N. of West Olive	23,000	4,600	20%	33,500	11,100	33%	55,700	18,100	32%
S. of Cardella	5,300	4,300	81%	12,000	10,800	90%	26,100	18,600	71%
S. of Bellevue	5,300	0	0%	5,500	4,800	87%	16,800	13,600	81%
M Street									
S. of West Olive	28,500	3,700	13%	26,900	7,200	27%	57,900	9,700	17%
N. of West Olive	30,700	5,800	19%	28,800	9,300	32%	51,400	6,900	13%
S. of Yosemite	23,000	7,800	34%	22,400	10,900	49%	42,100	8,800	21%
N. of Yosemite	16,800	8,100	48%	17,400	11,200	64%	21,300	8,700	41%
S. of Cardella	9,900	6,000	61%	12,000	9,600	80%	18,000	8,600	48%
G Street									
S. of West Olive	41,700	3,700	9%	48,600	6,100	13%	55,700	9,700	17%
N. of West Olive	39,800	2,600	7%	49,300	6,100	12%	54,800	12,800	23%
S. of Yosemite	16,900	2,600	15%	26,700	6,400	24%	37,500	13,900	37%
S. of Cardella	7,100	2,700	38%	13,700	7,300	53%	33,200	15,700	47%
S. of Bellevue	4,500	200	4%	10,900	4,800	44%	29,300	14,400	49%
Yosemite Avenue									
E. of SR 59	5,600	200	4%	17,200	200	1%	20,200	900	4%
E. of M Street	13,400	200	1%	13,300	300	2%	24,700	700	3%
Cardella Road									
E. of SR 59	2,700	400	15%	14,700	900	6%	26,700	3,200	12%
E. of R Street	10,200	3,700	36%	18,500	3,500	19%	23,100	3,800	16%
E. of M Street	11,100	4,800	43%	21,800	7,600	35%	32,400	7,800	24%
Bellevue Road									
E. of SR 59	2,000	0	0%	8,400	4,400	52%	16,700	5,600	34%
E. of R Street	2,000	0	0%	15,800	9,200	58%	27,400	11,300	41%
E. of M Street	2,000	0	0%	16,000	9,400	59%	25,200	14,200	56%
Average:			**13%**			**22%**			**23%**

on the regional model distribution. Through traffic is estimated from the 2000 and 2010 regional models, with 2005 through traffic determined through interpolation.

The contribution of future base and Bellevue Ranch development to state route traffic volumes is shown in Table 4.10-13. In the year 2000 future base land use contributes from 13% on SR 140 to the east to 27% on SR 99 to the north, averaging about 22% on all of the state routes. Table 4.10-12 shows the future base contribution ranges from as little as 1,000 vehicles daily on SR 59 and 140 to as high as 15,000 vehicles daily on SR 99 to the north. Bellevue Ranch contributes an average of 2% to the state route volumes in 2000. The Project will add 700 vehicles daily to SR 99 north and 1,800 vehicles daily south, and contributes little traffic to the other state routes (0 to 200 vehicles daily). In total, future development in Merced will add about 32,000 vehicles per day to the state highway system (24% of the forecast volumes) with the highest amount, 17,000 vehicles, added to SR 99 north.

In the year 2005 future base traffic increases to about 30% of the total state highway traffic around Merced. Again, SR 99 north will experience the highest amount of traffic, 28,000 vehicles daily, or about 40% of the projected 73,000 vehicles. Bellevue Ranch will contribute an average of 6% to the 2005 volumes including about 4,400 vehicles daily on SR 99 north and about 3,800 vehicles daily south, and continues to add little traffic to the other state routes (500 vehicles daily or less). Future development in Merced by 2005 will add about 60,000 vehicles to the state highway system ranging from 21% of the total traffic on SR 140 west to 42% on SR 99 north.

In the year 2010 future base traffic increases to 37% (67,200 vehicles) of the total state highway traffic. Future base land use will contribute 46% of the 89,000 vehicles projected on SR 99 north, 29% of the 55,000 vehicles on SR 99 south, and less than 5,000 vehicles per day on the other state routes. Bellevue Ranch will contribute an average of 8% to the 2010 state highway projections with about 8% (8,000 vehicles) to SR 99 north, 9% (5,300 vehicles) to SR 99 south, and less than 1,000 vehicles per day to the other state routes. In total, buildout of the land use scenario analyzed in this study (2010) contributes about 82,000 vehicles to the state highway system with substantial amounts on SR 99 north (49,000) and SR 99 south (21,000). Three quarters of the increase in traffic is due to future base development.

It is important to note that future base and Bellevue Ranch land use represents only 50% to 60% of the development expected in Merced by 2010. The remaining development, located in the southern regions of the city, will also contribute traffic to the state highway system. Assuming the southern region will generate an equal proportion of population and employment as the northern region, the traffic added to the state highway system could be twice that projected above.

Table 4.10-13
FUTURE BASE LAND USE AND BELLEVUE RANCH DAILY TRAFFIC VOLUMES ON STATE HIGHWAY SYSTEM

State Highway/ Direction	2000 State Route ADT Without Bellevue Ranch	2000 State Route ADT With Bellevue Ranch	Daily Traffic Volumes Added to State Routes: Year 2000 W/O Bellevue Ranch	% of ADT	Year 2000 With Bellevue Ranch: Future Base	% of ADT	Bellevue Ranch	% of ADT	Total	% of ADT
SR 99 North	56,800	58,600	15,100	27%	16,200	28%	700	1%	16,900	29%
SR 99 South	41,300	43,100	8,600	21%	8,600	20%	1,800	4%	10,400	24%
SR 59 South	8,000	8,200	1,100	14%	1,100	13%	200	2%	1,300	16%
Route 140 West	7,100	7,300	1,100	15%	1,100	15%	0	0%	1,100	15%
Route 140 East	16,600	16,800	2,200	13%	2,200	13%	200	1%	2,400	14%
Total:	**129,800**	**134,000**	**28,100**	**22%**	**29,200**	**22%**	**2,900**	**2%**	**32,101**	**24%**

State Highway/ Direction	2005 State Route ADT Without Bellevue Ranch	2005 State Route ADT With Bellevue Ranch	Daily Traffic Volumes Added to State Routes: Year 2005 W/O Bellevue Ranch	% of ADT	Year 2005 With Bellevue Ranch: Future Base	% of ADT	Bellevue Ranch	% of ADT	Total	% of ADT
SR 99 North	72900	77300	28,200	39%	28,200	36%	4,400	6%	32,600	42%
SR 99 South	45600	49400	9,900	22%	9,900	20%	3,800	8%	13,700	28%
SR 59 South	10200	10700	3,300	32%	3,300	31%	500	5%	3,800	36%
Route 140 West	7600	7600	1,600	21%	1,600	21%	0	0%	1,600	21%
Route 140 East	17700	19900	3,300	19%	5,000	25%	500	3%	5,500	28%
Total:	**154,000**	**164,900**	**46,300**	**30%**	**48,000**	**29%**	**9,200**	**6%**	**57,201**	**35%**

State Highway/ Direction	2010 State Route ADT Without Bellevue Ranch	2010 State Route ADT With Bellevue Ranch	Daily Traffic Volumes Added to State Routes: Year 2010 W/O Bellevue Ranch	% of ADT	Year 2010 With Bellevue Ranch: Future Base	% of ADT	Bellevue Ranch	% of ADT	Total	% of ADT
SR 99 North	88600	96600	40,900	46%	40,900	42%	8,000	8%	48,900	51%
SR 99 South	54600	59900	15,900	29%	15,900	27%	5,300	9%	21,200	35%
SR 59 South	11400	12300	4,500	39%	4,500	37%	900	7%	5,400	44%
Route 140 West	7400	7400	1,400	19%	1,400	19%	0	0%	1,400	19%
Route 140 East	18900	19800	4,500	24%	4,500	23%	900	5%	5,400	27%
Total:	**180,900**	**196,000**	**67,200**	**37%**	**67,200**	**34%**	**15,100**	**8%**	**82,301**	**42%**

Future Levels of Service

Traffic Signal Warrants

The intersections of Cardella Road/SR 59 and Cardella Road/G Street satisfied signal warrants in 2005 without Bellevue Ranch. The intersections of Cardella Road with R and M Streets, and Bellevue Road with R, M, and G Streets satisfied signal warrants in 2005 with Bellevue Ranch. All fourteen intersections were assumed signalized in the 2010 analysis. All the new intersections in 2000 were analyzed as all way stop controlled intersections except Cardella Road at SR 59 and G Street which were analyzed as two way stop controlled intersections. Traffic signal warrants were determined by the Manual on Uniform Traffic Control Devices.

Intersection Levels of Service

Table 4.10-14 presents the results of the year 2000 intersection service level analysis. Without Bellevue Ranch five intersections will operate below than the minimum acceptable LOS D in the morning or afternoon peak hours. These intersections are West Olive/SR 59, West Olive/R Street, West Olive/M Street, West Olive/G Street, and Yosemite/G Street. Two of these intersections, West Olive/SR 59 and West Olive/G Street, currently operate at LOS E in the afternoon peak hour. West Olive/SR 59 experiences severe deterioration from current volume to capacity ratios of 0.71 and 0.95 to ratios of 1.40 to 1.66, due to the amount of development adjacent to SR 59 and its low 2 lane rural highway capacity. The unsignalized intersections all operate at LOS D or better, with most operating at LOS A or LOS B.

Specific Intersection Impacts

2000 Scenario

Traffic from Bellevue Ranch in 2000 reduces the service levels at some signalized intersections by one letter grade, but does not cause any to change from an acceptable to unacceptable service level. Unsignalized intersections also experience reduced service levels, but operate acceptably except Cardella/G Street which changes from a LOS B to LOS F in the p.m. peak hour. However, this intersection does not warrant a traffic signal in 2000. Bellevue Ranch will cause a **significant impact** to two intersections in 2000, West Olive/M Street and Cardella/G Street.

2005 Scenario

Table 4.10-15 presents the results of the year 2005 intersection service level analysis. Without Bellevue Ranch six intersections will operate below LOS D in the morning or afternoon peak hours. These are West Olive Avenue at SR 59, R, M, and G Streets, Yosemite/G Street, and Cardella/SR 59. As in 2000, West Olive/SR 59 experiences the highest impact with volumes exceeding capacity by 72% to 132%, followed by West Olive/G

Table 4.10-14
INTERSECTION LEVELS OF SERVICE
YEAR 2000 WITH AND WITHOUT BELLEVUE RANCH

	2000 Without Bellevue Ranch				2000 With Bellevue Ranch			
	AM Peak		PM Peak		AM Peak		PM Peak	
Intersection	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS
West Olive/SR 59	1.40	F	1.66	F	1.42	F	1.66	F
West Olive/R St.	0.62	B	1.23	F	0.71	C	1.30	F
West Olive/M St.	0.60	B	0.94	E	0.68	B	1.07	F
West Olive/G St.	1.05	F[1]	1.20	F[1]	1.05	F[1]	1.25	F[1]
Yosemite/M St.	0.49	A	0.71	C	0.69	B	0.86	D
Yosemite/G St.	0.74	C[2]	0.92	E[2]	0.72	C[2]	0.93	E[2]
Yosemite/R St.[1]	0.21	A	0.45	A	0.29	A	0.61	B
Cardella/SR 59	[4]	D	[4]	A	[4]	D	[4]	C
Cardella/R St.	[4]	A	[4]	A	[4]	A	[4]	A
Cardella/M St.	n/a	n/a	n/a	n/a	[4]	B	[4]	C
Cardella/G St.	[4]	A	[4]	B	[4]	C	[4]	F
Bellevue/R St.	[4]	A	[4]	A	[4]	A	[4]	A
Bellevue/M St.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bellevue/G St.	[4]	A	[4]	A	[4]	A	[4]	A

n/a = intersection does not exist in the Without Project Scenario.

[1] Applying the mitigation measures recommended in the approved Smith's Food and Drug Store traffic study (dual left turn lanes at all four approaches) the service level at Olive/G changes as follows:

Without Bellevue Ranch: AM Peak V/C = 0.96, LOS E (9% improvement) With Bellevue Ranch: AM Peak V/C = 0.98, LOS E (7% improvement)
PM Peak V/C = 1.19, LOS F (1% improvement) PM Peak V/C = 1.29, LOS F (3% worsening)

The worsening LOS in the pm peak with Bellevue Ranch scenario is due to the increase in through traffic on G Street and the required split phasing for dual left turn lanes. Split phasing is relatively inefficient, but necessary at this intersection because the size limitation of the intersection will not permit simultaneous dual left turns in both directions.

[2] Yosemite/G Street currently has split phasing on the Yosemite Street approaches. By changing to protected left turn phasing the LOS changes as follows:

Without Bellevue Ranch: AM Peak V/C = 0.71, LOS C (4% improvement) With Bellevue Ranch: AM Peak V/C = 0.71, LOS C (1% improvement)
PM Peak V/C = 0.85, LOS D (8% improvement) PM Peak V/C = 0.88, LOS D (5% improvement)

[3] The intersection of Yosemite/R meets warrants for signalization in 2000.

[4] Intersections do not meet signalization warrants for year 2000 with and without Bellevue Ranch, and have been analyzed as stop sign controlled intersections. The type of control assumed at each intersection is:

- 4 way or all way stop: Cardella/R, Cardella/M, Bellevue/R, Bellevue/M, Bellevue/G
- 2 way stop on minor street: Cardella/SR 59, Cardella/G

Level of Service reported is for worst movement from the minor street to the major street.

Table 4.10-15

INTERSECTION LEVELS OF SERVICE
YEAR 2005 WITH AND WITHOUT BELLEVUE RANCH

	2005 Without Bellevue Ranch				2005 With Bellevue Ranch			
			AM Peak	PM Peak	AM Peak		PM Peak	
Intersection	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS
West Olive/SR 59	1.72	F	2.32	F	1.84	F	2.53	F
West Olive/R St.	0.82	D	1.39	F	0.88	D	1.59	F
West Olive/M St.	0.69	B	1.10	F	0.68	B	1.13	F
West Olive/G St.	1.07	F[1]	1.42[1]	F[1]	1.22	F[1]	1.57	F[1]
Yosemite/M St.	0.60	B	0.74	C	0.84	D	1.11	F
Yosemite/G St.	0.71	C[2]	1.00	F[2]	0.86	D[2]	1.21	F[2]
Yosemite/R St.	0.64	B	0.71	C	0.71	C	0.82	D
Cardella/SR 59[3]	0.90	E	0.92	E	1.32	F	1.12	F
Cardella/R St.	[4]	C	[4]	D	0.57	A	0.91	E
Cardella/M St.[4]	/a	n/a	n/a	n/a	0.61	B	0.84	D
Cardella/G St.[3]	0.40	A	0.71	C	0.58	A	1.05	F
Bellevue/R St.	[4]	A	[4]	A	0.28	A	0.64	B
Bellevue/M St.[4]	n/a	n/a	n/a	n/a	0.18	A	0.45	A
Bellevue/G St.	[4]	B	[4]	D	0.58	A	0.52	A

n/a = intersection does not exist in the Without Project Scenario.

[1] Applying the mitigation measures recommended in the approved Smith's Food and Drug Store traffic study (dual left turn lanes at all four approaches) the service level at Olive/G changes as follows:

Without Bellevue Ranch: AM Peak V/C = 0.91, LOS E (15% improvement)
PM Peak V/C = 1.25, LOS F (12% improvement)
With Bellevue Ranch: AM Peak V/C = 1.27, LOS F (4% worsening)
PM Peak V/C = 1.80, LOS F (15% worsening)

The worsening LOS in the Bellevue Ranch scenario is due to the increase in through traffic on G Street and the required split phasing for dual left turn lanes. Split phasing is relatively inefficient, but necessary at this intersection because the size limitation of the intersection will not permit simultaneous dual left turns in both directions.

[2] Yosemite/G Street currently has split phasing on the Yosemite Street approaches. By changing to protected left turn phasing the LOS changes as follows:

Without Bellevue Ranch: AM Peak V/C = 0.71, LOS C (0% improvement)
PM Peak V/C = 1.00, LOS F (0% improvement)
With Bellevue Ranch: AM Peak V/C = 0.86, LOS D (0% improvement)
PM Peak V/C = 1.18, LOS F (3% improvement)

[3] Meets warrants for signalization in the With and Without Project scenarios.

[4] Meets warrants for signalization in the With Project scenario.

Street with volume to capacity ratios of 1.07 and 1.42.[6] Cardella/SR 59, signalized in 2005, will operate at LOS E because of its low 2 lane rural highway capacity.

Traffic from Bellevue Ranch will reduce the service level at most of the study intersections in 2005, with two intersections (Yosemite/M Street and Cardella/G Street) changing from an acceptable to unacceptable service level. Except for Cardella/G Street, the intersections warranting signals in 2005 with the Project will operate at LOS A. Bellevue Ranch will create a **significant impact** to nine intersections in 2005 because it changes service levels from acceptable to unacceptable or adds more than 5% to intersections already experiencing LOS E or F. Significantly impacted intersections are West Olive/SR 59, West Olive/R, West Olive/M, West Olive/G, Yosemite/M, Yosemite/G, Cardella/SR 59, Cardella/R, and Cardella/G.

2010 Scenario

Table 4.10-16 presents the results of the year 2010 intersection service level analysis. Signalization was assumed at all fourteen study intersections. Without Bellevue Ranch ten intersections will operate below LOS D in the morning or afternoon peak hour. These consist of all of the study intersections except Cardella/R Street and Bellevue/R Street. The intersections of Cardella and Bellevue Roads at M Street do not exist without Bellevue Ranch. Severe congestion will occur at West Olive/SR 59 (v/c=2.23 to 2.98), West Olive/R Street (v/c=1.81), West Olive/M Street (v/c=1.63), West Olive/G Street (v/c=1.82), and Cardella/SR 59 (v/c=1.59).

Traffic from Bellevue Ranch in 2010 will **significantly impact** the intersections of Yosemite/M, Cardella/R, and Bellevue/R because it will change the service level from an acceptable to unacceptable level in either the morning or afternoon peak hour. Traffic from Bellevue Ranch will **significantly impact** all of the other study intersections except Cardella/M, Bellevue/M, and Cardella/SR 59 because it will contribute more than 5% to intersections already operating at unacceptable levels of service. Cardella/M and Bellevue/M will operate acceptably in 2010 with Bellevue Ranch.

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[6] As shown in Table 15, applying the mitigation measures approved in the Smith's Food and Drug Store Traffic Impact Study (October 1992) will improve the service level at West Olive/G 12% to 15%, but not to acceptable levels.

Roadway Levels of Service

Year 2000 With and Without Bellevue Ranch

Table 4.10-17 presents the service levels on major roadways in 2000 without Bellevue Ranch. Most of the major arterials experience moderate to substantial increases in traffic from existing conditions. The arterials of R, M, and G Street increase an average of 56%, accommodating traffic from the future base land use located in the Northeast Yosemite and Fahrens Creeks areas drawn to downtown Merced and the freeway. The increase in traffic reduces the service level on several streets. In particular G Street south of West Olive changes

Table 4.10-16

INTERSECTION LEVELS OF SERVICE
YEAR 2010 WITH AND WITHOUT BELLEVUE RANCH

	2010 Without Bellevue Ranch				2010 With Bellevue Ranch			
	AM Peak		PM Peak		AM Peak		PM Peak	
Intersection	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS
West Olive/SR 59	2.23	F	2.98	F	2.27	F	3.54	F
West Olive/R St.	1.01	F	1.81	F	1.22	F	2.00	F
West Olive/M St.	0.94	E	1.63	F	1.32	F	1.59	F
West Olive/G St.	1.24	F[1]	1.82	F[1]	1.47	F[1]	1.75	F[1]
Yosemite/M St.	0.84	D	1.04	F	1.13	F	1.46	F
Yosemite/G St.	0.99	E[2]	1.51	F[2]	1.13	F[2]	2.39	F[2]
Yosemite/R St.	1.04	F	0.94	E	0.94	E	1.33	F
Cardella/SR 59	1.26	F	1.59	F	1.95	F	2.41	F
Cardella/R St.	0.50	A	0.69	B	1.18	F	1.56	F
Cardella/M St.	n/a	n/a	n/a	n/a	0.77	C	0.89	D
Cardella/G St.	0.61	B	1.16	F	1.00	F	1.64	F
Bellevue/R St.	0.29	A	0.54	A	0.87	D	1.36	F
Bellevue/M St.	n/a	n/a	n/a	n/a	0.42	A	0.53	A
Bellevue/G St.	0.34	A	0.94	E	0.59	A	1.10	F

n/a = intersection does not exist in the Without Project Scenario.

Note: all intersections in 2010 With and Without Project meet signalization warrants.

[1] Applying the mitigation measures recommended in the approved Smith's Food and Drug Store traffic study (dual left turn lanes at all four approaches) the service level at Olive/G changes as follows:

Without Bellevue Ranch: AM Peak V/C = 1.10, LOS F (11% improvement)
PM Peak V/C = 1.68, LOS F (8% improvement)
With Bellevue Ranch: AM Peak V/C = 1.28, LOS F (13% improvement)
PM Peak V/C = 1.93, LOS F (10% worsening)

[2] Yosemite/G Street currently has split phasing on the Yosemite Street approaches. By changing to protected left turn phasing the LOS changes as follows:

Without Bellevue Ranch: AM Peak V/C = 0.95, LOS E (4% improvement)
PM Peak V/C = 1.45, LOS F (4% improvement)
With Bellevue Ranch: AM Peak V/C = 1.05, LOS E (7% improvement)
PM Peak V/C = 1.89, LOS F (21% improvement)

Table 4.10-17

LEVELS OF SERVICE OF MAJOR ROADWAYS IN MERCED YEAR 2000 W/O BELLEVUE RANCH

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume[7]	LOS
R Street			
South of W. Olive	30,900	35,070	C
North of W. Olive	17,300	35,700	A
M Street			
South of W. Olive	25,900	35,070	B
North of W. Olive	24,500	35,070	C
South of Yosemite	14,700	35,070	A
North of Yosemite	8,800	35,700	A
G Street			
South of W. Olive	37,200	33,705	F
North of W. Olive	38,600	35,070	F
South of Yosemite	20,100	35,070	B
South of Cardella	4,800	27,200	A
Yosemite Avenue			
West of G St.	16,500	35,070	A
West of R St.	5,300	35,070	A
West Olive Avenue			
East of SR 59	33,500	52,815	B
West of R St.	36,000	52,815	B
West of M St.	29,900	52,710	C
West of G St.	26,300	52,710	C
East Olive Avenue			
East of G St.	15,100	32,300	A

[7] The maximum daily traffic volumes represents the capacity of the facility (LOS E/F) according to the Florida Department of Transportation (FDOT) capacity tables.

Table 4.10-17 (cont.)

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume	LOS
State Routes			
SR 59			
North of W. Olive	34,700	24,200	F
North of W. 16th	29,400	23,300	F
SR 99			
North of V St.	56,800	79,300	C
South of Yosemite Parkway	41,300	79,300	B
San Jose Avenue			
N. of Yosemite	2,560	12,900	C

from a LOS E to a LOS F and from a LOS A to a LOS F north of West Olive. The remaining segments of R, M, and G Street will operate at LOS C or better in 2000.

West Olive Avenue increases an average of 16% from existing volumes. The lower increase than the north south arterials indicates less east-west travel from future base land use than north-south travel. Service levels remain at existing LOS B or LOS C because of West Olive Avenue's level of reserve capacity. The volumes on the east-west arterial of Yosemite Avenue double by 2000, but the service level is LOS A because of its substantial reserve capacity. The assumed extension of Yosemite west of R Street accommodates about 5,300 vehicles daily, well below the capacity of a four lane arterial.

State routes serving Merced experience substantial increases in traffic as described in the section above. As a result, service levels on SR 59 change from a LOS D to a LOS F. State Route 99 has enough reserve capacity to accommodate the additional traffic, maintaining its current LOS C north of V Street and LOS B south of Yosemite Parkway.

The collector street San Jose Avenue does not experience an increase in traffic without Bellevue Ranch and will operate at a LOS C in 2000.

Table 4.10-18 presents the roadway service levels for 2000 with Bellevue Ranch. The addition of Project traffic (about 18,000 vehicles) and the redistribution of future base traffic changes the service level on some road segments. Traffic on R Street south of West Olive Avenue increases about 5,000 vehicles daily reducing the service level from a LOS C to LOS F. Traffic on G Street near West Olive Avenue increases about 1,000 to 4,000 vehicles worsening the LOS F experienced with future base traffic alone. Several other arterial segments experience changes in service level of one letter grade, but do not change from acceptable to unacceptable levels.

Traffic on SR 59 increases slightly and the segments north and south of West Olive continue to operate at LOS F as it does with future base traffic alone. Traffic on SR 99 also increases slightly, but does not change the service levels north of the City. South of the City SR 99 will change from a LOS B to a LOS C. In its first phase, Bellevue Ranch contributes little traffic to SR 99 (less than 4%) relative to the future base land use.

San Jose Avenue will increase about 2,000 vehicles daily with the addition of Bellevue Ranch. About 50% of the traffic generated by the southwest portion of Bellevue Ranch will use San Jose Avenue because of convenient access, but not to avoid congestion on R or M Street which have sufficient capacity south of Cardella Road. With Bellevue Ranch, the traffic on San Jose Avenue is well below the practical capacity of the collector and will operate at LOS C, but exceed the environmental capacity (1,500 vehicles per day) where residents find traffic levels a nuisance in terms of safety and noise.

Traffic on streets within Bellevue Ranch are relatively light in 2000. The highest volumes occur on M Street (9,900 vehicles daily) and Cardella Road (3,000 to 11,000 vehicles daily). Cardella Road traffic consists of Project and future base traffic while M Street south of Cardella Road consists mostly of Project traffic. All of the streets will operate at LOS D or better and have substantial reserve capacity. Four lane arterials with approximately 4 signals per mile such as M Street, Cardella, and Bellevue Roads cannot operate better than LOS D

Table 4.10-18

LEVELS OF SERVICE OF MAJOR ROADWAYS IN MERCED YEAR 2000 WITH BELLEVUE RANCH

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume[8]	LOS
R Street			
South of W. Olive	36,100	35,070	F
North of W. Olive	23,400	35,700	B
M Street			
South of W. Olive	29,400	35,070	B
North of W. Olive	32,000	35,070	D
South of Yosemite	25,100	35,070	B
North of Yosemite	17,200	35,700	A
G Street			
South of W. Olive	41,500	33,705	F
North of W. Olive	39,800	35,070	F
South of Yosemite	19,000	35,070	B
South of Cardella	7,500	27,200	A
Yosemite Avenue			
West of G St.	15,400	35,070	A
West of R St.	5,700	35,070	A
West Olive Avenue			
East of SR 59	33,200	52,815	B
West of R St.	35,700	52,815	B
West of M St.	29,000	52,710	C
West of G St.	25,800	52,710	C
East Olive Avenue			
East of G St.	15,400	32,300	A

[8] The maximum daily traffic volumes represents the capacity of the facility (LOS E/F) according to the Florida Department of Transportation (FDOT) capacity tables.

Table 4.10-18 (cont.)

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume	LOS
State Routes			
SR 59			
North of W. Olive	35,000	24,200	F
North of W. 16th	30,300	23,300	F
SR 99			
North of V St.	58,800	79,300	C
South of Yosemite Parkway	41,700	79,300	B
San Jose Avenue			
N. of Yosemite	4,500	12,900	C
Streets Within Bellevue Ranch			
R Street			
South of Cardella	5,400	33,400	B
North of Cardella	1,600	33,400	B
M Street			
South of Cardella	10,600	32,100	D[9]
G Street			
North of Cardella	1,900	33,400	B
Cardella Road			
West of R Street	3,000	16,100	A
East of R Street	7,100	32,100	D[9]
West of G Street	8,900	32,100	D[9]
Bellevue Road			
West of R Street	900	16,100	A
East of R Street	900	32,100	D[9]
West of G Street	900	32,100	D[9]

[9] A four lane divided arterial with four signals per mile cannot achieve a service level better than LOS D.

because the speeds necessary for LOS A through LOS C are not achievable according to the Florida DOT capacity tables.

Year 2005 With and Without Bellevue Ranch

Table 4-10-19 shows the major roadway service levels for the year 2005 without Bellevue Ranch. The additional future base land use generates substantial traffic which uses some of the reserve capacity of the arterials, but does not have a significant impact on the service levels of most roads compared to the year 2000 without Bellevue Ranch. The additional future base land use redistributes the traffic patterns of the 2000 scenario resulting in slightly decreased volumes on some segments and increased volumes on others. Two street segments change from acceptable to unacceptable service levels in 2005, R Street south and north of West Olive Avenue change from LOS C and LOS A respectively to LOS F. The cause of this deterioration is the amount of housing (about 980 units) assumed in the "Transmeridian" development north of Yosemite Avenue. Traffic on G Street increases several thousand vehicles per day worsening the LOS F already experienced north and south of West Olive Avenue.

State Route 59 experiences a very substantial increase in traffic in 2005 partly due to the housing in the Transmeridian development and mostly due to the commercial, office, and industrial land use assumed to develop along the SR 59 corridor. The additional traffic results in the facility operating at twice the capacity of a two lane rural highway. State Route 99 also experiences a large increase in traffic, with daily volumes nearing the capacity of the highway north of Merced. Although SR 99 will operate at LOS C and LOS D in 2005 with its current four lanes, growth in the northern part of Merced will use a significant portion of its reserve capacity.

Without Bellevue Ranch San Jose Avenue does not increase in traffic because no connection to the Transmeridian development is assumed. Therefore, it remains at its present LOS C.

Table 4.10-20 shows the roadway service levels for the year 2005 with Bellevue Ranch. The addition of Project traffic, redistribution of future base traffic, and effects of capacity restraint assignment change the service level of some segments compared to "without Bellevue Ranch" conditions. The approximately 37,000 daily trips generated by the second phase of Bellevue Ranch worsen several arterials operating at LOS F without the Project. Traffic on R and G Street is about 10,000 to 15,000 vehicles over the capacity of the facilities. The entire length of West Olive Avenue will operate at LOS C or approximately 70% to 80% of capacity.

The addition of Project traffic and the shift in future base traffic away from congested R Street cause SR 59 to operate at LOS F with traffic volumes about 2 to 3 times its capacity. State Route 99, north of Merced, will operate just at capacity (LOS E) with the addition of 4,000 Project vehicles. State Route 99 south of Merced will operate at about 60% of capacity (LOS C) with the addition of about 4,000 Project vehicles.

San Jose Avenue will not experience additional traffic beyond the 2000 with Bellevue Ranch scenario because use of this street by other than the southwest part of the Project is less direct than the use of R or M Street to access downtown and the freeway. In addition, North of Yosemite Avenue R and M Street are not congested enough to cause the diversion of traffic

Table 4.10-19

LEVELS OF SERVICE OF MAJOR ROADWAYS IN MERCED YEAR 2005 W/O BELLEVUE RANCH

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume[2]	LOS
R Street			
South of W. Olive	44,100	35,070	F
North of W. Olive	37,700	35,700	F
M Street			
South of W. Olive	28,900	35,070	B
North of W. Olive	25,200	35,070	C
South of Yosemite	16,700	35,070	A
North of Yosemite	8,800	35,700	A
G Street			
South of W. Olive	39,000	33,705	F
North of W. Olive	39,600	35,070	F
South of Yosemite	22,900	35,070	B
South of Cardella	9,500	27,200	A
Yosemite Avenue			
West of G St.	18,900	35,070	A
West of R St.	17,900	35,070	A
West Olive Avenue			
East of SR 59	32,500	52,815	B
West of R St.	32,300	52,815	B
West of M St.	32,900	52,710	D
West of G St.	31,200	52,710	C
East Olive Avenue			
East of G St.	15,700	32,300	A

[2] The maximum daily traffic volumes represents the capacity of the facility (LOS E/F) according to the Florida Department of Transportation (FDOT) capacity tables.

Table 4.10-19 (cont.)

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume	LOS
State Routes			
SR 59			
North of W. Olive	49,100	24,200	F
North of W. 16th	37,500	23,300	F
SR 99			
North of V St.	72,900	79,300	D
South of Yosemite Parkway	45,600	79,300	C
San Jose Avenue			
N. of Yosemite	2,560	12,900	C

Table 4.10-20

LEVELS OF SERVICE OF MAJOR ROADWAYS IN MERCED YEAR 2005 WITH BELLEVUE RANCH

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume[3]	LOS
R Street			
South of W. Olive	37,700	35,070	F
North of W. Olive	45,700	35,700	F
M Street			
South of W. Olive	30,100	35,070	B
North of W. Olive	32,600	35,070	C
South of Yosemite	28,000	35,070	B
North of Yosemite	23,000	35,700	B
G Street			
South of W. Olive	53,800	33,705	F
North of W. Olive	54,400	35,070	F
South of Yosemite	32,100	35,070	F
South of Cardella	17,900	27,200	A
Yosemite Avenue			
West of G St.	14,200	35,070	A
West of R St.	6,900	35,070	A
West Olive Avenue			
East of SR 59	42,700	52,815	C
West of R St.	45,700	52,815	C
West of M St.	31,100	52,710	C
West of G St.	25,800	52,710	C
East Olive Avenue			
East of G St.	16,000	32,300	A

[3] The maximum daily traffic volumes represents the capacity of the facility (LOS E/F) according to the Florida Department of Transportation (FDOT) capacity tables.

Table 4.10-20 (cont.)

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume	LOS
State Routes			
SR 59			
North of W. Olive	65,800	24,200	F
North of W. 16th	48,800	23,300	F
SR 99			
North V St.	78,900	79,300	E
South of Yosemite Parkway	50,000	79,300	C
San Jose Avenue			
N. of Yosemite	4,500	12,900	C
Streets Within Bellevue Ranch			
R Street			
South of Cardella	16,700	33,400	B
North of Cardella	6,900	33,400	B
M Street			
South of Cardella	17,200	32,100	D[4]
G Street			
North of Cardella	12,200	33,400	B
Cardella Road			
West of R Street	15,800	16,100	E
East of R Street	23,800	32,100	D[4]
West of G Street	28,400	32,100	E
Bellevue Road			
West of R Street	8,800	16,100	A
East of R Street	15,700	32,100	D[4]
West of G Street	18,200	32,100	D[4]

[4] A four lane divided arterial with four signals per mile cannot achieve a service level better than LOS D.

to parallel collector streets. The streets within Bellevue Ranch will operate at LOS D or better in 2005.

Year 2010 With and Without Bellevue Ranch

Table 4.10-21 shows the roadway service levels for the year 2010 without Bellevue Ranch. Future base land use in 2010 adds about 62,000 vehicles per day to the street network impacting several major arterials. Seven arterial segments will operate at LOS F compared to four segments in 2005 without Bellevue Ranch. The segments are on R Street, M Street, and G Street north and south of West Olive Avenue, and on G Street south of Yosemite Avenue. The service level on West Olive Avenue changes from LOS C and LOS B to LOS D along the nonexpressway segments of the street (near M and G Streets). The reserve capacity of West Olive Avenue in 2010 is about 7,000 to 15,000 vehicles per day compared to its present 24,000 to 27,000 reserve capacity.

State Route 59 continues to operate severely congested in 2010 with its present two lane rural highway classification. State Route 99 north of Merced exceeds the capacity of a four lane freeway by 12% and will operate at LOS F with the addition of about 11,000 vehicles. South of Merced, SR 99 experiences an additional 7,000 vehicles and will operate at LOS C.

Table 4.10-22 presents the roadway service levels in 2010 with Bellevue Ranch. The daily traffic volumes shown consist of Project traffic, and redistributed and capacity restraint assigned future base traffic. The last phase of the Project adds about 34,000 vehicles per day to Merced streets. The result is that ten arterial segments will operate at LOS E or F at buildout of Bellevue Ranch. These segments are R Street north and south of West Olive, M Street from south of West Olive to south of Yosemite, G Street from south of West Olive to South of Cardella Road, and West Olive Avenue west of R Street. The remaining segments of West Olive will operate at the minimum acceptable LOS D, with little capacity to spare.

The state routes will experience moderate increases in traffic from the Project. State Route 59 will operate 2 to 3 times its capacity at LOS F. The Project will add about 8,000 vehicles to State Route 99 north of Merced and about 5,300 south of Merced in 2010. State Route 99 to the north will operate at 25% over capacity of a four lane freeway at LOS F, and SR 99 to the south will operate at 75% of capacity at LOS C.

Four road segments within or near Bellevue Ranch will operate below LOS D in 2010. These are Cardella Road west of R Street and west of G Street, the 4 lane segment of Bellevue east of R Street and the 2 lane segment west of R Street. The remaining 4 lane segment of Bellevue Road within the Project will operate at LOS D and maintain a reserve capacity between 6,900 vehicles per day. This additional capacity will be required for traffic from future development such as the villages to the north and the potential UC campus to the east. Bellevue Road may potentially be designated as an expressway to accommodate traffic from development to the east traveling to SR 59. The reserve capacity remaining on Bellevue Road may not be

sufficient to accommodate large developments such as the UC campus. If Bellevue Road were widened to six lanes the reserve capacity would increase to about 25,000 vehicles per day. Alternatively, Old Lake Road could be designated as an expressway to serve east-west traffic from the northern villages and the UC Campus since it will have a higher reserve capacity than Bellevue Road.

Table 4.10-21

LEVELS OF SERVICE OF MAJOR ROADWAYS IN MERCED YEAR 2010 W/O BELLEVUE RANCH

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume[5]	LOS
R Street			
South of W. Olive	54,800	35,070	F
North of W. Olive	45,400	35,700	F
M Street			
South of W. Olive	45,000	35,070	F
North of W. Olive	37,800	35,070	F
South of Yosemite	24,000	35,070	B
North of Yosemite	9,400	35,700	A
G Street			
South of W. Olive	47,200	33,705	F
North of W. Olive	51,900	35,070	F
South of Yosemite	36,000	35,070	F
South of Cardella	20,600	27,200	B
Yosemite Avenue			
West of G St.	22,200	35,070	B
West of R St.	30,300	35,070	B
West Olive Avenue			
East of SR 59	45,900	52,815	C
West of R St.	44,900	52,815	C
West of M St.	42,400	52,710	D
West of G St.	37,700	52,710	D
East Olive Avenue			
East of G St.	16,700	32,300	A

[5] The maximum daily traffic volumes represents the capacity of the facility (LOS E/F) according to the Florida Department of Transportation (FDOT) capacity tables.

Table 4.10-21 (cont.)

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume	LOS
State Routes			
SR 59			
North of W. Olive	63,600	24,200	F
North of W. 16th	38,300	23,300	F
SR 99			
North V St.	88,600	79,300	F
South of Yosemite Parkway	54,600	79,300	C
San Jose Avenue			
N. of Yosemite	2,560	12,900	C

Table 4.10-22

LEVELS OF SERVICE OF MAJOR ROADWAYS IN MERCED YEAR 2010 WITH BELLEVUE RANCH

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume[6]	LOS
R Street			
South of W. Olive	64,600	35,070	F
North of W. Olive	57,500	35,700	F
M Street			
South of W. Olive	57,600	35,070	F
North of W. Olive	50,800	35,070	F
South of Yosemite	43,000	35,070	F
North of Yosemite	24,900	35,700	B
G Street			
South of W. Olive	59,600	33,705	F
North of W. Olive	58,100	35,070	F
South of Yosemite	41,600	35,070	F
South of Cardella	38,900	27,200	F
Yosemite Avenue			
West of G St.	25,500	35,070	C
West of R St.	20,700	35,070	A
West Olive Avenue			
East of SR 59	49,500	52,815	D
West of R St.	57,900	52,815	F
West of M St.	45,100	52,710	D
West of G St.	33,900	52,710	D
East Olive Avenue			
East of G St.	16,800	32,300	A

[6] The maximum daily traffic volumes represents the capacity of the facility (LOS E/F) according to the Florida Department of Transportation (FDOT) capacity tables.

Table 4.10-22 (cont.)

Roadway/ Segment	Daily Traffic Volume	Max. Daily Traffic Volume	LOS
State Routes			
SR 59			
North of W. Olive	69,700	24,200	F
North of W. 16th	38,600	23,300	F
SR 99			
North of V St.	99,200	79,300	F
South of Yosemite Parkway	61,700	79,300	D
San Jose Avenue			
N. of Yosemite	4,500	12,900	C
Streets Within Bellevue Ranch			
R Street			
South of Cardella	29,800	33,400	D
North of Cardella	18,900	33,400	A
M Street			
South of Cardella	17,000	32,100	D[7]
G Street			
North of Cardella	32,600	33,400	E
Cardella Road			
West of R Street	26,500	16,100	F
East of R Street	23,100	32,100	D[7]
West of G Street	31,100	32,100	E
Bellevue Road			
West of R Street	17,500	16,100	F
East of R Street	21,400	32,100	D[7]
West of G Street	22,600	32,100	D[7]

[7] A four lane divided arterial with four signals per mile cannot achieve a service level better than LOS D.

Based on the "Standards of Significance" described in Existing Conditions, Bellevue Ranch will "significantly" impact roads if 1) it causes a change in service level from acceptable to unacceptable, and 2) it contributes 5% or more to roads already operating at LOS E or F. **Significant** impacts occur on:

- R Street (2000, 2005, 2010)
- G Street (2000, 2005, 2010)
- SR 59 (2000, 2005, 2010)
- SR 99 (2005, 2010)
- M Street (2010)
- West Olive Avenue (2010)

The definition of significant impacts should not apply to streets within Bellevue Ranch because the streets are provided by the Project with sufficient capacity to accommodate its traffic. Because of the magnitude of Bellevue Ranch trip generation, few streets will experience less than a 5% contribution to total volumes. It is clear that development in Merced will cause severe congestion unless additional capacity is provided as part of a Citywide Circulation Plan. Bellevue Ranch, which contributes about 30% to the additional future traffic generated north of Bear Creek, should participate in the implementation of the Plan.

5. Mitigation Measures

Description of Mitigations

This section summarizes the roadway and intersection improvements recommended to mitigate the combined traffic impacts of future base and Bellevue Ranch land use. In addition, the improvements are presented as they are required for each planning horizon, providing a general schedule for implementation.

The Project is not solely responsible for all of the mitigations described below. Because of the magnitude the Project, and the realistic assumption that Bellevue Ranch would not develop without concurrent growth in Merced's growth area and surrounding County regions, the mitigations must consider the combined impact of all development. Therefore, this study identifies a greater level of improvements than just those necessary to meet the needs of Bellevue Ranch. The improvements presented here, or feasible alternatives, should be incorporated into the circulation element of the General Plan Update. Once a Citywide circulation plan and capital improvement plan is adopted, the City will have a method for distributing funding responsibility equitably to future development. This study identifies the Project's contribution to and estimates the cost of improved facilities to aid the City in determining the Project's share of these facilities. Bellevue Ranch will most likely provide 100% of some of the facilities within the Project's boundaries. These facilities are not

mitigations, but part of the Project's basic infrastructure. However, they are presented here to show the full improvements necessary for an adequate circulation system.

Implementation of the improvements is presented in seven to five year increments, 1992 to 2000, 2000 to 2005, and 2005 to 2010. This "schedule" identifies the time the improvements should be in place if development builds out as anticipated. Actual construction of a roadway will depend on the phasing, and the access and capacity needs of the individual developments served by the facility. This should be evaluated in detail at the Specific Plan stage.

Mitigation measures for the first two phases of Bellevue Ranch (2000 and 2005) consist of extensions of streets to provide access to future development and widening of existing streets to accommodate additional traffic. Measures for the last phase (2010) hinge on the construction of a "bypass" to divert the primarily north-south travel patterns of future development away from R,M, and G Streets, and SR 59 south of West Olive. In this study we recommend a combination of a north-south and east-west expressway to direct traffic to the west and south.

Recommended Bypass System and Alternatives

City and County staff have discussed the bypass concept over the past several years. One alternative, the "Yosemite Bypass and SR 59 Beltway", is recommended in this study. The SR 59 beltway around the villages was discussed in the 1991 study Working Paper on Circulation Options in Future Merced. This study presented various options for phasing a beltway system into the northern growth area depending on the level of development within and outside Merced's sphere of influence. The anticipated level of development in Merced's growth area, particularly the concentration of employment in the SR 59 corridor, warrants the upgrade of SR 59 to an expressway by 2010. This alternative has been conceptually approved by the Merced City/County Liaison Committee.

The right-of-way limitations on R, M, and G Streets increase the need for a bypass around the western edge of the City, and eventually around the eastern edge as well. Without additional through lanes on these arterials, R, M, and G Streets will not bear the increase in traffic accessing existing downtown and the freeways. The Yosemite Bypass is one of two alternatives the Liaison Committee approved. The other alternative for a bypass around the western edge of the city is along the Franklin Road corridor connecting with SR 99 at its existing overpass location. This alternative, located approximately halfway between Merced and Atwater, would better serve Atwater and its expansion to the east. Because of the increased travel time for Merced residents, they would find it a less attractive route than the Yosemite Bypass or existing streets resulting in minimal improvement to the conditions along major north-south arterials. In addition, the Franklin Road bypass is not a feasible route from the northern growth area to downtown, southern Merced, and SR 99 south. For certain regions of the City, the Yosemite Bypass is an attractive route to these destinations further reducing congestion on R, M, and G Streets.

The effectiveness of the SR 59 expressway and Yosemite Bypass to divert future traffic from existing streets was determined using Caltrans' Basic California Diversion Curves method. This method indicates the likelihood of traffic using a highway over city streets based on the time saved by selecting one route over another. It was found that nearly 100% of the future development north of Yosemite Avenue would use the Yosemite Bypass to access SR 99 north. Zones in the western region of the growth area would also use the bypass to access downtown, southern Merced, and SR 99 south. Zones in the eastern region, however, would not use the bypass to access these destinations. The diversion of traffic with implementation of the bypass includes only traffic from the future development analyzed in this study. Traffic from existing development will also be diverted to the bypass. However, the tools for evaluating the bypass' effect on existing traffic is not available at this time. Implementation of the Yosemite Bypass, or an alternative, will require further study to determine its impacts on the environment. The concept may be further refined in the General Plan Update and/or the Route 99 Corridor Study.

The alignment recommended in this study, the Yosemite Bypass, diverts traffic west and south to a connection with Santa Fe Drive and SR 99. The bypass facilitates traffic to the two destinations with the highest draw from northern Merced (Atwater and State Route 99 north). The high capacity, six lane grade-separated expressway could connect with SR 99 at several locations, two of which are discussed below.

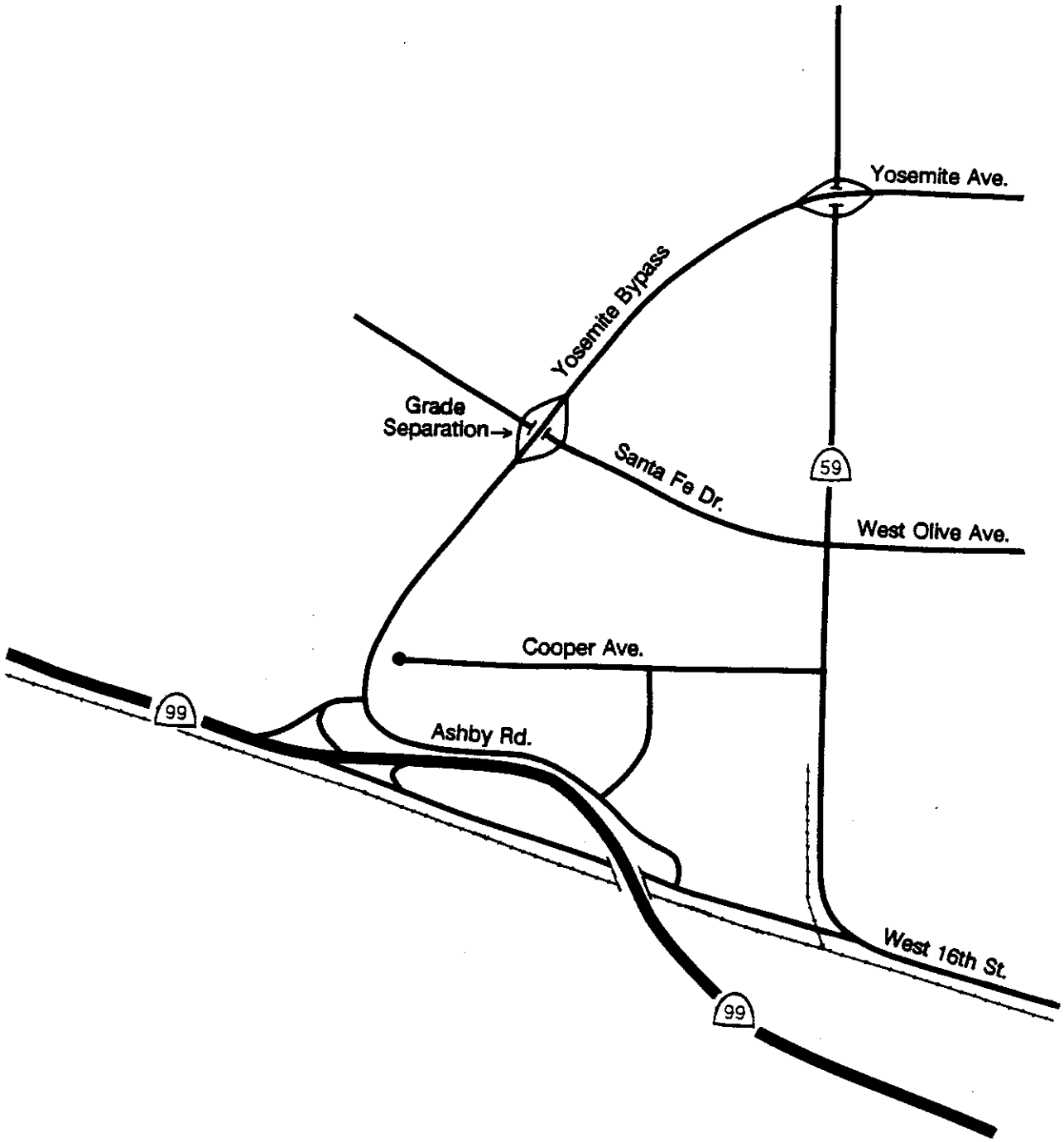
The ideal location to connect the Yosemite Bypass with SR 99 is at the present 16th Street interchange approximately 1 mile north of the SR 59/140/99 junction. This location provides direct access to SR 99 and Atwater, yet is close enough to central Merced to be used for access to downtown and SR 99 south. However, this location has constraints:

- The curvature or SR 99 and the proximity of the railroad tracks south of the freeway do not allow for a standard interchange without major reconstruction and realignment of the tracks.

- A conceptual connection design at this location is shown in Figure 4.10-6. The design incorporates Ashby Road and the existing 16th Street interchange and adds a set of northbound hook ramps so that all directions of travel can be served. The design, however, is circuitous and confusing and does not provide the capacity of a standard interchange.

- The elevation of SR 99, its proximity to the railroad tracks, and 16th Street undercrossing the freeway restricts the ability to span this corridor and provide access to SR 140 to the south.

An alternative location connecting the Yosemite Bypass with SR 99 is north of the 16th Street interchange approximately south of Beachwood Drive (see Figure 4.10-7). This alternative aligns the Yosemite Bypass to the south and further east to the Beachwood Drive alignment.



Source: Fehr & Peers Associates, Inc.

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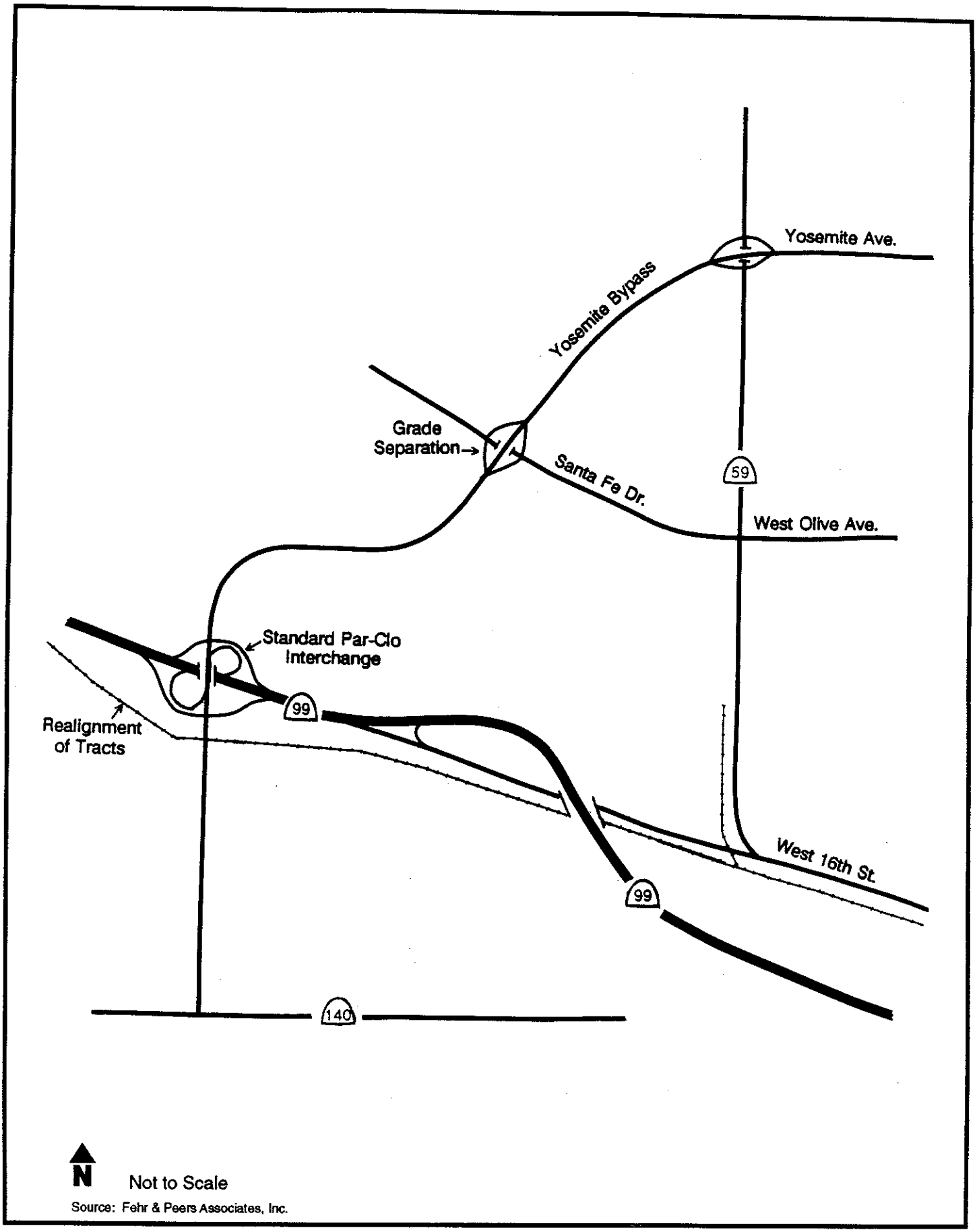
Figure 4.10-6
Conceptual Connection of Proposed Yosemite Bypass and SR99-Alternative I



Source: Fehr & Peers Associates, Inc.

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Figure 4.10-7
Conceptual Connection of Proposed Yosemite Bypass and SR99-Alternative I I

This location is suitable for a standard freeway interchange such as a par-clo, but would require realignment of the railroad tracks south of SR 99. A standard interchange at this location would allow for a connection to SR 140. The constraints at this location are:

- The further east of Merced, the less likely traffic will use the connection to access central Merced and SR 99 south. This traffic will continue to use R, M, and G Streets.
- The location is less than 1 mile from the adjacent interchange (16th Street), violating the desirable interchange spacing guidelines.
- Requires realignment of the railroad tracks to accommodate the interchange, and a span across Bear Creek to access SR 140.
- Increases the cost of constructing the Yosemite Bypass because of its increased length.

Specific Mitigation

Year 2000 Roadway Improvements

Roadway improvements are illustrated in Figure 4.10-8.

MM 4.10.1 Extend R Street to approximately 1/2 mile north of Cardella Road. Construct a 2 lane divided arterial between present terminus and Cardella Road. Construct a 2 lane divided arterial north of Cardella Road. Build R Street with ultimate curb to curb width of 84 feet to allow widening inside without reconstructing curb, gutter, sidewalks, etc.

MM 4.10.2 Extend Cardella Road from G Street to present terminus east of Kansas Street. Construct a 4 lane divided arterial (ultimate curb to curb width of 84 feet) between G and R Streets and a 2 lane divided arterial west of R Street. Build 2 lane section with an ultimate curb to curb width of 84 feet.

MM 4.10.3 Extend Yosemite Avenue to SR 59 (planned improvement). Construct a 4 lane divided arterial from present terminus to R Street and as a 2 lane divided street from R Street to SR 59. If possible, build 4 lane and 2 lane sections with an ultimate curb to curb width of 98 feet in anticipation of widening to 6 lanes. Maintain expressway level access restrictions on the extension.

MM 4.10.4 Extend M Street from present terminus to Cardella Road. Construct a 2 lane divided arterial (maintaining existing tree-lined median).

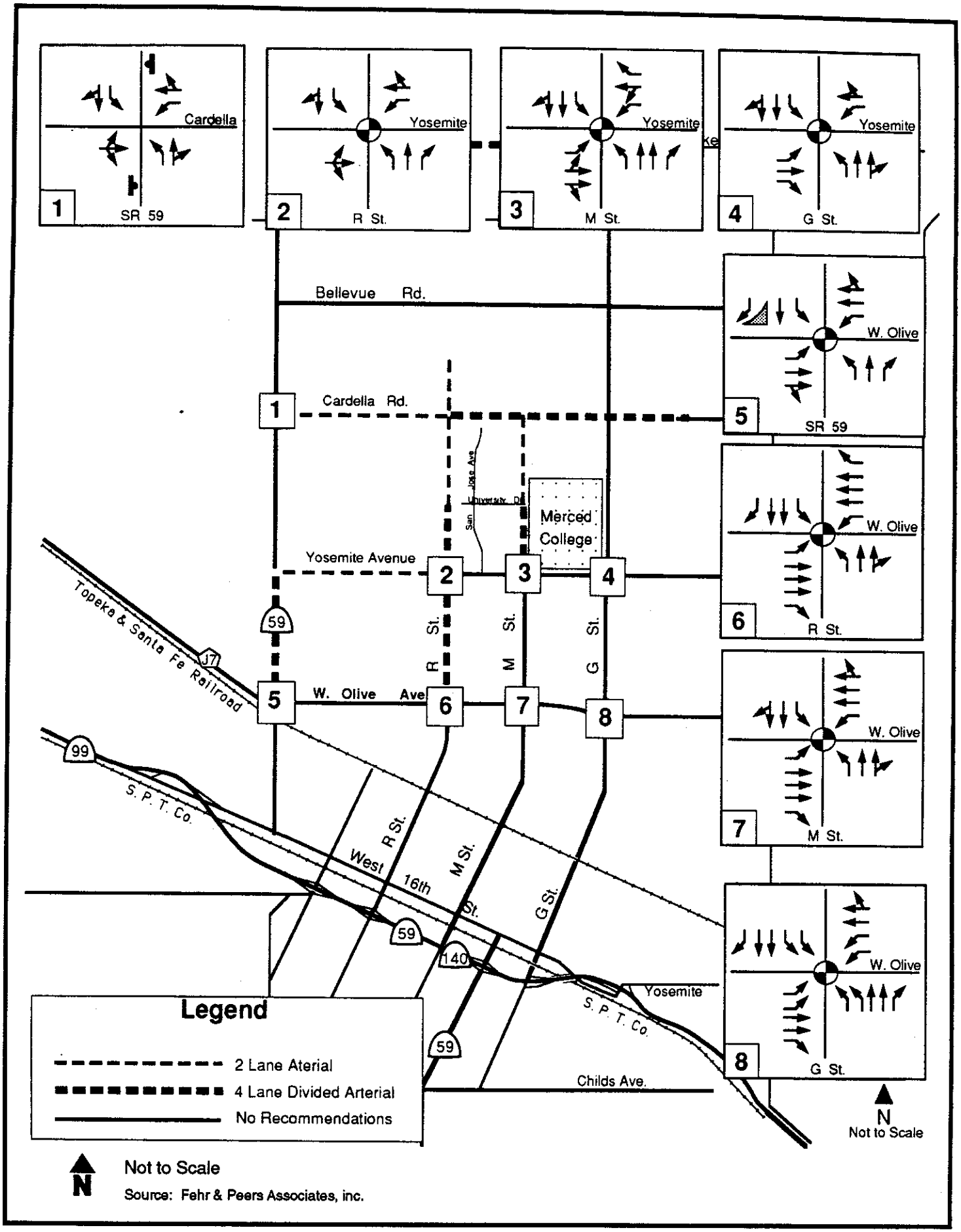

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Figure 4.10-8
Year 2000 Recommended Road Sizing and Lane Configurations

MM 4.11.5 Widen SR 59 to a 4 lane divided expressway from West Olive Avenue to Yosemite Avenue. Maintain expressway level access restrictions.

Year 2000 Intersection Improvements

Lane configurations for all intersections are shown in Figure 4.10-9.

MM 4.10.6 Build new intersections of Cardella/R, Cardella/M, and western side of Cardella/G with the lane configurations shown in Figure 4.10-9.

Cardella/G- construct left turn pockets at all approaches. Install stop sign on eastbound Cardella approach.[8]

Cardella/M- construct intersection to ultimate configuration as shown in Figure 4.10-9. Since the intersection does not warrant a traffic signal in 2000, improvement alternatives are:

1) install all way stop control and close off inside dual left turn lane (westbound) until a signal is required.

2) signalize the intersection, which will operate at a LOS A in the morning and afternoon peak hours.

Cardella/R- construct intersection as shown in the Figure. Install all way stop control until signal is required.

MM 4.10.7 Build the new intersections of **Yosemite/R** and **Yosemite/SR 59**, with the lane configurations for Yosemite/R shown in the figure. Install a traffic signal at Yosemite/R and a stop sign at the westbound approach to SR 59.

MM 4.10.8 **Yosemite/G-** mitigate service level with a change in signal phasing to include protected left turns on the Yosemite Avenue approaches. Maintain existing lane configurations.

MM 4.10.9 **West Olive/SR 59-** concurrent with widening SR 59 construct a free right turn lane southbound SR 59 to westbound Santa Fe Drive. Add a right turn lane to the northbound SR 59 approach at West Olive Avenue.

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[8] The intersection of Cardella/G does not warrant the installation of a signal in 2000 with the Project. If signalized the intersection will operate at a LOS B in the p.m. peak hour and a LOS A in the a.m. peak hour with the recommended lane configurations.

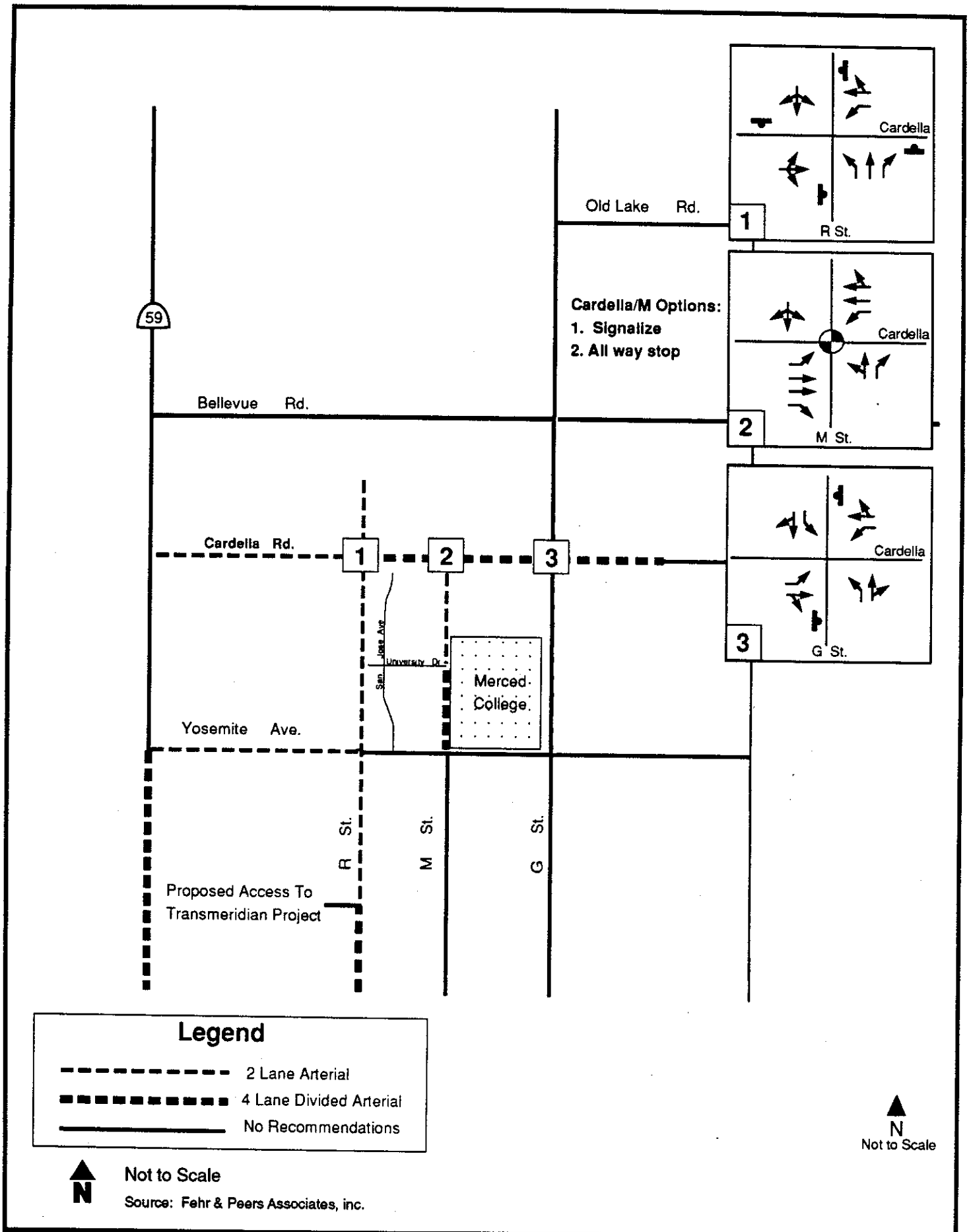

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Figure 4.10-9
Year 2000 Recommended Road Sizing and Lane Configurations Within Bellevue Ranch

West Olive/SR 59 cannot easily be mitigated to LOS D or better because of right-of-way constraints. To mitigate to LOS D the following improvements in addition to those described above would be needed:

-Dual left turn lanes southbound on SR 59
-Dual left turn lanes eastbound on West Olive
-Exclusive right turn lane westbound on West Olive
-Two through lanes on SR 59 north and south of West Olive
-Three through lanes eastbound on Santa Fe Drive

MM 4.10.10 **West Olive/G-** apply improvements recommended in the 1992 Smith's Food and Drug Store traffic impact study. These improvements are dual left turn lanes on all approaches and exclusive right turn lanes on the northbound and southbound G Street, and eastbound Olive Avenue approaches. These improvements, however, do not improve the service level to LOS D or better.

MM 4.10.11 **West Olive/R and West Olive/M-** no mitigations are recommended for these intersections because of right-of-way constraints. Dual left turns on all approaches of both intersections would result in a LOS F at West Olive/R and a LOS D/E at West Olive/M. Additional through lanes on R and M Streets are needed to fully mitigate these intersections. Rather than incur high right-of-way costs to improve these intersections, it is recommended that funds be used for additional capacity to divert traffic away from West Olive Avenue. If redevelopment projects occur adjacent to these intersections, the City should evaluate potential improvements as part of the project.

Year 2005 Roadway Improvements

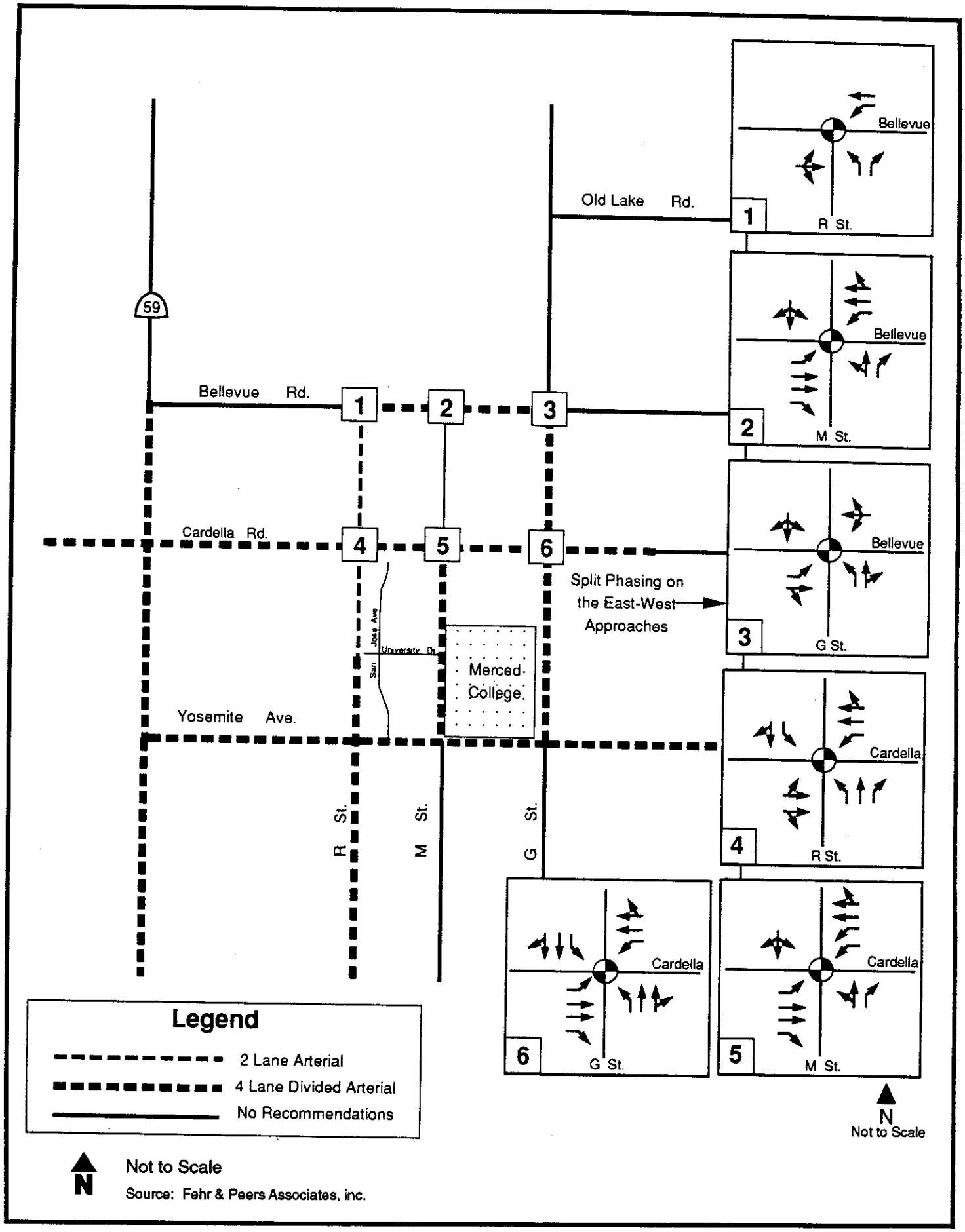
Roadway improvements are illustrated in Figure 4.10-10.

MM 4.10.12 Extend R Street from north of Cardella Road to Bellevue Road. Maintain this section of R Street as a 2 lane divided arterial with ultimate curb-to curb width of 84 feet.

MM 4.10.13 Widen Bellevue Road to its ultimate curb to curb width (84 feet) from G Street to R Street.

MM 4.10.14 Widen Yosemite Avenue to a 4 lane divided arterial from R Street to SR 59.

MM 4.10.15 Widen Cardella Road to a 4 lane divided arterial from R Street to SR 59.



Source: Fehr & Peers Associates, inc.

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Figure 4.10-10
Year 2005 Recommended Road Sizing and Lane Configurations

MM 4.10.16 Widen G Street to a 4 lane divided arterial from Yosemite Avenue to Bellevue Road.

MM 4.10.17 Widen SR 59 to a 4 lane divided arterial from Yosemite Avenue to Bellevue Road. Maintain expressway level access restrictions.

MM 4.10.18 Widen M Street to 4 lanes from present terminus to Cardella Road.

Year 2005 Intersection Improvements

Lane configurations for intersections are shown in Figure 4.10-11.

MM 4.10.19 Build new intersections of **Bellevue/R** and **Bellevue/M** with the lane configurations shown in the Figure. Install traffic signals at both intersections.

MM 4.10.20 **Bellevue/G**- improve with the addition of a left turn pocket and a shared through-right lane on the northbound and eastbound approaches. Signalize the intersection.

MM 4.10.21 **Cardella/R**- improve with an additional through lane in each directions of Cardella Road concurrent with widening road east of R Street. Signalize the intersection.

MM 4.10.22 **Cardella/G**- improve concurrent with the G Street widening and development east of G Street. Add additional through lanes on G Street and in both directions of Cardella Road. Add an exclusive right turn lane on the eastbound Cardella approach. Signalize the intersection.

MM 4.10.23 **Cardella/SR 59**- improve concurrent with the Cardella Road widening and development west of SR 59. Add additional through lanes on the SR 59 approaches and construct a free right turn lane northbound with a lane addition on eastbound Cardella. Signalize the intersection.

MM 4.10.24 **Yosemite/R**- improve concurrent with the widening of the west approach of Yosemite. Add through lanes to the approaches of Yosemite and R Street.

MM 4.10.25 **Yosemite/M**- convert the existing westbound and eastbound shared through-left turn lanes to exclusive through lanes. Add an exclusive right turn lane eastbound, and an exclusive through lane westbound. Provide dual left turn lanes northbound. Modify signal phasing to provide protected left turns on all approaches.

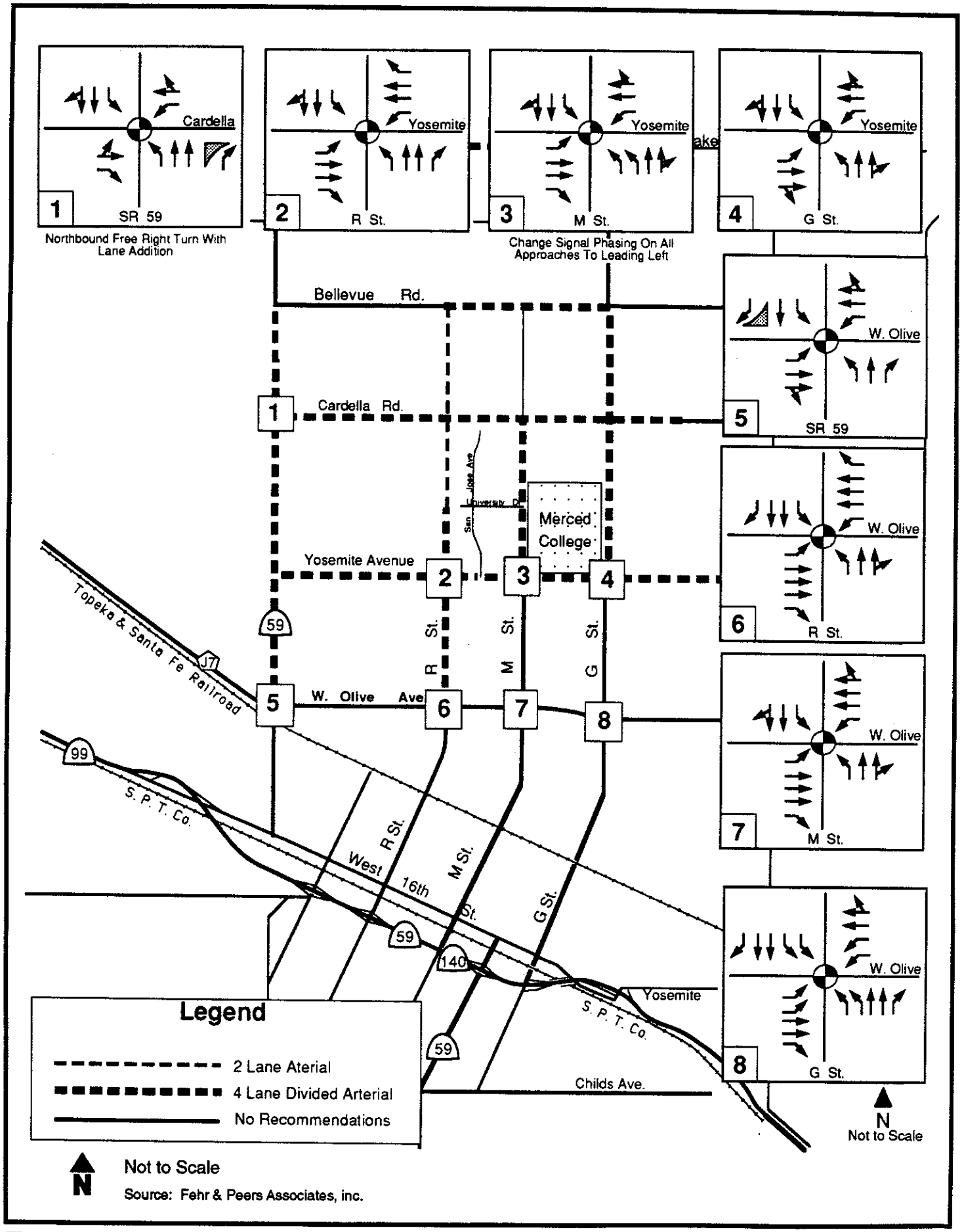

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Figure 4.10-11
Year 2005 Recommended Road Sizing and Lane Configurations Within Bellevue Ranch

MM 4.10.26 **Yosemite/G-** improve concurrent with the G Street widening (G Street lane configurations remain the same). Stripe an additional through lane in each direction of Yosemite Avenue.

MM 4.10.27 **West Olive/SR 59-** no improvements beyond those described for the year 2000 are recommended.

Year 2010 Roadway Improvements

Roadway improvements are illustrated in Figure 4.10-12.

MM 4.10.28 Widen SR 59 to a 6 lane divided expressway from Yosemite Avenue to approximately 1/2 mile north of Cardella Road.

MM 4.10.29 Widen G Street to 6 lane divided arterial from Yosemite Avenue to approximately 1/2 mile north of Cardella Road.

MM 4.10.30 Extend R Street from Bellevue Road to Old Lake Road. Widen R Street to a 4 lane divided arterial from 1/2 mile north of Yosemite Avenue to 1/2 mile north of Bellevue Road. Construct R Street as a 2 lane divided arterial from 1/2 mile north of Bellevue Road to Old Lake Road with ultimate curb to curb width of 84 feet.

MM 4.10.31 Extend Old Lake Road from G Street to SR 59 (possibly) incorporating existing Nevada Street. Construct Old Lake Road as a 4 lane divided arterial (ultimate curb to curb width of 84 feet) between G and R Streets, and as a 2 lane undivided road between R Street and SR 59.

MM 4.10.32 Extend R Street from Bellevue Road to Old Lake Road as a 4 lane divided arterial, with ultimate curb to curb width of 84 feet.

MM 4.10.33 Widen G Street to a 4 lane divided arterial from Bellevue Road to Old Lake Road.

MM 4.10.34 Widen Yosemite Avenue to a 6 lane divided expressway from San Jose Avenue to SR 59. Extend Yosemite Avenue as a 6 lane expressway ("Yosemite Bypass") from SR 59, intersecting Santa Fe Drive, and continuing south potentially along the Cooper Avenue alignment to connect with SR 99. Construct a new interchange with SR 99 and eliminate the existing 16th Street interchange.

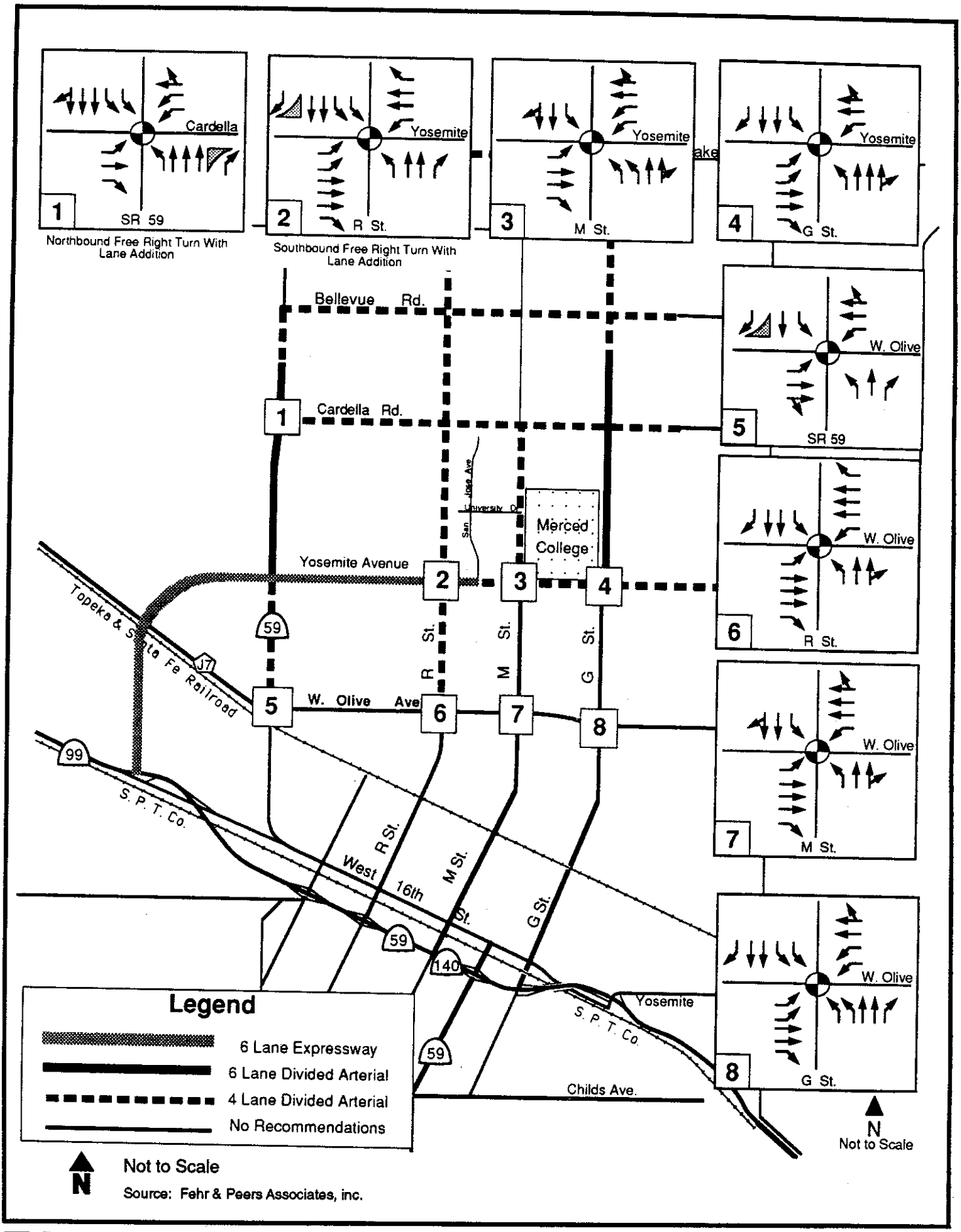

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Figure 4.10-12
Year 2010 Recommended Road Sizing and Lane Configurations

Year 2010 Intersection Improvements

Lane configurations for intersections are shown in Figure 4.10-13.

MM 4.10.35 **Cardella/SR 59**- add a through lane in each direction of SR 59 concurrent to widening the state route to 6 lanes. Add dual left turns on the westbound Cardella approach. Maintain the free right turn northbound with a lane addition eastbound on Cardella Road.

MM 4.10.36 **Yosemite/R**- improve concurrent with Yosemite Avenue widening. Provide two through lanes on the westbound approach of Yosemite Avenue. Construct a free right turn lane southbound on R Street with a lane addition westbound on Yosemite Avenue. The third through lane eastbound on Yosemite Avenue will drop at or before San Jose Avenue.

MM 4.10.37 **Yosemite/M**- improve with the addition of a second left turn lane on the westbound approach of Yosemite Avenue.

MM 4.10.38 **Yosemite/G**- improve concurrent with the G Street widening. Flare northbound approach to provide three through lanes. Third southbound through lane on G Street is dropped as an exclusive left or right turn lane.

Phasing of the R Street Extension

The traffic analysis is based on the assumption that a specific level of infrastructure and access will be provided concurrent with the development of each phase. These assumptions are illustrated in Figure 4.10-3. The purpose of these assumed roadways is to provide a basic transportation network for the assignment of future base and Project traffic and to measure the traffic impacts. The analysis assumes the basic network exists whether development warrants it or not. The mitigation measures then indicate the actual roadway needs at buildout of each of the Project's phases. The basic analysis does not determine at what point during each phases' development that the improvements are required.

The following section carries the basic analysis one step further and determines the phasing of the R Street extension and widening. The criteria used to determine the R Street improvements is the percentage of development in each phase and the roadway or intersection levels of service which trigger the improvements. The methodology used in this analysis, linear interpolation, assumes a direct correlation between development levels and roadway/intersection service level. The phasing of the R Street improvements and associated development levels are summarized below:

1) **R Street Improvement:** Extend R Street (2 lanes) from present terminus to a point 1/2 mile north of Yosemite Avenue. This point is the

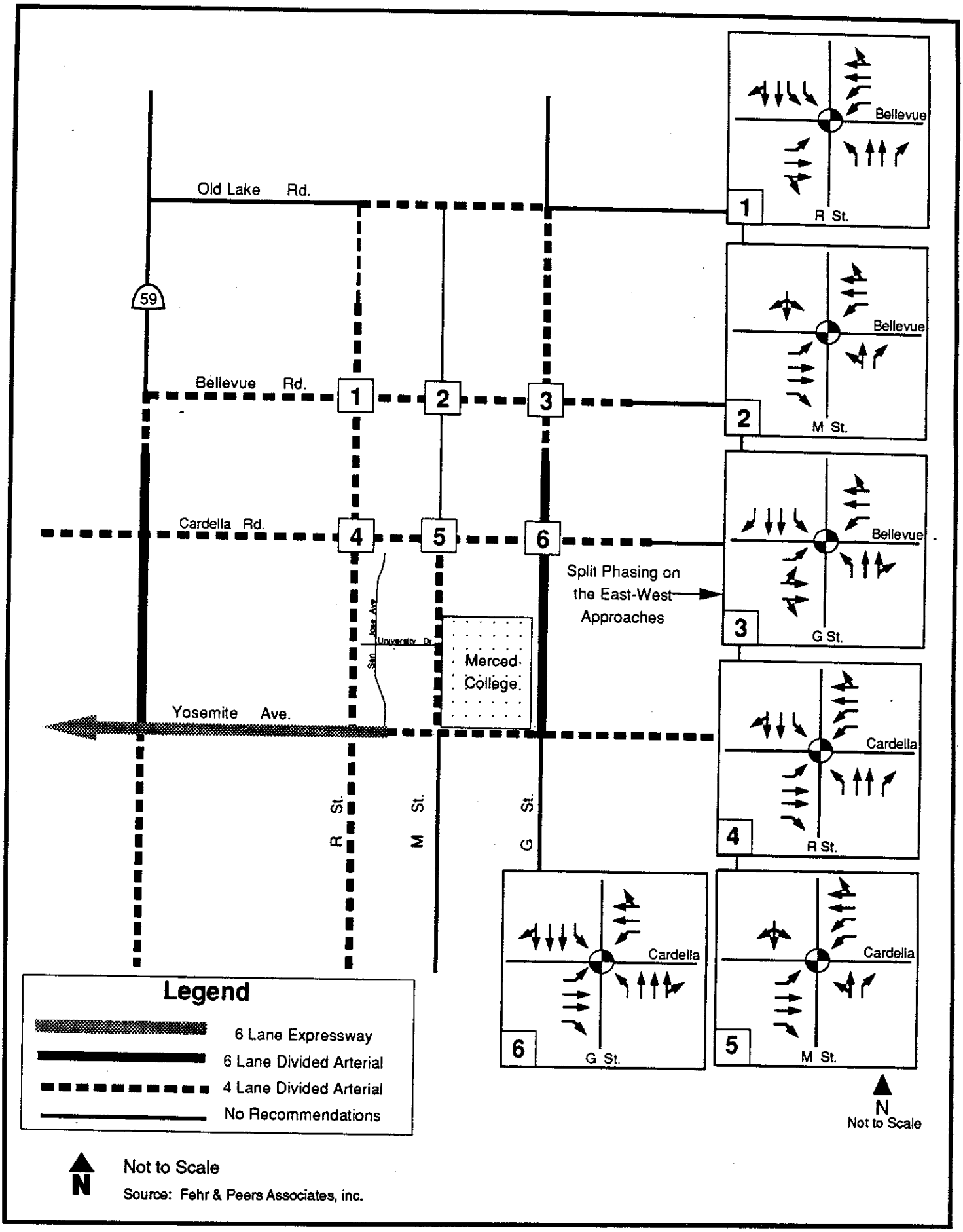

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Figure 4.10-13
Year 2010 Recommended Road Sizing and Lane Configurations Within Bellevue Ranch

assumed major access point to the proposed Transmeridian Project located on the west side of R Street.

Development Level: 0% development of Bellevue Ranch. Assumes 25% to 50% development of the Transmeridian Project[9].

2) R Street Improvement: Extend R Street (2 lanes) from 1/2 mile north of Yosemite Avenue to 1/2 mile north of Cardella Road.

Development Level: 22% buildout of Bellevue Ranch Phase I.[10]

3) R Street Improvement: Widen R Street to 4 lanes from present terminus to 1/2 mile north of Yosemite Avenue.

Development Level: 100% buildout of Bellevue Ranch Phase I.

4) R Street Improvement: Extend R Street (2 lanes) from Cardella Road to Bellevue Road.

Development Level: 100% buildout of Bellevue Ranch Phases I and II.

5) R Street Improvement: Widen R Street to 4 lanes from 1/2 mile north of Yosemite Avenue to 1/2 mile north of Cardella Road. Extend R Street (2 lanes) from Bellevue Road to 1/2 mile south of Old Lake Road.

Development Level: 100% buildout of Bellevue Ranch Phases I and II, 17% buildout of Phase III.

6) R Street Improvement: Widen R Street to 4 lanes from 1/2 mile north of Cardella Road to 1/2 mile north of Bellevue Road. Extend R Street (2 lanes) from 1/2 mile north of Bellevue Road to Old Lake Road.

Development Level: 100% buildout of Bellevue Ranch Phases I and II, 76% buildout of Phase III.

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[9] If the proposed Transmeridian project does develop before or concurrent to Phase I, then Bellevue Ranch will be fully responsible for extending R Street from its present terminus to Cardella Road at about 22% buildout of Phase I.

[10] This phase of the R Street improvements is triggered by the level of service at the intersections of Yosemite/M and Yosemite/G when Phase I of Bellevue Ranch traffic is shifted to M and G Streets without R Street in place. Without R Street, the roadways of M and G Street and the intersections on Cardella Road have sufficient capacity to accommodate 100% of Phase I. However, future base and Project traffic at the Yosemite intersections cause them to deteriorate to unacceptable levels without R Street. Therefore, these intersections are the constraining factors.

Figure 4.10-14 graphically illustrates the phasing of the R Street improvements and associated levels of development.

Recommended Mitigation of G Street

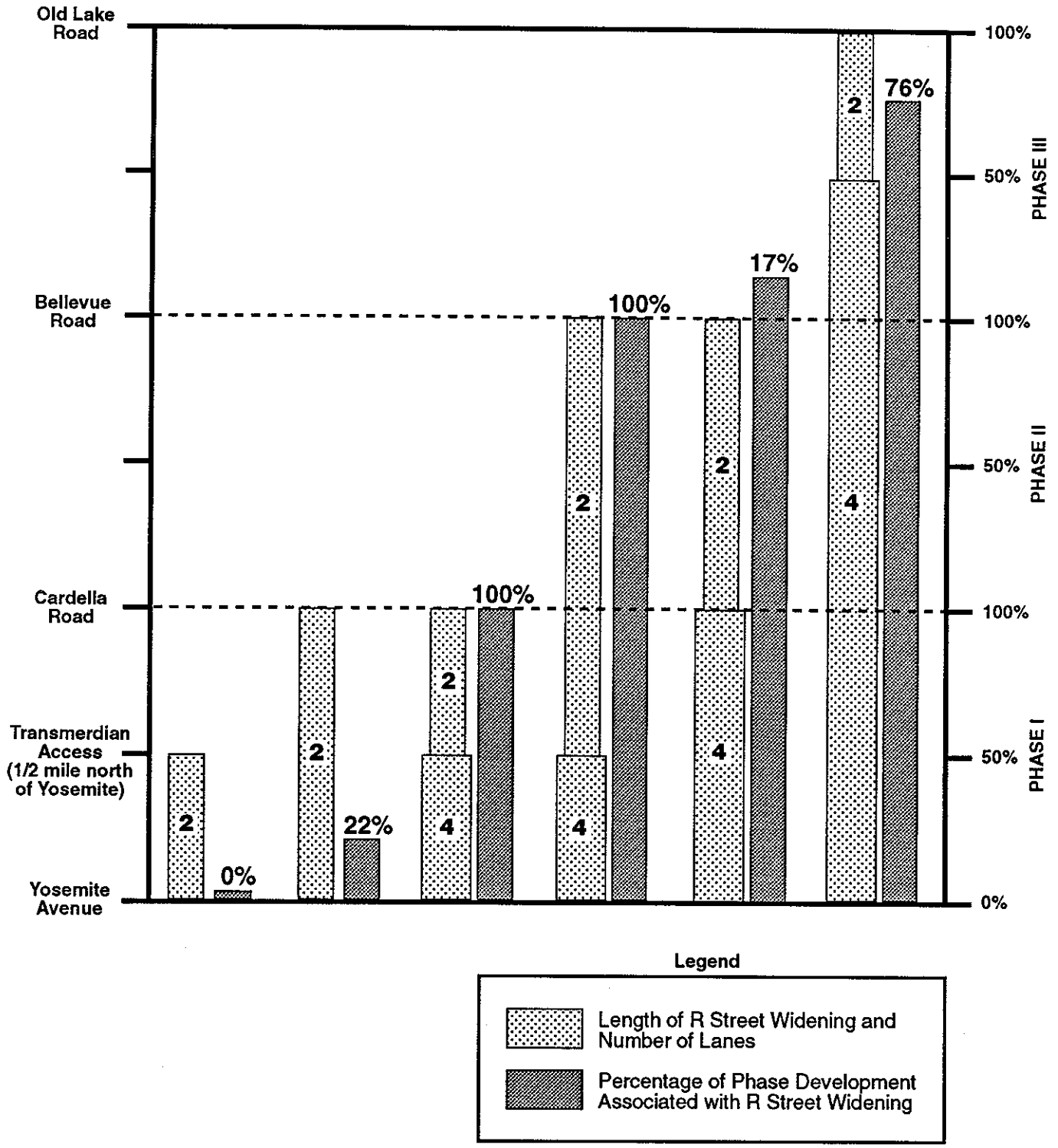
With buildout of Bellevue Ranch Phase III in 2010 plus cumulative development traffic, G Street is shown to require widening to 6 lanes to mitigate impacts at the intersections of Yosemite/G and Cardella/G. It is important to note that the intersections require the additional lanes rather than the mid-block street segments. Therefore it is not necessary that the 6 lanes be continuous between major intersections. The outside 5th and 6th lanes can be dropped as exclusive right turn lanes about 1/4 mile beyond the intersections.

The lane requirements for G Street are based on the modeled distribution and assignment of projected traffic volumes. The traffic demand on G Street is slightly imbalanced with the demand on R Street. The combined capacity of the two streets is 20% higher than the combined demand. Actual travel patterns at buildout may create an equal demand on G and R Streets, eliminating the need for 6 lanes on G Street. On the segment of G Street in question, 4 lanes should definitely be provided before buildout in 2010. Right-of-way should be reserved for 6 lanes, and traffic conditions monitored to determine the need for widening. The present requirement for a 128 foot right-of-way on G Street is sufficient for a 6 lane arterial/expressway.

Left Turn Storage Requirements at Key Intersections Within Bellevue Ranch

Table 4.10-24 shows the left turn storage lengths required to accommodate the projected traffic volumes at buildout of the Project (year 2010). Based on the calculated length, dual left turn lanes are recommended at two intersections rather than the single turn lane suggested in the mitigation measures. These intersections and movements are:

- Cardella/R Eastbound left turn
- Bellevue/G Northbound left turn



Source: Fehr & Peers Associates, Inc.

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Figure 4.10-14
Phasing of R Street Widening with Development of Bellevue Ranch

Table 4.10-24
LEFT TURN STORAGE REQUIREMENTS AT MAJOR INTERSECTIONS WITHIN BELLEVUE RANCH (YEAR 2010 BUILDOUT)

Intersection	Left Turn Movement	Peak Volume	Left Turn Configuration	Left Turn Storage (Ft)
Cardella/R	Northbound	318	Single	265
	Southbound	90	Single	100
	Westbound	203	Dual	100
	Eastbound	359	Dual	165
Cardella/M	Northbound	193	Single	161
	Westbound	704	Dual	323
Cardella/G	Northbound	252	Single	210
	Southbound	203	Single	169
	Westbound	109	Single	100
	Eastbound	258	Single	215
Bellevue/R	Northbound	0	Single	100
	Southbound	35	Single	100
	Westbound	536	Dual	246
	Eastbound	19	Single	100
Bellevue/M	Northbound	283	Single	236
	Westbound	179	Single	149
Bellevue/G	Northbound	345	Dual	178
	Southbound	21	Single	100
	Westbound	252	Single	210
	Eastbound	332	Dual	152

Left turn storage requirements based on the following formula:

Storage in feet = (Peak Hour Volume/Cycles Per Hour) x 1.5 x 25 feet

Cycles per hour are assumed at 45 (80 second cycle).
Peak volumes for dual left turn lanes multiplied by 55% to reflect highest lane utilization.
Minimum storage length = 100 feet.

Signalization Threshold for Arterial/Collector Intersections

The installation of traffic signals can be warranted by many different factors, but for planning purposes the "peak hour warrant" provides a good indication if a signal will actually be

needed. When the approach volume of a 2 lane collector reaches 150 vehicles per hour, and the intersecting 4 lane arterial serves 1,500 or more vehicles per hour in both directions, the intersection warrants the installation of a traffic signal.

At buildout of Phase I (year 2000), peak hour traffic on the major arterials (Cardella, R, and G) do not exceed about 1,100 vehicles per hour and signals at the major collector intersections may not be warranted. At buildout of Phase II (year 2005), peak hour volumes on Cardella and Bellevue Roads exceed 1,500 indicating the need for signals. The peak hour volumes on R and G Streets do not exceed 1,500, but the collector approach volume may warrant signals with lower arterial volumes. At buildout of Phase III (year 2010), all of the collector intersections on major arterials will warrant traffic signals because arterial volumes will be well in excess of 1,500 vehicles per hour. The exception is Old Lake Road which, because there is no development to the north, may not require signals even in 2010.

Mitigated Levels of Service

Table 4.10-25 shows the intersection levels of service for each planning horizon after application of the roadway and intersection improvements. In the year 2000, all of the study intersections will operate at LOS D or better except West Olive Avenue at SR 59, R Street, and G Street. These intersections would require additional through lanes to fully mitigate the impacts of future development. Because of right-of-way limitations, additional through lanes

Table 4.10-25

MITIGATED INTERSECTION SERVICE LEVELS WITH BELLEVUE RANCH

	Year 2000				Year 2005				Year 2010			
	AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
Intersection	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
West Olive/SR 59	1.49	F	1.35	F	1.80	F	1.95	F	1.18	F	1.49	F
West Olive/R St.	0.53	A	0.94	E	1.02	F	1.61	F	0.74	C	1.29	F
West Olive/M St.	0.57	A	0.87	D	0.68	B	1.04	F	0.94	E	1.37	F
West Olive/G St.	1.01	F	1.28	F	1.29	F	1.63	F	1.06	F	1.42	F
Yosemite/M St.	0.65	B	0.80	D	0.57	A	0.74	C	0.72	C	0.87	D
Yosemite/G St.	0.55	A	0.88	D	0.55	A	0.88	D	0.81	D	0.88	D
Yosemite/R St.	0.47	A	0.83	D	0.69	B	0.77	C	0.65	B	0.86	D
Cardella/SR 59	[11]	D	[1]	C	0.81	D	0.66	B	0.75	C	0.88	D
Cardella/R St.	[1]	A	[1]	A	0.48	A	0.79	C	0.74	C	0.87	D
Cardella/M St.	[1]	B	[1]	C	0.41	A	0.55	A	0.38	A	0.59	B
Cardella/G St.	[12]	C	[2]	F	0.61	B	0.79	C	0.71	C	0.85	D
Bellevue/R St.	n/a	n/a	n/a	n/a	0.24	A	0.59	A	0.44	A	0.83	D
Bellevue/M St.	n/a	n/a	n/a	n/a	0.17	A	0.41	A	0.34	A	0.78	C
Bellevue/G St.	[1]	A	[1]	A	0.40	A	0.70	C	0.48	A	0.85	D

n/a = intersection does not exist in 2000 planning horizon.

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[11] Intersections do not warrant traffic signals. Levels of service reported for stop sign controlled intersections are for the worst movement from the minor street to the major street.

[12] Cardella/G does not warrant a traffic signal in 2000. However, if signalized it will operate at a LOS B (0.62) in the p.m., and LOS A (0.37) in the a.m. peak hours.

are not feasible. Therefore, these intersections experience unavoidable adverse impacts. The intersection of Cardella/G does not warrant the installation of a traffic signal in 2000 with the Project. As a consequence, several movements from Cardella onto G Street will operate at LOS E or F. If the intersection is signalized, though, the service level would improve to LOS D or better.

In the year 2005, all of the study intersections will operate at LOS D or better except the intersections on West Olive Avenue. With existing intersection and roadway capacity these intersections worsen with the addition of future traffic, and continue to experience unavoidable adverse impacts.

In the year 2010, with the mitigations described above and the Yosemite Bypass, all of the study intersections will operate at LOS D or better except those along West Olive Avenue. However, implementation of the Yosemite Bypass reduces the traffic using R,M, and G Streets and West Olive Avenue. The result is an average improvement over the 2005 volume to capacity ratios of 10% in the morning and 6% in the afternoon peak hour even with the additional traffic generated between 2005 and 2010. One intersection, West Olive/SR 59, will experience an improvement as high as 34%.

Project Contribution to Mitigated Facilities

Table 4.10-26 shows the Project's contribution to the total traffic using improved roadway segments. In the year 2000, Bellevue Ranch will contribute an average of 22% to new and widened facilities, with the highest percentages on roads with direct access to the Project. In 2005, Bellevue Ranch's contribution increases to an average of 24%, and in 2010 to an average of 47%. Bellevue Ranch contributes 40% to the future traffic using the Yosemite Bypass. This percentage will actually be less when the diversion of existing traffic to the bypass can be accounted for.

Table 4.10-26
PROJECT CONTRIBUTION TO TRAFFIC ON MITIGATED ROADWAY SEGMENTS

Roadway Segment	ADT	Project ADT	Project Share
Year 2000			
R Street			
S. of Cardella	5,300	4,300	81%
N. of Cardella	2,400	2,300	96%
Cardella Road			
W. of G Street	10,500	2,700	26%
E. of R Street	7,200	3,700	51%
W. of R Street	2,700	400	15%
Yosemite Avenue	11,700	400	3%
E. of R Street	5,600	200	4%
W. of R Street			
M Street	9,900		
S. of Cardella		6,000	61%
State Route 59			
N. of West Olive	35,000	200	1%
Total/Average:	**90,300**	**20,200**	**22%**
Year 2005			
R Street			
S. of Bellevue	4,400	4,400	100%
Bellevue Road			
W. of G Street	14,600	10,600	73%
E. of R Street	12,800	8,800	69%
Yosemite Avenue	17,600	100	1%
W. of R Street			
Cardella Road			
W. of R Street	14,800	900	6%
G Street			
N. of Yosemite	18,200	7,300	40%

State Route 59			
N. of Yosemite	42,100	2,000	5%
Total/Average:	**305,100**	**74,500**	**24%**
R Street	23,400	20,400	87%
N. of Cardella	16,700	16,700	100%
N. of Bellevue			
G Street			
N. of Yosemite	34,800	12,200	35%
N. of Cardella	27,600	15,800	57%
N. of Bellevue	28,300	15,100	53%
Yosemite Avenue			
W. of R Street	27,900	9,400	34%
State Route 59			
N. of Yosemite	47,500	9,800	21%
Yosemite Bypass			
W. of SR 59	44,100	17,700	40%
Total/Average:	**250,300**	**177,100**	**47%**
Grand Total/Average:	**645,700**	**211,800**	**33%**

Tables 4.10-27 through 4.10-29 show the Project's contribution to the total volumes at the study intersections. In the years 2000, 2005, and 2010 Bellevue Ranch contributes an average of 18%, 31%, and 32% to the critical p.m. peak hour volumes respectively.

Table 4.10-27
YEAR 2000 LAND USE CONTRIBUTION TO MITIGATED INTERSECTION VOLUMES

Intersection	Year 2000 With Project-PM Peak Hour				
	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	6194	48.40%	49.70%	1.90%	100%
West Olive/R	6737	50.40%	41.90%	7.70%	100%
West Olive/M	5774	60.20%	29.70%	10.10%	100%
West Olive/G	5901	62.30%	31.60%	6.10%	100%
Yosemite/R	2495	0.00%	82.60%	17.40%	100%
Yosemite/M	3459	29.00%	46.90%	24.10%	100%
Yosemite/G	2934	38.20%	53.40%	8.40%	100%
Cardella/SR 59	838	35.10%	60.10%	4.80%	100%
Cardella/R	809	0.00%	39.10%	60.90%	100%
Cardella/M	1441	0.00%	44.80%	55.20%	100%
Cardella/G	1501	36.10%	47.50%	16.40%	100%
Bellevue/R	n/a	n/a	n/a	n/a	n/a
Bellevue/M	n/a	n/a	n/a	n/a	n/a
Bellevue/G	735	73.60%	24.00%	2.40%	100%
Average:		36.11%	45.94%	17.95%	

Intersection	Year 2000 With Project-PM Peak Hour				
	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	4082	47.50%	50.20%	2.30%	100%
West Olive/R	3685	49.70%	38.50%	11.80%	100%
West Olive/M	3531	57.30%	30.40%	12.30%	100%
West Olive/G	4457	63.00%	30.20%	6.80%	100%
Yosemite/R	1400	0.00%	72.00%	28.00%	100%
Yosemite/M	2318	29.40%	43.20%	27.40%	100%
Yosemite/G	2036	31.10%	57.40%	11.50%	100%
Cardella/SR 59	1284	66.70%	31.00%	2.30%	100%
Cardella/R	675	0.00%	35.00%	65.00%	100%
Cardella/M	1215	0.00%	40.50%	59.50%	100%
Cardella/G	1030	23.60%	53.60%	22.80%	100%
Bellevue/R	n/a	n/a	n/a	n/a	n/a
Bellevue/M	n/a	n/a	n/a	n/a	n/a
Bellevue/G	363	66.90%	28.40%	4.70%	100%
Average:		36.27%	42.53%	21.20%	

Table 4.10-28
YEAR 2005 LAND USE CONTRIBUTION TO MITIGATED INTERSECTION VOLUMES

Intersection	Year 2005 With Project-PM Peak Hour				
	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	9016	33.20%	58.50%	8.30%	100%
West Olive/R	8647	39.30%	45.00%	15.70%	100%
West Olive/M	5852	59.40%	23.80%	16.80%	100%
West Olive/G	6928	53.10%	36.90%	10.00%	100%
Yosemite/R	4682	0.00%	75.20%	24.80%	100%
Yosemite/M	3655	27.50%	39.70%	32.80%	100%
Yosemite/G	4107	27.30%	53.70%	19.00%	100%
Cardella/SR 59	3136	9.30%	81.00%	9.70%	100%
Cardella/R	2845	0.00%	53.80%	46.20%	100%
Cardella/M	2794	0.00%	55.70%	44.30%	100%
Cardella/G	3999	13.50%	52.40%	34.10%	100%
Bellevue/R	1473	16.20%	20.60%	63.20%	100%
Bellevue/M	1755	13.60%	15.30%	71.10%	100%
Bellevue/G	1619	33.30%	32.10%	34.60%	100%
Average:		23.26%	45.98%	30.76%	

Intersection	Year 2005 With Project-PM Peak Hour				
	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	5908	32.90%	59.00%	8.10%	100%
West Olive/R	5082	36.00%	47.30%	16.70%	100%
West Olive/M	3447	58.60%	23.60%	17.80%	100%
West Olive/G	4939	56.80%	34.30%	8.90%	100%
Yosemite/R	3017	0.00%	74.80%	25.20%	100%
Yosemite/M	2356	28.90%	38.90%	32.20%	100%
Yosemite/G	2599	24.40%	56.70%	18.90%	100%
Cardella/SR 59	2909	29.40%	63.90%	6.70%	100%
Cardella/R	1889	0.00%	53.00%	47.00%	100%
Cardella/M	1866	0.00%	53.30%	46.70%	100%
Cardella/G	2371	10.40%	55.00%	34.60%	100%
Bellevue/R	703	0.10%	25.70%	74.20%	100%
Bellevue/M	848	10.00%	11.30%	78.70%	100%
Bellevue/G	884	27.80%	35.80%	36.40%	100%
Average:		22.52%	45.19%	32.29%	

Table 4.10-29
YEAR 2010 LAND USE CONTRIBUTION TO MITIGATED INTERSECTION VOLUMES

Intersection	Year 2010 With Project-PM Peak Hour				
	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	6321	47.40%	49.70%	2.90%	100%
West Olive/R	8057	42.20%	40.40%	17.40%	100%
West Olive/M	8153	42.60%	45.20%	12.20%	100%
West Olive/G	6809	54.00%	31.00%	15.00%	100%
Yosemite/R	5976	0.00%	60.90%	39.10%	100%
Yosemite/M	5478	18.20%	66.50%	15.30%	100%
Yosemite/G	6043	18.60%	59.90%	21.50%	100%
Cardella/SR 59	5375	5.50%	73.20%	21.30%	100%
Cardella/R	4677	0.00%	46.10%	53.90%	100%
Cardella/M	2821	0.00%	68.40%	31.60%	100%
Cardella/G	5443	9.90%	55.80%	34.30%	100%
Bellevue/R	4690	5.10%	25.30%	69.60%	100%
Bellevue/M	3397	7.10%	26.00%	66.90%	100%
Bellevue/G	4252	12.70%	40.30%	47.00%	100%
Average:		18.81%	49.10%	32.00%	

Intersection	Year 2010 With Project-PM Peak Hour				
	Total Intersection Volume	Percent Existing Volume	Percent Future Base Volume	Percent Bellevue Ranch Volume	Total
West Olive/SR 59	4226	45.90%	51.30%	2.80%	100%
West Olive/R	4741	38.60%	43.20%	18.20%	100%
West Olive/M	5081	39.80%	48.00%	12.20%	100%
West Olive/G	4917	57.10%	29.80%	13.10%	100%
Yosemite/R	4094	0.00%	63.50%	36.50%	100%
Yosemite/M	3824	17.80%	68.40%	13.80%	100%
Yosemite/G	4062	15.70%	64.60%	19.70%	100%
Cardella/SR 59	4394	19.50%	65.10%	15.40%	100%
Cardella/R	3295	0.00%	48.80%	51.20%	100%
Cardella/M	2056	0.00%	67.40%	32.60%	100%
Cardella/G	3417	7.20%	59.60%	33.20%	100%
Bellevue/R	2687	0.00%	28.00%	72.00%	100%
Bellevue/M	1861	0.10%	28.30%	71.60%	100%
Bellevue/G	2433	10.00%	41.10%	48.90%	100%
Average:		17.89%	50.51%	31.51%	

Mitigation of State Route 99

State Route 99 will require widening to 6 lanes from Merced to at least Atwater by the year 2010. Since the projections in this study reflect about 50% to 60% of the total growth anticipated in Merced, traffic generated by future growth may be twice as high on SR 99. This will increase the volumes on SR 99 to nearly the capacity of a 6 lane freeway (about 120,000 ADT) and require widening to 8 lanes north of Merced. Doubling the projected traffic on SR 99 to the south of the City will require widening to 6 lanes by 2010.

This study cannot accurately project the traffic volumes on SR 99 because the amount and location of the future base land use south of Bear Creek is unknown. Therefore, the actual number of lanes needed on SR 99 cannot be determined with certainty. With completion of the General Plan Update and the Route 99 Corridor Study, better projections will be available as well as the opportunities and constraints of improving SR 99 through Merced. This information, combined with the Project and future base traffic projections in this study, will assist in determining funding mechanisms for freeway and interchange improvements. In addition, Merced County is developing a county-wide development fee program which will include projects to improve CMP facilities such as SR 59 and 99. Funding for these improvements will include state funds, potential sales tax revenues, and developer fees.

4.11 AIR QUALITY

1. Environmental Issues

This portion of the document summarizes the current air quality setting of the project site and discusses anticipated impacts to local and regional air quality. The complete text of the air quality analysis is located in the Technical Appendices of the EIR.

2. Existing Setting

The City of Merced lies within the northern portions of the San Joaquin Valley Air Basin. This air basin is a well-defined climatic region, primarily because of the topographic barriers which form distinct boundaries on three sides of the basin. The western boundary is formed by the Coast Range, the southern boundary by the Tehachapi Mountains, and the eastern boundary by the Sierra Nevada. Only the northern boundary is not marked by a distinct topographic feature. At the northern end of the basin, the Carquinez Strait, a sea level gap between the Coast Ranges, extends to the west and is a major source of ventilation.

Air Quality Standards and Pollutant Characteristics

The Mulford-Carrell Act of 1969 and the Clean Air Act of 1970 established state and federal air quality standards for several pollutants. These standards are divided into primary standards, designed to protect the public health, and secondary standards, intended to protect the public welfare from effects such as visibility reduction, soiling, nuisance and other forms of damage. The state and federal standards are summarized in Table 4.11.1.

TABLE 4.11.1

AMBIENT AIR QUALITY STANDARDS
(ppm unless otherwise noted)

Pollutant	Averaging Time	Federal Primary Standards	State Standards
Ozone	1-Hour	0.12	0.09
Carbon Monoxide	8-Hour 1-Hour	9.0 35.0	9.0 20.0
Nitrogen Dioxide	Annual 1-Hour	0.05 ---	--- 0.25
Sulfur Dioxide	Annual 24-Hour 1-Hour	0.03 0.14 ---	--- 0.25 0.5
PM-10	AGM Annual Mean 24-Hour	------- 50 ug/m3 150 ug/m3	30 ug/m3 ------- 50 ug/m3
Lead	30-Day Ave. 3-Month Ave.	------- 1.5 ug/m3	1.5 ug/m3 -------
Hydrogen Sulfide	1-Hour	---	0.03
Vinyl Chloride	24-Hour	---	0.01

Notes:

ppm	=	Parts per Million
—	=	Not Applicable
AGM	=	Annual Geometric Mean
ug/m3	=	Micrograms per Cubic Meter

The State of California and the federal ambient air quality standards are different in many cases. In particular, the state standards for ozone, carbon monoxide (1-hour standard) and PM-10 are considerably more stringent than the federal standards.

Ozone

Ozone is the most prevalent of a class of photochemical oxidants formed in the urban atmosphere. The creation of ozone is a result of complex chemical reactions between hydrocarbons and oxides of nitrogen in the presence of sunshine. Unlike other pollutants, ozone is not released directly into the atmosphere from any sources. The major sources of oxides of nitrogen and hydrocarbons, known as ozone precursors, are combustion sources such as factories and automobiles, and evaporation of solvents and fuels. The health effects of ozone are eye irritation and damage to lung tissues. Ozone also damages some materials such as rubber, and damages plants and crops. Typical ozone damage to sensitive crops include visible leaf damage and decreased growth and yield.

Carbon Monoxide

Carbon monoxide is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels, and its main source in Merced County is automobiles. Carbon monoxide's health effects are related to its affinity for hemoglobin in the blood. At high concentrations, carbon monoxide reduces the amount of oxygen in the blood, causing heart difficulties in people with chronic diseases, reduced lung capacity and impaired mental abilities.

Nitrogen Dioxide

Nitrogen dioxide is a reddish-brown toxic gas and is one of the oxides of nitrogen that results from combustion. It is the only oxide of nitrogen which is toxic; however, other oxides of nitrogen, particularly nitric oxide, are converted to nitrogen dioxide in the presence of sunshine. Major sources of oxides of nitrogen are automobiles and industry. The health effects of nitrogen dioxide are irritation to lung tissues and aggravation of existing pulmonary problems.

Sulfur Dioxide

Sulfur dioxide is a colorless gas with a pungent, irritation odor. It is created by the combustion of sulfur-containing fuels and is known to oxidize to sulfur trioxide, which combines with moisture in the atmosphere to form a sulfuric acid mist. Sulfur dioxide damages and irritates lung tissue, and accelerates corrosion or deterioration of metals, painted surfaces, stone and textiles.

Suspended Particulate Matter (PM-10)

Suspended particulate matter consists of solid and liquid particles of dust, soot, aerosols, and other matter which are small enough to remain suspended in the air for a long period of time. A portion of the suspended particulate matter in the air is due to natural sources such as wind

blown dust and pollen. Man-made sources include combustion, automobiles, field burning, factories and unpaved roads. Particulate matter also results from photochemical reactions in the atmosphere.

The effects of high concentrations on humans include aggravation of chronic disease and heart/lung disease symptoms. Non-health effects include reduced visibility and soiling of surfaces.

Regional Air Quality Planning

Federal Air Quality Programs

The U.S. Clean Air Act Amendments of 1977 required that each state identify areas within its borders that do not meet federal primary standards as non-attainment areas. Merced County is considered non-attainment under the federal Clean Air Act for ozone, and either attainment or unclassified for other gaseous pollutants. Merced County is designated as a Group 3 area for suspended particulate (PM-10).

The Clean Air Act required the preparation of a non-attainment plan showing how the federal standards were to be met by 1982. Because some areas in California were not able to attain these standards by 1982, the State requested, and was granted, an extension to 1987.

The Merced County Board of Supervisors adopted a non-attainment plan for Merced County in 1978. Merced County was one of many non-attainment areas in California that failed to meet the federal ambient air quality standards by 1987.

The federal Clean Air Act Amendments of 1990 require that non-attainment areas develop plans and strategies that will reduce pollutants by 15 percent during the first 6 years, then 3 percent annually thereafter until the standards are met. Areas must meet the standards within 5 to 17 years, depending on the severity of the problem.

The San Joaquin Valley Unified Air Pollution Control District has recently adopted federal nonattainment plans for PM-10 and carbon monoxide; the federal non-attainment plan for ozone is due in November 1993.

State Air Quality Programs

Prior to 1988 there was no timetable for attainment of the state air quality standards. The California Clean Air Act, enacted in 1988, requires local air pollution control districts to prepare air quality attainment plans for ozone and carbon monoxide. Generally, these plans must provide for district-wide emission reductions of five percent per year averaged over consecutive three-year periods. The Act also grants air districts explicit statutory authority to adopt indirect source regulations and transportation control measures, including measures

to encourage or require the use of ridesharing, flexible work hours, or other measures which reduce the number or length of vehicle trips.

Under the California Clean Air Act, Merced County is considered non-attainment for ozone and suspended particulate (PM-10). The County is either attainment or unclassified for other pollutants.

The state-required nonattainment plan for ozone and carbon monoxide for the air basin as been recently adopted, and has been approved by the State Air Resources Board.

Current Air Quality Programs

Prior to 1991, the San Joaquin Valley Unified Air Pollution Control District operated two monitoring sites in Merced County at Los Banos and Merced. Both these sites monitored only PM-10. In 1991 monitoring began in Merced for ozone, carbon monoxide and nitrogen dioxide. Other nearby monitoring sites in neighboring counties are located north in Stanislaus County (Crows Landing, Turlock) and south in Madera County (Madera). A summary of air quality data from these monitoring sites is shown in Table 4.11.2 for the years 1987-1991.

Table 4.11.2
REGIONAL AIR QUALITY MONITORING (1987-1991)

	Number of Days Standard was Exceeded at:				
Year	Madera	Turlock	Crows Landing	Los Banos	Merced
	Carbon Monoxide (8-Hour)				
1987	--	--	--	--	--
1988	--	--	--	--	--
1989	--	--	0	--	--
1990	--	--	0	--	--
1991	--	--	--	--	0
	Ozone (Federal 1-Hour)				
1987	--	15	1	--	--
1988	1	4	1	--	--
1989	0	3	0	--	--
1990	0	0	1	--	--
1991	2	0	--	--	2
	Ozone (State 1-Hour)				
1987	--	75	23	--	--
1988	11	55	32	--	--
1989	15	31	23	--	--
1990	6	17	21	--	--
1991	24	22	--	--	13
	Nitrogen Dioxide (State 1-Hour)				
1987	--	--	0	--	--
1988	--	--	0	--	--
1989	--	--	0	--	--
1990	--	--	0	--	--
1991	--	--	--	--	0

4.11.2 (cont)	Sulfur Dioxide (State 1-Hour)				
1987	–	–	0	–	–
1988	–	–	0	–	–
1989	–	–	0	–	–
1990	–	–	0	–	–
1991	–	–	–	–	–
	PM-10 (State 24-Hour)				
1987	21	–	10	–	18
1988	26	–	21	10	23
1989	18	–	22	13	18
1990	23	–	19	13	25
1991	27	–	2	16	24

Table 4.11.2 shows that the standards for ozone and PM-10 are exceeded in the project vicinity. The standards for other pollutants are generally met.

General Plan Goals and Policies

Through the City of Merced General Plan, the City has adopted the following policies related to air quality in order to restore and maintain a high level of air quality within the community and the San Joaquin Valley Air Basin:

- *Support local and regional agencies in efforts and programs to achieve the state air quality standards.*
- *Develop policies and programs which will reduce traffic congestion and over-dependence on the use of the automobile.*
- *Continue the development and improvement of the Merced Transit System and to expand the system to include a monorail or other similar system in future transportation planning.*
- *Develop policies and programs which facilitate the use of bicycles and foot traffic for both commuter and recreational purposes.*
- *Investigate the feasibility of converting City-owned vehicles to less polluting fuels.*

- *Ensure that industrial standards and promotion are not in conflict with regional and state control of air quality performance standards.*

3. Project Impacts

Standards of Significance

According to CEQA, a project will normally have a significant adverse impact on air quality if it will "violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations".

For carbon monoxide, an impact is considered significant if it would cause or significantly contribute to a violation of either the 1-hour or 8-hour ambient air quality standards.

Since concentrations of ozone and PM-10 currently exceed the ambient air quality standards in the project area, violation of air quality standards cannot be used as a "threshold of significance". Impacts are judged on their contribution to the regional or sub-regional emission burden, using the following thresholds of significance, equivalent to the offset trigger levels for stationary sources imposed by the San Joaquin Valley Unified Air Pollution Control District: emissions of ozone precursors (hydrocarbons or oxides of nitrogen) exceeding 150 pounds per day and emissions of PM-10 exceeding 80 pounds per day.

Local-Scale Impacts

Construction-Related Impacts

Construction activities such as clearing, excavation and grading operations, construction vehicle traffic on unpaved ground and wind blowing over exposed earth would generate dust and particulate matter. Construction dust would affect local and regional air quality at various times during the build-out period of the project. The dry, windy climate of the area during the summer months combined with the fine, silty soils of the region create a high potential for dust generation.

Where construction is occurring upwind of previously-completed portions of the project a potential for dust nuisance would be created. The effects of construction activities would be increased dustfall and locally elevated levels of particulate matter. Dustfall would soil exposed surfaces, requiring more frequent washing during the construction period.

The construction-related impacts of the proposed project are considered to be **significant**, although temporary.

Auto-Related Impacts

The project and cumulative development would increase automobile traffic, affecting carbon monoxide concentrations near streets and intersections. Carbon monoxide is a localized pollutant that typically has large variations in concentration over relatively small distances. The primary source of carbon monoxide is automobile traffic. Intersections of major surface streets are considered "hotspots" for carbon monoxide. This is due to the high volumes of traffic and the idling of vehicles associated with delays at the intersection.

To estimate carbon monoxide levels in areas affected by project traffic the CALINE-4 computer model was applied to 5 intersections under existing traffic conditions and for future traffic conditions with the project and cumulative traffic growth. These intersections were selected as having the highest traffic volumes and/or congestion levels of those studied, and should provide estimates of the highest concentrations expected to occur in the area. Two of these intersections are within the proposed project site while three are intersections near the project site.

The calculations reflected worst-case conditions for both traffic and meteorology. The CALINE-4 model and conditions assumed for its use are described in Appendix A.

The state and federal standards for carbon monoxide specify averaging times of 1 and 8 hours. Predicted existing carbon monoxide concentrations near the 9 selected intersections are shown below in Table 4.11.3. The data is in parts per million (PPM). The applicable 1-hour state and federal standards are 20 and 35 PPM, respectively.

Table 4.11.3
PREDICTED WORST-CASE CARBON MONOXIDE CONCENTRATION, IN PART PER MILLION

Intersection	Existing (1993)	No Project (2000)	Project (2000)	No Project (2010)	Project (2010)
	1-Hour Averaged Concentrations				
West Olive/S.R. 59	16.5	17.0	16.9	15.0	15.1
West Olive/R Street	18.5	17.3	17.6	14.7	14.7
Yosemite/G Street	13.0	14.9	14.1	14.0	14.9
Cardella/G Street	–	10.6	12.5	12.9	14.6
Cardella/R Street	–	9.4	11.1	10.9	14.0
	8-Hour Averaged Concentrations				
West Olive/S.R. 59	7.9	8.2	8.1	7.2	7.2
West Olive/R Street	8.9	8.3	8.4	7.1	7.1
Yosemite/G Street	6.2	7.2	6.8	6.7	7.2
Cardella/G Street	–	5.1	6.0	6.2	7.0
Cardella/R Street	–	4.5	5.3	5.2	6.7

Existing concentrations are below the state and federal standards for both the 1-hour and 8-hour averaging periods.

Future carbon monoxide concentrations are affected by opposing trends. The number of vehicles entering the intersections in question will in part determine carbon monoxide emissions, as does the level of congestion. Both of these will be increasing in the future. At the same time, the per-mile emission rate from automobiles in the future will be lower, as newer vehicles, with more effective emission control systems, replace older vehicles.

The project would generate new traffic and result in construction of new roadways. The net effect on carbon monoxide levels in the year 2000 is mixed, with concentrations at some intersections going up and concentrations at others going down. No violation of either the 1-hour or 8-hour standards are predicted.

The project would increase concentrations of carbon monoxide at all five intersections studied in the year 2010. The impact would be greatest at the two intersections within the project site. Impacts outside the project site would range from 0.1 to 0.9 PPM. Year 2010

concentrations are predicted to be lower than current levels, and no violations of the 1-hour or 8-hour standards are predicted.

Project impacts on local carbon monoxide concentrations are considered to be **less-than-significant.**

Regional Air Quality Impacts

The project would increase regional emissions of criteria pollutants through new vehicle travel. Vehicle trips generated by new land uses would result in air pollutant emissions over a large area. To estimate the emissions associated with the project the URBEMIS-3 computer program, developed by the California Air Resources Board, was applied to project land uses. The URBEMIS-3 program was also applied to cumulative development assumed in the future base case of the traffic analysis.

The daily increases in regional emissions from auto travel are shown in Table 4.11-4 for four regional pollutants. The analysis was carried out for the years 2000, 2005 and 2010.

Daily emissions associated with proposed residential uses are also shown in Table 4.11.4. Residential uses contain a number of dispersed and intermittent sources of pollutants such as space and water heaters, household paints and solvents, fireplaces and woodstoves, lawn mowers and other equipment. Published annual emission rates for residential uses were taken from published sources.

Table 4.11.4
REGIONAL EMISSIONS ASSOCIATED WITH PROJECT BUILDOUT CUMULATIVE DEVELOPMENT, IN POUNDS PER DAY

Year		ROG	NOX	PM-10
		Project		
2000	Auto Emissions Residential Emissions Total	252 84 336	551 17 568	69 5 74
2005	Auto Emissions Residential Emissions Total	638 194 832	1633 39 1672	200 13 213
2010	Auto Emissions Residential Emissions Total	1114 333 1447	2618 66 2684	316 22 338
		Cumulative Development		
2000	Auto Emissions Residential Emissions Total	1428 228 1656	3230 46 3276	341 15 356
2005	Auto Emissions Residential Emissions Total	2029 361 2390	4756 72 4828	502 23 525
2010	Auto Emissions Residential Emissions Total	2875 494 3369	6796 95 6891	700 32 732

ROG = Reactive Organic Gases
NOX = Nitrogen Oxides
PM-10 = Particulate Matter, Ten Microns

Table 4.11.4 shows that growth accommodated by the proposed project would result in substantial new regional emissions. A much greater new emission would result from cumulative development in the area. These new emissions could cause a deterioration in regional air quality and delay eventual attainment of the air quality standards for ozone and PM-10 in the San Joaquin Valley air basin.

Project impacts on regional air quality are considered to be **significant and unavoidable.**

4. Mitigation Measures

The following measures are offered to mitigate the air quality impacts identified above to a less-than-significant level, except in the case where impacts are significant and unavoidable:

Construction-Related Impacts

MM 4.11.1 To ensure that construction mitigation is utilized, final approval ~~should~~ shall not be given to any development until the developer/contractor submits a satisfactory construction mitigation plan. This plan should specify the methods of control that will be utilized, demonstrate the availability of needed equipment and personnel, and identify a responsible individual who, if needed, can authorize generation the implementation of additional measures, if needed.

The construction dust mitigation plan shall, at a minimum, include the following:

- Suspend earthmoving or other dust-producing activities during periods of high winds when dust control measures are unable to avoid visible dust plumes.
- Provide equipment and staffing for watering of all exposed or disturbed soil surfaces at least twice daily, including weekends and holidays. An appropriate dust palliative or suppressant, added to water before application, should be utilized.
- Water or cover stockpiles of debris, soil, sand or other materials that can be blown by the wind.
- Sweep construction area and adjacent streets of all mud and debris, since this material can be pulverized and later resuspended by vehicle traffic.
- Limit the speed of all construction vehicles to 15 miles per hour while on site.
- All materials transported by truck will be covered or wetted down.
- All inactive portions of the site will be watered with an appropriate dust suppressant, covered or seeded.

Regional Impacts

The proposed project utilizes the Village Concept, a community design that provides a high degree of accessibility between residences and centrally located commercial/retail uses, and

utilizes a mixed-use strategy to reduce the need for external trips. Implementation of the Village Concept is intended to:

- Utilize land uses and densities to orient the development towards pedestrian/bicycle travel for local tips.
- Establish a system of pedestrian/bicycle/electric vehicle paths connecting residences to shopping, employment and recreational uses to encourage non-auto travel for short trips.
- Provide a transit center, transit amenities.
- Develop neighborhood parks and schools in close proximity to residential uses.

The air quality impact analysis is based upon conservative, worst-case traffic generation rates that reflected a standard suburban subdivision. Trip generation at the proposed project site would be somewhat lower, depending on a number of factors. Use of a "Neo-traditional Neighborhood Design", or Villages Concept, has be estimated to have the potential to reduce daily trip generation (compared to a standard suburban planned unit development) by up to a maximum of 26%. It should be noted, however, that even with emission reductions resulting from the design concept, impacts resulting from the project will remain **significant and unavoidable.**

Implementation of the following additional mitigation measures will assist in reducing regional air quality impacts. These measures will serve to reduce, not eliminate the project's incremental contribution to regional air quality problems.

MM 4.11.2 As a condition of project approval, the project applicant shall coordinate with the City to implement a Transportation Demand Program (TDP). In order to implement the program, the City should, during review of the Master Development Plan and subsequent plans, identify the types of improvements which should be incorporated into specific project designs. Such improvements may include public transportation dedications, bikeway/paths, transit improvements/amenities, and pedestrian facilities.

MM 4.11.3 Employers within the Master Plan area shall coordinate with the City to implement a strong Transportation Demand Management (TDM) program for all employment generating uses. TDM strategies shall use parking incentives for ridesharing, bicycle amenities, employee shower and locker areas, on-site cafeteria and eating facilities and other appropriate strategies for trip reduction.

MM 4.11.4 Project design shall be reviewed by the City Planning Department prior to tentative map approvals to encourage tele-commuting by providing designs that accommodate home offices and including satellite work centers within the project.

MM 4.11.5 Project design shall be reviewed by the City Planning Department prior to approval of the Master Development Plan to encourage the provision of park-and-ride amenities within the project, which are generally consistent with the Villages Concept Design Guidelines, for people commuting out of the development.

MM 4.11.6 Prior to issuance of certificates of occupancy, individual homes will require the installation of low NOx space and water heaters, the provision of electric lawn mowers and blowers with the sale of residential units, and include in residential units an electrical outlet and a natural gas line to the backyard of each residence to provide an alternative to charcoal barbecues.

MM 4.11.7 In conjunction with the processing of tentative maps, the applicant shall restrict the number of fireplaces in each residence, and require residential use of EPA-certified woodstoves or fireplace inserts.

MM 4.11.8 In conjunction with the processing of tentative maps, development plans shall be reviewed to ensure that building orientation and design be utilized to reduce heating and cooling requirements.

The implementation of the above measures has the potential of reducing project impacts on regional air quality by perhaps 20-30%, but the impact would remain significant after implementation of all measures.

4.12 NOISE

1. Environmental Issues

This section evaluates the existing noise environment at the Project site, determines the noise environments for the future scenarios, assesses the potential on-site noise impacts relative to noise issues, and recommends mitigation measures to meet applicable noise standards.

2. Existing Setting

Primary Project area noise sources consist of vehicular traffic activity along G Street and Bellevue Road, as well as aircraft fly overs from Castle Air Force Base (AFB). Results of existing noise levels are contained in Table 4.12-1. The noise levels presented are "A-weighted", meaning measurements of only the mid-range noise frequencies or the same frequencies that are audible to the human ear. This level of analysis is considered to be the professionally accepted standard for environmental documentation.

For clarification purposes, the following technical language is used throughout this section to describe various measurements of noise:

Leq = the average amount of noise (in decibels) over a stated time period, such as certain hours over a given day of measurement.

L10 = the amount of noise (in decibels) that is equalled to or exceeded 10 percent of the time during the measurement period (such as 70 dB is achieved or exceeded 10% of the time over 1 hour). Where other numbers follow "L", this denotes the percent of time (such L50 = 50% of the time) during a measurement period.

DNL= the Day/Night Average Noise Level over a 24-hour period.

Vehicular Activity Noise

Two continuous 24-hour and two short-term (15-30 minute) noise measurements were conducted along G Street and Bellevue Road, two of the major arterials on the project site. The Day-Night Average Sound Levels (DNLs) were 65 dB at approximately 50 feet from the centerlines of G Street and Bellevue Road. East of G Street on Bellevue Road , the estimated DNL is 62 dB at a distance of 50 feet from the centerline of the roadway.

Castle Air Force Base Noise

The best available information on the existing airport noise environment is the noise contours shown on "Folio Map 1A, Castle AFB Comprehensive Land Use Plan (CLUP) Study Area, Compatible Use Districts (CUDs)" dated July 1988. This map is reproduced in the City of

Merced's 1993 Noise Element showing CUDs for recommended land uses. The map shows the DNL 70 dB contour extending into the project area. The "CLUP for Castle AFB, March 1989" reports 115 Air Force KC-135 aerial tanker operations daily, with most of the aircraft noise affecting the site being generated by the approach to Runway 31 on the base leg descent. The 1988 Castle AFB noise contours indicate that approximately 6% of the project area is exposed to a DNL above 70 dB (CUD 12), 65% to a DNL between 65 dB and 70 dB (CUD 13), and the remainder of the site to DNL below 65 dB.

However, with the impending closure of Castle AFB in 1995, the current volume of aircraft activity and associated noise exposure will be less than that from the 1988 information for the active air base. No information is available on the present noise environment at the project site resulting from Castle AFB.

Table 4.12-1
Noise Measurements for Bellevue Ranch, Merced
A-weighted Noise Level (dB)

A-weighted Noise Level (dB)

Site	Location	Date/Time	Leq	L10	L50	L90	DNL
1	70 feet west of G Street roadway centerline, entrance to Bellevue Ranch, 10 feet above roadway elevation	22 Sept 1992 1:45-2:15 p.m.	66	—	—	—	—
		22-23 Sept 1:00 p.m.	—	—	—	—	65
2	60 feet north of Bellevue Road roadway centerline, 1.3 miles west of G Street, 8 feet above roadway elevation	22 Sept 2:30-2:45 p.m.	70	71	53	40	—
		22-23 Sept 1:00 p.m.	63	64	46	38	66
		23 Sept 12:45-1:00 p.m.	61	65	46	38	—
3	30 feet south of Old Lake Road roadway centerline, at property line between 1159E and 1171E Old Lake Road, 800 feet east of G Street, 8 feet above roadway elevation	22-23 Sept 2:00 p.m.	61	57	40	31	63
4	200 feet east of G Street roadway centerline, 200 feet north of Farmland Avenue roadway centerline, 5 1/2 feet above site elevation	22 Sept 1:45-2:15 p.m.	63	62	47	36	61*
5	30 feet south of Bellevue Road roadway centerline, 1/2 mile east of G Street , 4 feet above roadway elevation	22 Sept 2:30-2:45 p.m.	64	67	46	34	60*
6	north end of San Jose Avenue, southern property line of Bellevue Ranch, 5 1/2 feet above roadway elevation	22 Sept 3:00-3:20 p.m.	45	49	41	33	—
7	50 feet south of Bellevue Road roadway centerline, 100 feet west of G Street, 5 1/2 feet above roadway elevation	23 Sept 12:45-1:00 p.m.	60	65	44	32	65*

*estimate based on simultaneous measurement at
24-hour noise monitoring location.

Since the preparation of the 1988 noise contours, the volume of KC-135 traffic over the site has likely dropped substantially with the phasing out of Castle AFB as an active military facility. Also, noise emissions from KC-135 aerial tankers have generally dropped dramatically over the past ten years, due to the replacement of older and noisier KC-135A aircraft with newer and quieter KC-135E and KC-135R models. Noise emissions from the new models is more than 10 dB lower due to the replacement of the older turbo jet engines with newer and much quieter turbo fan engines. Therefore, it is expected that the actual existing noise level from Castle AFB over the Bellevue Ranch site is 5 to 10 dB below that reported in the contours. The measurements conducted between September 22 and 23, 1992 indicate that none of the project site is exposed to a DNL in excess of 65 dB due to aircraft noise.

Future Noise Environment (Year 2010)

Two future vehicular activity scenarios and one future Castle AFB reuse scenario were used as the basis of analysis for future noise conditions.

Vehicular Activity Noise

The two future traffic scenarios are for the year 2010 with and without the Bellevue Ranch project. The year 2010 is when the third and final phase of the project is anticipated to be at build-out. The first two phases of the project are expected to be completed by the years 2000 and 2005. Since the project is expected to be completed over an estimated fifteen year period, the increases in noise levels are also expected to be gradual.

For these two future scenarios, traffic volumes and speeds used to determine the year 2010 DNLs with and without the project are summarized in Table 4.12-2. All but one of the roadway segments for the year 2010 with project scenario will generate a DNL of 70 dB or more at a distance of 50 feet from the roadway centerlines. In most cases, the year 2010 with project scenario DNLs are 1 to 3 dB greater than the without project DNLs.

During the development of the project, an increase of trucks and heavy equipment activity associated with construction will occur on the local roads. The extent of truck activity is not known at this time.

Table 4.12-2
SUMMARY OF EXISTING AND FUTURE DNLs (dB) AT A DISTANCE OF 50 FEET FROM THE ROADWAY CENTERLINES FOR BELLEVUE RANCH

Roadway Segment	DNL (dB) at 50 feet from Roadway Centerlines			Distance to DNL 65 dB Contour (in feet)			Distance to DNL 60 dB Contour (in feet)		
	Existing (1992)	Future (2010) w/o Project	Future (2010) w/ Project	Existing (1992)	Future (2010) w/o Project	Future (2010) w/ Project	Existing (1992)	Future (2010) w/o Project	Future (2010) w/ Project
State Route 59									
Bellevue to Cardella	—	74	75	—	199	232	—	429	500
Cardella to Yosemite	—	74	76	—	199	271	—	429	583
Yosemite to W. Olive	72	77	77	146	315	315	315	680	680
R Street									
Bellevue to Cardella	—	51	73	—	—	171	—	—	368
Cardella to Yosemite	—	62	75	—	25	232	—	68	500
Yosemite to W. Olive	65	75	77	50	232	315	108	500	680
M Street									
Cardella to Yosemite	62	65	70	25	50	108	68	108	232
Yosemite to W. Olive	67	71	73	68	126	171	146	271	368
G Street									
North of Bellevue	66 (Site 4)*	70	74	58	108	199	126	232	429
Bellevue to Cardella	65 (Site 1)*	71	75	50	126	232	108	271	500
Cardella to Yosemite	65	71	76	50	171	271	108	368	583
Yosemite to W. Olive	70	75	77	108	232	315	232	500	680
Bellevue Road									
West of R Street	65 (Site 2)*	69	70	50	92	108	108	199	232
R Street to M Street	—	68	71	—	79	126	—	171	271
M Street to G Street	65 (Site 7)*	68	70	50	79	108	108	171	232
East of G Street	62 (Site 5)*	70	67	25	108	68	68	232	146
Cardella Road									
West of R Street	—	68	71	—	79	126	—	171	271
R Street to M Street	—	69	70	—	92	108	—	199	232
M Street to G Street	—	70	72	—	108	146	—	232	315
East of G Street	—	70	71	—	108	126	—	232	271

* Measured DNLs from Table 4.12-1

Castle AFB Aircraft Noise

Castle AFB is scheduled to close in 1995. To determine the future noise environment at the project site from the Castle AFB airstrip, it is necessary to have an operational plan for the airport. This plan would include the types of aircraft and their quantity of operation, utilization by period of the day, flight tracks, climb profiles, etc. To date, no plan has been developed for the future use of the air base, as this is an ongoing task being conducted by various planning agencies. At this time, we believe that the proposed civilian reuse plan for Mather AFB may provide the best estimate for the future civilian use of Castle AFB, although a variety of assumptions are required. It is assumed that the same types of operations for the same type of aircraft using the same flight tracks are used for both future air bases. However, it must be noted that wind direction dictates runway use. Castle AFB uses runway 30 approximately 80% of the time, while Mather uses runway 22 approximately 98% of the time. By assuming an identical fleet mix, and 23% more operations for Castle AFB than Mather AFB, the future Mather reuse contours can be applied to Castle AFB for preliminary land use planning purposes. The future scenario for Castle AFB is summarized as follows:

- 409 general aviation operations daily, comprised of mostly single and light twin engine operations, with approximately 30 operations each for turbo prop and executive jet aircraft.

- 57 Air Force Reserve, Forest Service, National Guard, etc., and transient military operations daily. These will be comprised of a variety of tactical transport and general aviation aircraft. A specific contribution is expected from 12 KC-135E aerial tanker operations per day, assuming continued operation of these aircraft by Reserve units.

- 56 wide-body and narrow-body air cargo operations per day, with 20% evening use and 15% nighttime use. These numbers represent the possible reuse of Castle AFB for airline flight training, airliner maintenance and/or cargo operations to the Pacific Rim.

This conservative estimate totals to approximately 190,000 flight operations annually and represents more aircraft activity than most current projections. Overstating the future aircraft noise exposure at Bellevue Ranch will help protect the future residents of the site by providing a design margin for safety.

Using this future reuse scenario, the Bellevue Ranch project would be approximately one mile away from the DNL 60 dB contour, and nearly two miles away from the DNL 65 dB contour. If the contour were to bend, to allow for a base leg approach of KC-135R directly over the site, then the DNL 60 dB contour may touch the Bellevue Ranch property line, but the DNL 65 dB contour would remain more than a mile away from the project site.

General Plan Noise Element Goals and Policies

The City of Merced 1993 Noise Element was adopted as a component of the General Plan on March 15, 1993. The Noise Element incorporates interior noise requirements for all residential land uses, general land use, and noise compatibility guidelines for addressing outdoor noise levels. The Noise Element also includes land use requirements and related building construction recommendations for areas exposed to excessive aircraft noise. An additional interior noise goal for residential and other noise sensitive dwelling units addresses the potential acoustical impact of single events, such as aircraft fly overs.

3. Project Impacts

Standards of Significance

Pursuant to the City's Noise Element and Title 24, Part II of the California Code, noise impacts on project land uses will be considered significant if:

- Exposure to noise levels of 65dB (DNL) for outdoor use areas in residential areas.
- Indoor residential, hotel or motel noise levels exceed 45 db.
- Project-generated traffic noise impacts adjacent land uses to the following noise levels:

Increase in DNL1	Significance of Impact
0 < increase ≤ 3 dB	No Impact
3 dB < increase ≤ 6 dB	Impact for noise-sensitive uses, such as residential and schools, hospitals, etc., if resultant DNL exceeds 65 dB. Impact for other land uses if resultant DNL exceeds 70 dB.
6 dB < increase	Impact for all noise-sensitive uses. Impact for other land uses if resultant DNL exceeds 70 dB.

1 Derived from the 1987 ASHRAE Handbook, Chapter 52, Table 1 and the 1979 Department of Transportation UMTA Circular 5620.1, Section III.D.3.

- Land uses are found to be inconsistent with the Compatible Use Districts (CUDs) identified in the Noise Element.
- Single event noise levels (individual aircraft fly overs) exceed 60 dB.

Specific Impacts

Year 2010 With Project Traffic Noise Levels Affecting Proposed Bellevue Ranch Land Uses

For the segments of R, M and G Streets, Bellevue Road and Cardella Road located within the Bellevue Ranch project, the year 2010 DNLs at distances of 50 feet from the roadway centerlines would range from 70 to 76 dB. Therefore, all new residential dwellings, schools and parks located along these roadway segments would be exposed to a "normally unacceptable" to "clearly unacceptable" noise environment according to the City's noise compatibility guidelines summarized in Figure 4.12-1. The outdoor use areas of the new residences along these roadway segments would also be exposed to a DNL which is up to six (6) dB higher than the maximum DNL recommended by the City's Noise Element. This is a **significant impact.**

Year 2010 With Project Traffic Noise Levels Affecting Existing Off-Site Land Uses

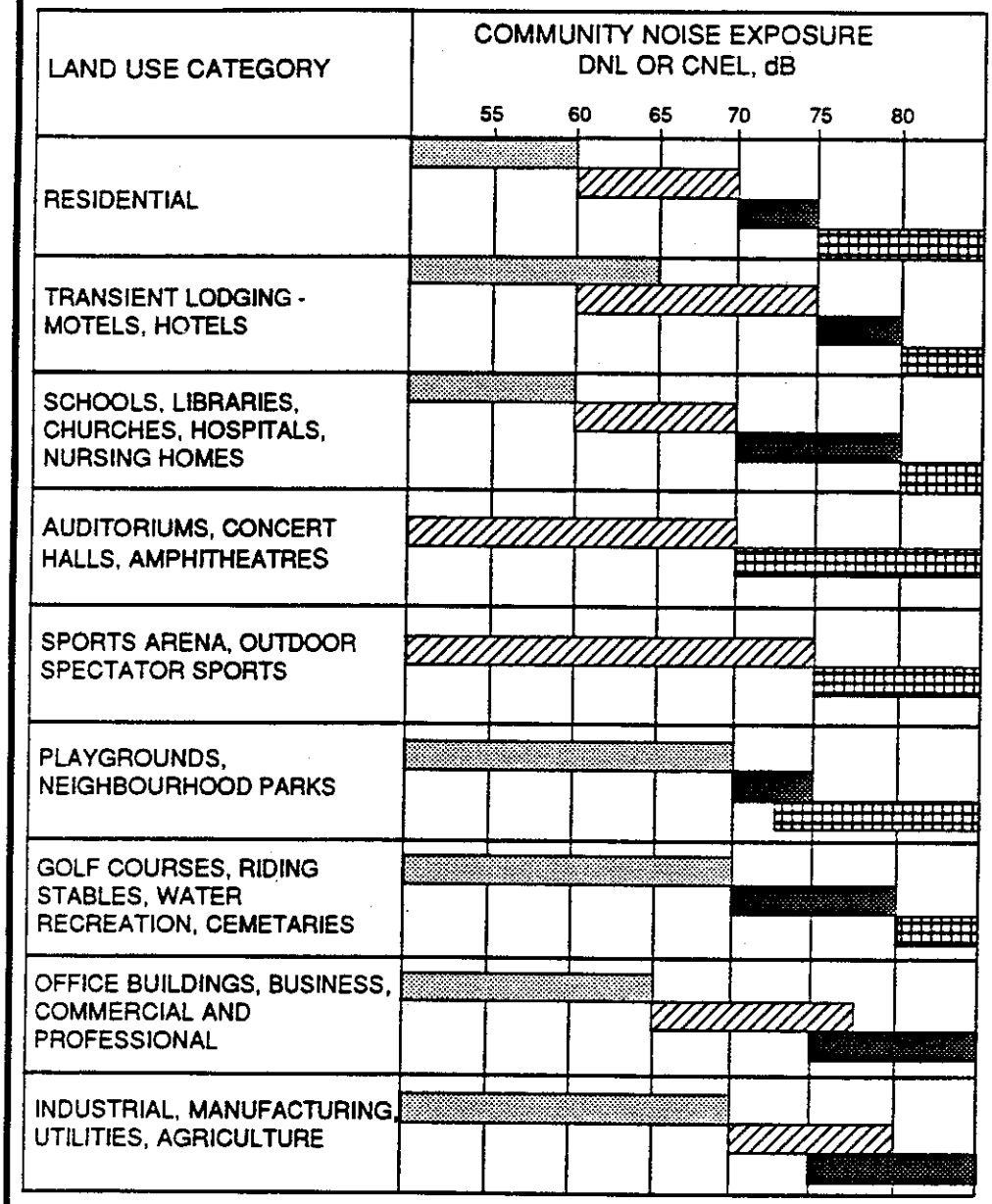
The DNLs for the year 2010 with project scenario are listed in Column 3 of Table 4.12-2 for the segments of R, M and G Streets, Bellevue Road and Cardella Road and State Route 59 outside of Bellevue Ranch. The existing residences located along Bellevue Road, east of G Street, would be exposed to a DNL of 67 dB which is considered "conditionally acceptable" for residential land uses. The existing residences located along the other roadway segments, would be exposed to DNLs that are considered "normally unacceptable" to "clearly unacceptable." Additionally, the year 2010 increases in noise above the existing (year 1992) conditions would be considered significant for all roadway segments analyzed, because the resultant DNLs exceed 65 dB and the increase in noise levels exceed 3 dB. These increases result in a **significant impact.**

Castle AFB Reuse Affecting Bellevue Ranch

The future noise exposure from any reasonable reuse of Castle AFB would dramatically reduce the existing noise contour size. The entire project would be well beyond the DNL of 65 dB contour, while a small part of the project could be within the DNL of 60 dB contour. This reduction in noise levels is due to the elimination of B-52 aircraft and older KC-135 aircraft, which will no longer be using the field. Future operation of Castle AFB in terms of the established criteria will result in noise impacts to future residents which are **less-than-significant.**

4. Mitigation Measures

The following mitigation measures will reduce noise-related impacts to a less-than-significant level:



Source : Adapted from the State of California General Plan Guidelines, 1990. Office of Planning and Research.

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Figure 4.12-1
Land Use Compatibility Guidelines for Community Noise Environments

MM 4.12.1 For the year 2010 with project scenario noise environment, 6 to 12 foot high sound walls or earthen berms (or combination of both) would need to be constructed to meet the City's recommended outdoor noise goal of DNL 65 dB in the primary outdoor activity area of existing and new residential developments located within 50 to 150 feet of the roadway centerlines of all roadway segments analyzed in this report. Depending on the DNLs and the acoustical shielding provided by the first row of buildings (if any), existing and new residential developments located further than 150 feet from the roadway centerlines may require lower sound walls or a combination of sound attenuation methods. As an alternative to sound walls, new dwelling units may be oriented so that the outdoor use areas would be shielded by the building. A detailed noise study should be performed along impacted roadway segments to corroborate the actual noise environment and the required heights of the sound walls prior to recordation of final maps for each phase of the project development.

MM 4.12.2 Most future residences within Bellevue Ranch that are located within 125 feet of Bellevue Road, Cardella Road and M Street roadway centerlines would require sound-rated windows to be consistent with the 45 dB interior noise level maximum. New Bellevue Ranch residences within 175 feet of R and G Streets will require sound-rated windows. Additionally, new Bellevue Ranch residences located within 50 feet of R and G Streets will also require sound-rated exterior wall assemblies.

MM 4.12.3 Trucks used for the development of Bellevue Ranch will be required to use the City's designated truck routes, to be demonstrated by the project applicant through the submittal of a construction traffic plan to the City Planning Department prior to issuance of grading permits. Olive Avenue, G Street, State Route 59 and Highway 99 will be the roadways used to access the project site. A noise study should be performed if trucks and heavy equipment are routed along roads that pass existing residential land uses.

MM 4.12.4 All construction activity shall be conducted in accordance with City of Merced standards for times of operation