ADDENDUM SHEET

Date: July 26, 2011

Project: Los Osos Valley Road/US 101 Interchange Improvements Project
EA: 05-0H7300
Location: 05-SLO-101 (PM 25.5/26.3)

Los Osos Valley Road/US 101 Interchange Improvements Project 05-SLO-101 (PM 25.5/26.3)

The following corrections are made to the *Air Quality Technical Report, Los Osos Valley Road/US 101 Interchange Improvements Project, City of San Luis Obispo, California* (February 2008).

Section/Page	Change From	Change To
Cover page and signature page	05-SLO-101-PM 25.9-26.3	05-SLO-101-PM 25.5-26.3
Project Description; Page: 2-1	Project description is brief and does not include discussion of the 7' Prefumo Creek culvert under US 101	Complete project description has been included for clarity of all project components.
Figure 2-2 and 2-3	Indicated locations of the proposed 7' Prefumo Creek culvert under US 101.	All indications of the proposed 7' Prefumo Creek culvert under US 101 were eliminated see attached Figures 2-2 and 2-3.

The project's limits (25.5/26.3) were covered in the *Air Quality Technical Report for the Los Osos Valley Road/US 101 Interchange Improvements Project* (February 2008). No changes result from the changes in the project, therefore, the analysis in the *Air Quality Technical Report, Los Osos Valley Road/US 101 Interchange Improvements Project, City of San Luis Obispo, California* (February 2008) remains valid.

Prepared By: Namat Hosseinion Date: July 26, 2011

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District 05

PROJECT DESCRIPTION

Build Alternatives

Two build alternatives (Alternative 3 and Alternative 6) have been identified to satisfy the purpose and need for the project. Alternative 3 has been identified by the City of San Luis Obispo as the locally preferred alternative. Alternative 3 and Alternative 6 are described below.

Common Design Features of the Build Alternatives

This project is intended to accommodate current and future travel demands. Calle Joaquin Road south of LOVR has been realigned so that the existing "T" intersection of LOVR and Calle Joaquin Road north of LOVR has been converted to a four-way intersection. The Calle Joaquin Road realignment was developed and completed by the Costco Wholesale Corporation as a condition of approval and mitigation measure for traffic impacts.

The project limits extend along LOVR between Auto Park Way to the west and South Higuera Street to the east covering a distance of 0.52 mile and along US 101 for about 2,500 feet south and 4,300 feet north of the LOVR overcrossing.

Under both build alternatives, the San Luis Obispo Creek arch culvert would be changed. Built in 1986, the existing three-barrel structural steel-plate arch culvert is a large structure, carrying LOVR over San Luis Obispo Creek. This project would widen and raise the roadway. These roadway changes require lengthening the culvert with a new structural steel arch (matching what exists) and increasing the loading on the existing culvert that would remain. To determine the feasibility of this increased loading, a structural analysis was conducted. The analysis showed that the existing culvert can easily carry the additional loading, making this a viable option.

Included in the project, along both sides of all project-related local streets, are sidewalks with grades and curb ramps at intersections, in compliance with Americans with Disabilities Act requirements. To help non-motorized transportation (such as pedestrians and bicyclists) cross the intersections, the project would limit use of free-slip ramps, include single-lane ramps, and review the southwest corner of the US 101 northbound off-ramp/LOVR to determine if a widened area is needed to create a bigger "landing" area.

A portion of the proposed Bob Jones City-to-Sea Bike Trail passes through the project. This project would provide bikeway access to connect to LOVR at the northbound on- and off-ramp intersection. Project design would not preclude connection of the Prefumo Creek trail extension to the future Bob Jones City-to-Sea Bike Trail (including possible extension of the trail under or over LOVR). Each build alternative would provide 6.5-foot Class II bike lanes throughout the project on both sides of LOVR. These lanes would connect to the existing 6-foot sidewalks in front of the Los Verdes Parks I and II developments. Sidewalks on both sides of the San Luis Obispo Creek bridge would be widened to accommodate Class I trails. Safety device placement, striping, and signage of the Class I trail would be completed once the location and alignment of the Bob Jones City-to-Sea Bike Trail is determined south of the interchange. Any at-grade crossings of the LOVR by the Bob Jones City-to-Sea Bike Trail would use appropriate and safe design guidelines for visibility and signal operations. Bicycle detector loops would be placed at all intersections that have traffic signals. Project design would remain consistent with the Bob Jones City-to-Sea Bike Trail Project Master Plan and the City of San Luis Obispo Bicycle Transportation Plan.

Both alternatives would:

1. Widen LOVR to four lanes from South Higuera Street to 600 feet west of Calle Joaquin to meet the existing four-lane section west of Calle Joaquin.
2. Extend the existing San Luis Obispo Creek culvert crossing to accommodate widened LOVR
3. Construct retaining walls to avoid Prefumo Creek and business impacts at LOVR and the US 101 southbound ramps.
4. Construct sidewalks and Class II bike lanes along both sides of LOVR.
5. Change the existing signals at the LOVR and US 101 ramp intersections.
6. Widen and rebuild the US 101 northbound off-ramp and build a retaining wall to avoid creek impacts.
7. Change the landscaping and sidewalks along LOVR at Los Verdes.
8. Change the striping, medians, and lane widths along LOVR at Los Verdes.
9. Restripe South Higuera Street to optimize the capacity of the South Higuera Street/LOVR intersection, given the widening of LOVR.
10. Include pedestrian crossing controls at all intersections that have traffic signals unless determined unsafe or detrimental to traffic conditions.
11. Further widen San Luis Obispo Creek bridge to accommodate a future Class I trail on either shoulder of the structure.
12. Use concrete paving at off-ramp ends.
13. Use street print (stamped/imprinted asphalt or concrete) through crosswalks for increased visibility.
14. Use rubberized asphalt concrete, as a project feature, on LOVR in front of the Los Verdes Parks I and II.
15. Restripe LOVR from two to four lanes in front of the Los Verdes Parks I and II driveways to assist with access.
16. Plant native landscaping within the intersections and ramps where appropriate.

Unique Features of Build Alternatives

Alternative 3—Minimum Build

Alternative 3 is the minimum build alternative for this project and is the locally preferred alternative. This alternative would widen LOVR between the recently constructed Calle Joaquin intersection with LOVR west of US-101 and the Los Verdes Park community east of US-101 to 4 lanes, construct a new two lane structure adjacent the existing LOVR Overcrossing, and widening San Luis Obispo Creek culvert crossing.

The actual work to be performed under the project includes:

1. Widen LOVR to four lanes from South Higuera Street to the existing four-lane section west of Calle Joaquin.

2. Extend the existing San Luis Obispo Creek culvert crossing to accommodate widened LOVR.

3. Construct retaining walls to avoid Prefumo Creek and business impacts at LOVR and the US 101 southbound ramps.

4. Construct sidewalks and Class II bike lanes along both sides of LOVR.

5. Change the existing signals at the LOVR and US 101 ramp intersections.

6. Widen and rebuild the US 101 northbound off-ramp and build a retaining wall to avoid creek impacts.

7. Change the landscaping and sidewalks along LOVR at Los Verdes.

8. Change the striping, medians, and lane widths along LOVR at Los Verdes.

9. Restripe South Higuera Street to optimize the capacity of the South Higuera Street/LOVR intersection, given the widening of LOVR.

10. Pavement section for ramps and LOVR will be 0.2' rubberized asphalt concrete over 0.3' hot mix asphalt over 1.67' aggregate based on the Life Cycle Pavement Cost Analysis findings. Concrete paving will be used at both off-ramp ends.

11. Use street print through crosswalks for increased visibility.

12. Use open-grade or rubberized asphalt on LOVR in front of the Los Verdes Parks I and II.

13. Plant native landscaping within the intersections and ramps where appropriate.

14. Construct retaining walls to avoid San Luis Obispo Creek impacts.

15. Construct a separate US 101 overcrossing to carry the two eastbound lanes with a split profile.

16. Raise the intersection of LOVR at the US 101 southbound ramps.

17. Construct new street lighting along LOVR.

18. Raise headwalls on Prefumo Creek box culvert under the southbound off-ramp to accommodate ramp raising and widening.

19. Widen the US 101 southbound off-ramp and construct retaining walls.

20. Change the storm drain system along LOVR to accommodate widening and profile changes.

21. Construct a standard acceleration lane from the southbound on-ramp.

Changes to Work to be Performed Resulting from Value Analysis and Public Comment

22. Include pedestrian crossing controls at all signalized intersections unless specific movements are determined unsafe or detrimental to traffic conditions.

23. Further widen San Luis Obispo Creek Bridge to accommodate a future Class I trail on either shoulder of the structure.

24. Restripe LOVR from two to four lanes in front of the Los Verdes Parks I and II driveways to assist with access.

25. Construct a right-turn lane from eastbound LOVR to northbound US-101 on-ramp.

26. Use concrete paving at off ramp termini.

27. Use imprinted AC for crosswalks for increased visibility, outside limits of state right-of-way.

28. Place bicycle detector loops at signalized intersections.

Alternative 6—Moderate Build, Near Full Standard

This alternative proposes to widen Los Osos Valley Road between Calle Joaquin west and the Los Verdes communities east of US 101 (see Figures 1.3-3 and 1.3-4). The existing LOVR overcrossing would be replaced to improve the profile, vertical clearance, and space required for the southbound hook off-ramp.

In addition, the existing northbound loop on-ramp to US 101 would be reconstructed, and the northbound off-ramp would be widened. A new northbound diagonal on-ramp to US 101 may be added in the northeast quadrant of the interchange as a phased improvement. An auxiliary lane would be added to northbound US 101 from the end of the northbound loop on-ramp to 1,000 feet beyond the end of the northbound diagonal on-ramp. The northbound diagonal on-ramp would be supported by retaining walls and an additional bridge over Prefumo Creek. The existing southbound on- and off-ramps from US 101 would be removed. South of LOVR, new/relocated southbound on- and off-ramps from US 101 would be constructed in a hook ramp configuration. Calle Joaquin south of LOVR is being realigned to accommodate the realigned southbound US 101 ramps and to create a four-way intersection with Calle Joaquin north LOVR.

The actual work to be performed under the project includes:

1. Widen LOVR to 4 lanes from South Higuera St. to 600 feet north of Calle Joaquin

2. Extend or reconstruct existing San Luis Obispo Creek Culvert Crossing to accommodate widened LOVR

3. Replace the LOVR US-101 Overcrossing

4. Relocate and reconstruct the southbound US-101 ramps

5. Reconstruct northbound US-101 loop on-ramp

6. Construct northbound US-101 slip on-ramp and merge lane to US-101

7. Construct northbound US-101 on-ramp bridge & retaining walls at Prefumo Creek

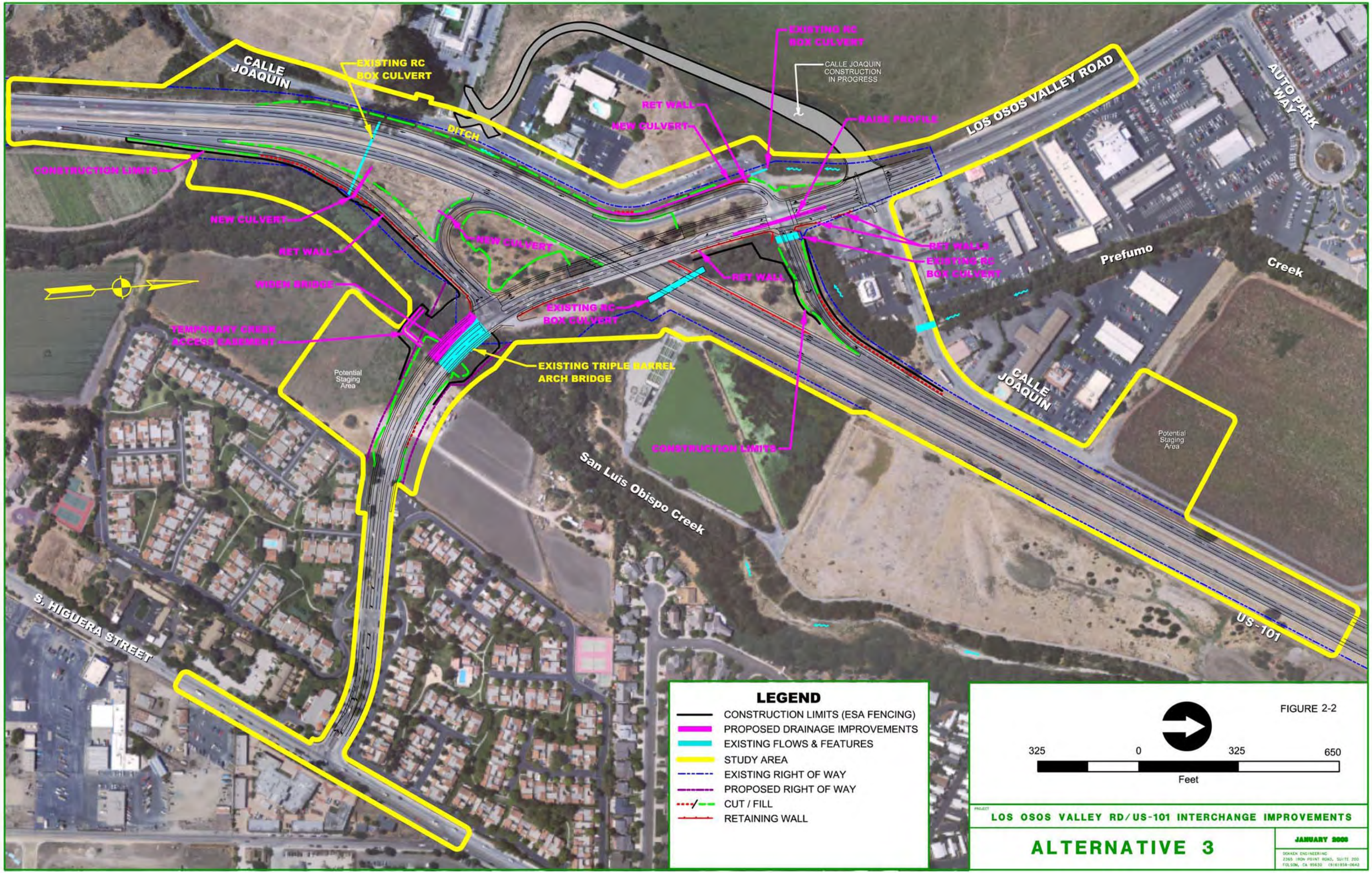
8. Construct signalized intersection of US-101 southbound ramps and Calle Joaquin

9. Construct sidewalks and combined bike lane/shoulder along LOVR
10. Construct new street lighting along LOVR and Calle Joaquin
11. Modify existing signals at LOVR/US-101 northbound off-ramp intersection
12. Abolish existing southbound US-101 ramps and Perfumo Creek Box Culvert
13. Widen US-101 northbound off-ramp and construct retaining wall
14. Extend the Perfumo Creek box culvert under US-101 for new southbound off ramp
15. Construct storm drain systems for LOVR and reconstruct ramps
16. Modify landscaping and sidewalks along LOVR at Los Verdes
17. Restripe South Higuera Street

No-Build Alternative

Environmental review must consider the effects of not implementing the proposed project. The No-Build Alternative provides a baseline for comparing the impacts of all alternatives.

Effects of the No-Build Alternative include deteriorating level of service, impacts to air quality, and continuing safety conditions. Unless operational improvements are made, future planned development and general regional growth will increase traffic volumes to a degree that all intersections in the vicinity of the LOVR/US 101 interchange would operate with severe congestion during both the morning and afternoon peak hours. This would result in congestion on US 101 from backups at the off-ramp intersections. This congestion would affect both local traffic on LOVR and regional traffic on US 101. Decreasing operational efficiency may negatively affect air quality and would likely affect existing safety


CALLE JOAQUIN
EXISTING RC BOX CULVERT
DITCH
CONSTRUCTION LIMITS
NEW CULVERT
RET WALL
WIDEN BRIDGE
TEMPORARY CREEK ACCESS EASEMENT
Potential Staging Area
NEW CULVERT
EXISTING RC BOX CULVERT
EXISTING TRIPLE BARREL ARCH BRIDGE
RET WALL
CONSTRUCTION LIMITS
San Luis Obispo Creek
S. HIGUERA STREET
EXISTING RC BOX CULVERT
CALLE JOAQUIN CONSTRUCTION IN PROGRESS
RET WALL
NEW CULVERT
RAISE PROFILE
LOS OSOS VALLEY ROAD
RET WALLS
EXISTING RC BOX CULVERT
AUTO PARK WAY
Prefumo
Creek
CALLE JOAQUIN
Potential Staging Area
US-101
LEGEND
CONSTRUCTION LIMITS (ESA FENCING)
PROPOSED DRAINAGE IMPROVEMENTS
EXISTING FLOWS & FEATURES
STUDY AREA
EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
CUT / FILL
RETAINING WALL
FIGURE 2-2
325
0
325
650
Feet
PROJECT
LOS OSOS VALLEY RD/US-101 INTERCHANGE IMPROVEMENTS
ALTERNATIVE 3
JANUARY 2008
DOKKEN ENGINEERING
2365 IRON POINT ROAD, SUITE 200
FOLSOM, CA 95630 (916)858-0642

CALLE JOAQUIN

EXISTING RC BOX CULVERT

DITCH

NEW CULVERT

CONSTRUCTION LIMITS

NEW CULVERT

RET WALL

NEW CULVERT

WIDEN BRIDGE

TEMPORARY CREEK ACCESS EASEMENT

Potential Staging Area

EXISTING TRIPLE BARREL ARCH BRIDGE

San Luis Obispo Creek

CONSTRUCTION LIMITS

S. HIGUERA STREET

ROW

ROW

ROW

EXISTING RC BOX CULVERT

CALLE JOAQUIN CONSTRUCTION IN PROGRESS

EXTEND EXISTING RC BOX CULVERT

RAISE PROFILE

RET WALL

RET WALLS

REMOVE EXISTING OFF RAMP & CULVERT REGRADE TO NATURAL CONDITIONS

LOS OSOS VALLEY ROAD

AUTO PARK WAY

Prefumo Creek

CALLE JOAQUIN

Potential Staging Area

US-101

LEGEND

- CONSTRUCTION LIMITS (ESA FENCING)
- PROPOSED DRAINAGE IMPROVEMENTS
- EXISTING FLOWS & FEATURES
- STUDY AREA
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- CUT / FILL
- RETAINING WALL

FIGURE 2-3

325 0 325 650

Feet

PROJECT

LOS OSOS VALLEY RD/US-101 INTERCHANGE IMPROVEMENTS

ALTERNATIVE 6

JANUARY 2006

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Los Osos Valley Road/
U.S. 101 Interchange Improvements Project

Air Quality Technical Report

Los Osos Valley Road/U.S. 101 Interchange Improvements Project
City of San Luis Obispo, San Luis Obispo County, California
05-SLO-101-PM 25.9-26.3
E.A.05-OH7300

February 2008

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Air Quality Technical Report

Los Osos Valley Road/U.S. 101 Interchange Improvements Project

City of San Luis Obispo, San Luis Obispo County, California
05-SLO-101-PM 25.9-26.3
E.A.05-OH7300

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Chapter 1 Introduction

1.1 Introduction

This air quality technical report was prepared for the Los Osos Valley Road/U.S. 101 Interchange Project (proposed project). The City of San Luis Obispo (City), in conjunction with the California Department of Transportation (Caltrans) and Federal Highway Administration (FHWA), is proposing to improve the Los Osos Valley Road (LOVR)/U.S. 101 interchange and LOVR in the City and County of San Luis Obispo through the year 2030. These improvements are in addition to operational improvements currently planned or under construction by Caltrans, the City and the County.

This report is intended to support the preparation of National Environmental Policy Act (NEPA) documentation for FHWA, the NEPA lead agency, which is funding a portion of the project, and preparation of California Environmental Quality Act (CEQA) documentation for the City of San Luis Obispo, the CEQA lead agency.

This report evaluates the effects of the proposed project on air quality.

1.2 Scope and Content of the Report

This report describes the environmental and regulatory setting, the environmental consequences of the project, and measures to minimize adverse impacts of the project on air quality. This report is organized in the following manner:

- Chapter 1, "Introduction," introduces the report and describes the purpose, scope, and content of the report.
- Chapter 2, "Project Description," describes the location, purpose and need, project characteristics and alternatives, and schedule associated with the proposed project.
- Chapter 3, "Affected Environment, Environmental Consequences and Mitigation Measures," describes the physical and regulatory setting, discloses the environmental effects of the alternatives, and identifies mitigation measures to avoid or minimize adverse effects associated with the alternatives.
- Chapter 4, "References Cited," describes the printed references and personal communications used in writing this report.

Chapter 2 Project Description

2.1 Project History

The proposed project is located in the City of San Luis Obispo, San Luis Obispo County on U.S. 101 at the LOVR Interchange (Figure 2-1). Within the limits of the proposed project, U.S. 101 is a four-lane freeway with 3.6-meter (12-foot) lanes, 2.4-meter (8-foot) right shoulders, and a median width of 12.2 meters (40 feet). The original two-lane roadway was built in 1933 and was replaced with a four-lane facility in 1954. The functional classification of this segment of U.S. 101 is a Principal Arterial and is included in the National Highway System. U.S. 101 is also a State Highway Extra Legal Load (SHELL) route and an oversize truck route. Commuter traffic is the primary use through this portion of U.S. 101, but a large percentage of travel through the study area is interregional. The Transportation Concept Report (TCR), dated 2001, recommends that U.S. 101 be expanded to a six-lane freeway through this segment. However, widening of U.S. 101 is not part of this project.

The existing U.S. 101/LOVR interchange is configured as a diamond interchange except that a loop ramp in the southeast quadrant of the interchange provides access from LOVR to northbound U.S. 101. The LOVR overcrossing (No. 49-0185) was built in 1962 to carry two lanes of traffic. The bridge was widened in 1987 to carry four lanes of traffic. The existing bridge is a four-span structure of approximately 91.6 meters (300.5 feet) in length and 16.8 meters (55 feet) in width. Roadway embankments up to 6 meters (20 feet) in height were constructed for the overcrossing. Southeast of the interchange, within the project limit, LOVR passes over San Luis Obispo Creek. The on-ramp to southbound U.S. 101 is accessed from Calle Joaquin-South and not directly from LOVR. The southbound U.S. 101 off-ramp intersects LOVR at the LOVR/Calle Joaquin-South intersection. Calle Joaquin-North intersects LOVR approximately 91 meters (300 feet) to the west of the southbound U.S. 101 off-ramp/Calle Joaquin-South intersection.

2.2 Purpose and Need

The purpose of the proposed project is to improve traffic operations and safety on LOVR and the LOVR/U.S. 101 interchange incurred as a result of the traffic queues formed by slow-moving vehicles. The acceptable Level of Service for the proposed project is level D. The project is to be designed such that it will not preclude the planned ultimate widening of U.S. 101 or future interchange improvements.

2.3 Project Description

The project limits extend along LOVR between Auto Park Way to the west and South Higuera Street to the east and along U.S. 101 for approximately 762 meters (2,500 feet) south and 1,500 meters (4,300 feet) north of the LOVR overcrossing, covering a distance of 0.84 km (0.52 miles).

This section describes the proposed action and the design alternatives that were developed by a multi-disciplinary team to achieve the project purpose and need while avoiding or minimizing environmental impacts.

The proposed project will provide a wider Los Osos Valley Road Overcrossing and an adjacent bridge crossing San Luis Obispo Creek, and the possible relocation and reconfiguration of the freeway ramps depending on the alternative chosen. This project is intended to accommodate current and future travel demands. Calle Joaquin Road south of LOVR is being realigned such that the existing "T" intersection of LOVR and Calle Joaquin Road north of LOVR will be converted to a four-legged intersection. The Calle Joaquin Road realignment is currently being developed by the Costco Wholesale Corporation as a condition of approval and mitigation measure for traffic impacts. The realignment is scheduled for completion prior to initiation of interchange improvements. The two build alternatives selected to be studied as a part of this project are summarized below.

Under both build alternatives, the San Luis Obispo Creek Arch Culvert will be modified. The existing three-barrel structural steel plate arch culvert is a large and modern (1986) structure, carrying LOVR over San Luis Obispo Creek. This project would widen and raise the roadway. These roadway revisions require lengthening the culvert with a new structural steel arch (matching the existing), as well as increasing the loading on the existing culvert that is to remain. To determine the feasibility of this increased loading, a structural analysis was conducted. The analysis showed that the existing culvert can easily carry the additional loading placed on it. Therefore, lengthening the culvert is a viable option.

2.3.1 Staging and Access Areas

Access to the construction site would occur along existing paved roadways and would be limited to the designated permanent and temporary impact areas for Alternatives 3 and 6. Two staging areas have been proposed (one for Alternative 3 and two for Alternative 6) and are included in the study area.

2.3.2 Project Schedule

The project is planned for construction in 2010.

2.4 Alternatives Considered

Two viable build alternatives (Alternative 3 and Alternative 6) for the proposed improvements have been identified by the Project Development Team (PDT) that satisfy the purpose and need for this project. The estimated construction cost of these alternatives ranges from $11 to $24 million. The major difference between the two build alternatives relates to the method used to provide additional travel lanes on Los Osos Valley Road on the Route 101 overcrossing. Alternative 3 would use the existing structure to carry the westbound lanes and would construct a separate but adjacent overcrossing structure to carry the eastbound lanes. Alternative 6 would replace the existing structure with a new, wider structure that would accommodate both the westbound and eastbound lanes. Alternative 3 and Alternative 6 are described below.

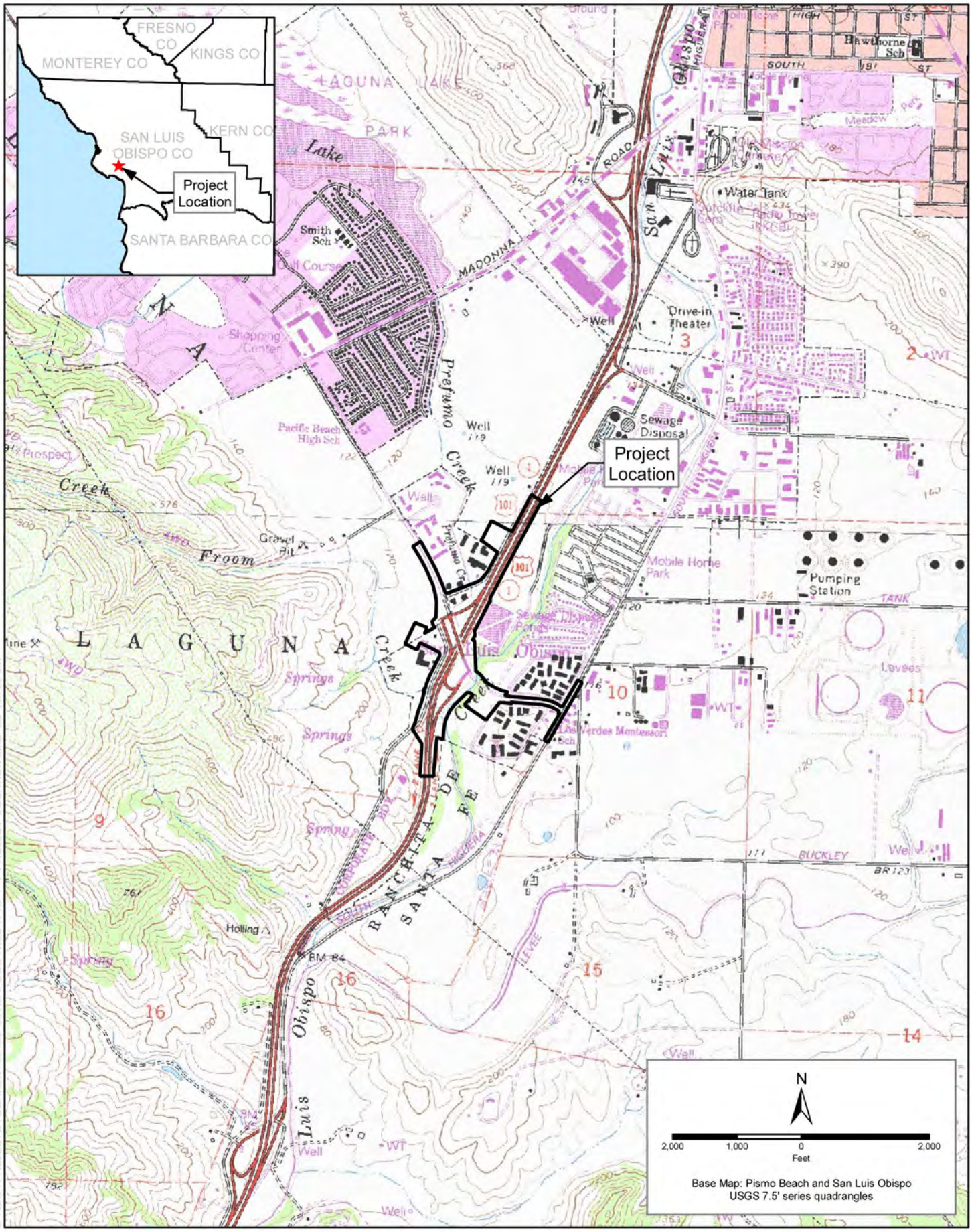


Figure 2-1
Project Location

2.4.1 Alternative 3—Minimum Build

Alternative 3 is the minimum build alternative for this project and is the locally preferred alternative (Figure 2-2). This alternative proposes to widen Los Osos Valley Road between the recently constructed Calle Joaquin intersection with Los Osos Valley Road west of US 101 and the Los Verdes community east of US 101 to 4 lanes, including the existing Los Osos Valley Road Overcrossing structure, and San Luis Obispo Creek culvert crossing. The widening will be accomplished by constructing a separate structure to carry the two eastbound lanes over US 101. Los Osos Valley Road will be a split profile over US 101 to accommodate the westbound lanes on the existing overcrossing. The project will lengthen the San Luis Obispo Creek culvert crossing on the south side and construct a cantilevered sidewalk on the north side. These widening efforts will accommodate four 12 foot through-lanes, bike lanes, sidewalks (on both sides), and a median 5 to 16 feet in width, which will be used for left turn pockets where needed. The northbound US 101 off-ramp will be widened from the intersection with Los Osos Valley Road to 500 feet south. The southbound on-ramp will be reconstructed near the current location opposite the southbound off-ramp.

The actual work to be performed under this alternative includes:

1. Widen Los Osos Valley Road from 2 to 4 lanes from South Higuera St. to 600 feet north of Calle Joaquin to meet existing 4 lane section west of Calle Joaquin.
2. Extend existing San Luis Obispo Creek Culvert Crossing to accommodate widened Los Osos Valley Road.
3. Construct retaining walls to avoid San Luis Obispo Creek impacts.
4. Construct a separate US 101 Overcrossing to carry the 2 eastbound lanes with a split profile.
5. Raise the intersection of Los Osos Valley Road/US 101 southbound ramps.
6. Construct retaining walls to avoid Prefumo Creek and business impacts at LOVR/US-101 southbound ramps
7. Construct sidewalks and Class II bike lanes along both sides of Los Osos Valley Road.
8. Construct new street lighting along Los Osos Valley Road.
9. Modify existing signals at Los Osos Valley Road/US 101 ramp intersections.
10. Construct additional box culvert capacity under US 101 for Prefumo Creek.
11. Raise headwalls on Prefumo Creek box culvert under southbound off-ramp to accommodate ramp raising and widening
12. Increase the hydraulic capacity of San Luis Obispo Creek by removal of deposited sediment from the outer two bays of the of the San Luis Obispo Creek bridge to a level 3 feet above the bottom of the active channel to prevent spreading flow. No modification will be made to the active channel.
13. Widen/reconstruct US 101 northbound off-ramp and construct retaining wall to avoid creek impacts.
14. Widen US 101 southbound off-ramp and construct retaining walls.

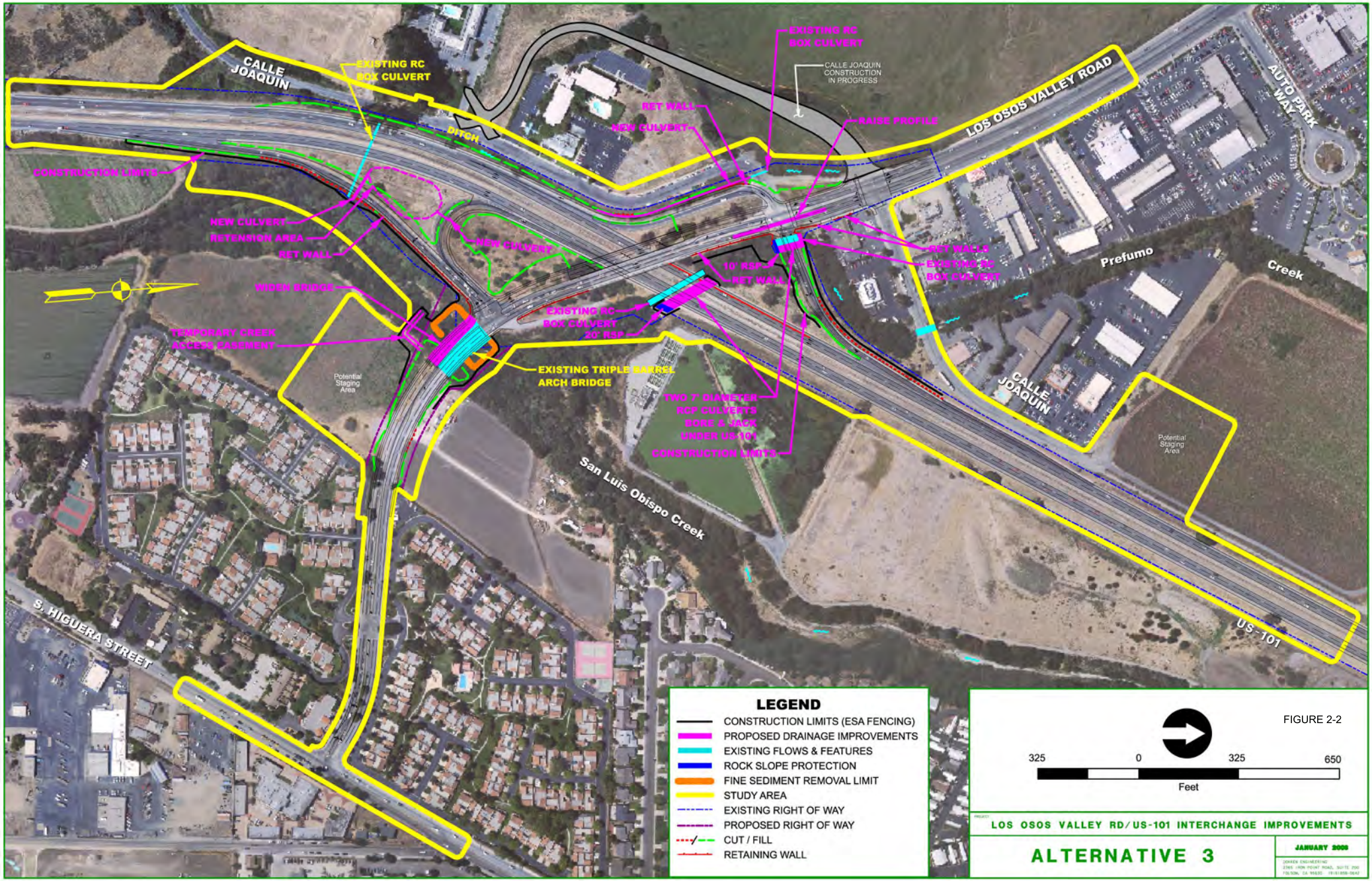
15. Modify storm drain system along Los Osos Valley Road to accommodate widening and profile revisions.
16. Modify landscaping and sidewalks along Los Osos Valley Road at Los Verdes.
17. Modify striping, medians, and lane widths along Los Osos Valley Road at Los Verdes.
18. Restripe on South Higuera Street to optimize the capacity of the South Higuera Street/Los Osos Valley Road intersection given the widening of Los Osos Valley Road.
19. Construct retention basin within the northbound loop on ramp.
20. Construct native landscaping within the intersection.
21. Construct standard acceleration lane from southbound on-ramp.

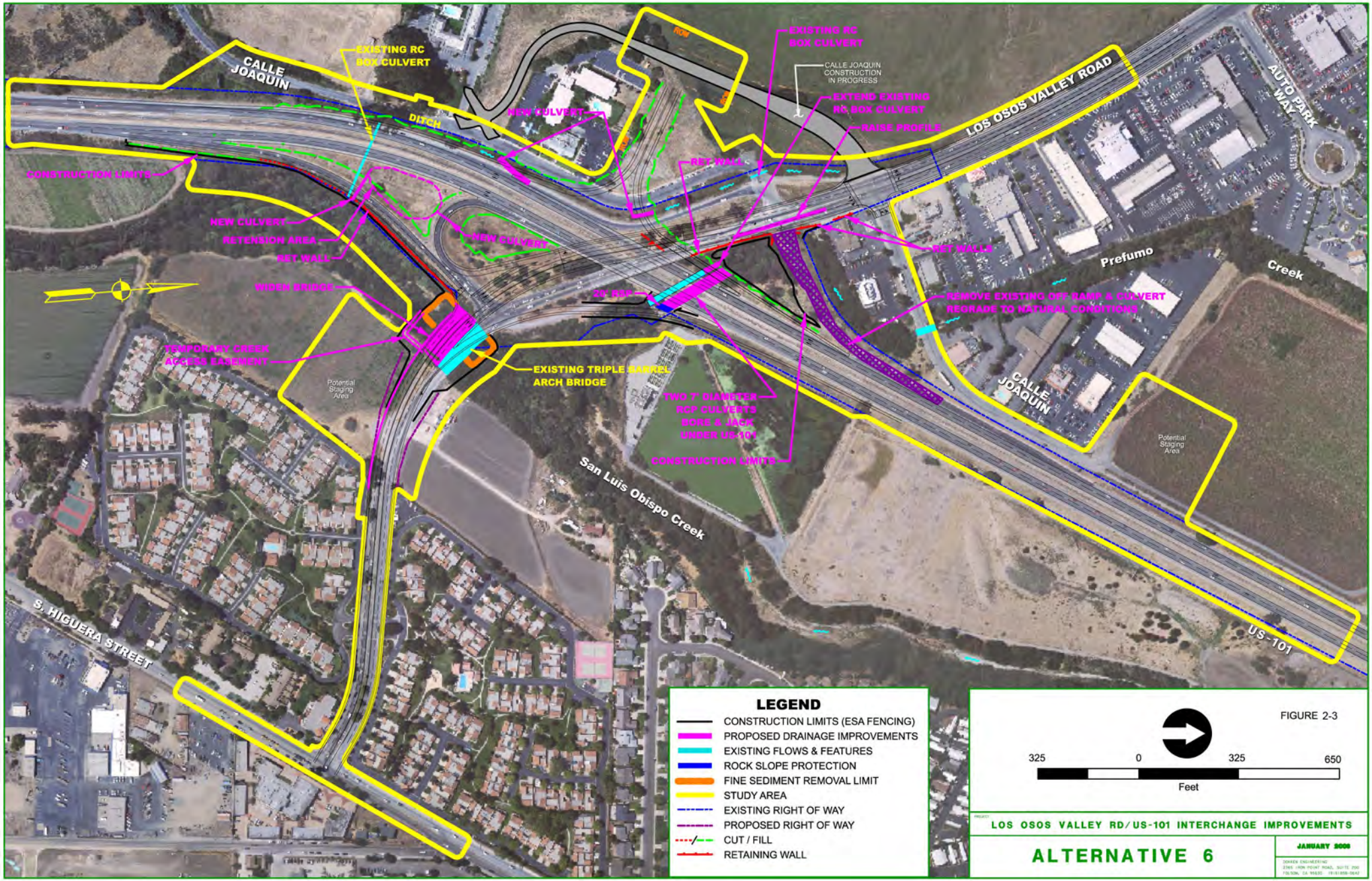
2.4.2 Alternative 6—Moderate Build, Near Full Standard

This alternative proposes to widen Los Osos Valley Road between Calle Joaquin west and the Los Verdes Communities east of US 101 (Figure 2-3). The existing Los Osos Valley Road OC will be replaced to improve the profile, vertical clearance and space required for the southbound hook off-ramp. The existing northbound loop on-ramp to US 101 will be reconstructed and the northbound off-ramp will be widened. A new northbound diagonal on-ramp to US 101 may be added in the NE quadrant of the interchange as a phased improvement. An auxiliary lane will be added to northbound US 101 beginning at the terminus of the northbound loop on-ramp and ending 1000 feet beyond the terminus of the northbound diagonal on-ramp. The northbound diagonal on-ramp would be supported by retaining walls and an additional bridge over Prefumo Creek. The existing southbound on- and off- ramps from US 101 will be removed. South of Los Osos Valley Road, new southbound on- and off-ramps from US 101 would be constructed in a hook ramp configuration. Calle Joaquin south of Los Osos Valley Road is being realigned to accommodate the realigned southbound US 101 ramps and to create a four-leg intersection with Calle Joaquin north of Los Osos Valley Road.

The actual work to be performed under this alternative includes:

1. Widen Los Osos Valley Road to 4 lanes from South Higuera St. to 600 feet north of Calle Joaquin.
2. Extend or reconstruct existing San Luis Obispo Creek Culvert Crossing to accommodate widened Los Osos Valley Road.
3. Increase the hydraulic capacity of San Luis Obispo Creek by removal of deposited sediment from the outer two bays of the of the San Luis Obispo Creek bridge to a level 3 feet above the bottom of the active channel to prevent spreading flow. No modification will be made to the active channel.
4. Replace the Los Osos Valley Road US 101 Overcrossing with a new 4 lane overcrossing.
5. Relocate and reconstruct the southbound US 101 ramps.
6. Construct retaining walls to avoid Prefumo Creek and business impacts at LOVR/old US-101 southbound ramps


CALLE JOAQUIN
EXISTING RC BOX CULVERT
DITCH
CONSTRUCTION LIMITS
NEW CULVERT
RETENSION AREA
RET WALL
HIDEN BRIDGE
TEMPORARY CREEK ACCESS EASEMENT
Potential Staging Area
NEW CULVERT
EXISTING RC BOX CULVERT
20' RSP
10' RSP
RET WALL
EXISTING TRIPLE BARREL ARCH BRIDGE
TWO 7' DIAMETER RCP CULVERTS BORE & JACK UNDER US-101
CONSTRUCTION LIMITS
RET WALL
NEW CULVERT
EXISTING RC BOX CULVERT
CALLE JOAQUIN CONSTRUCTION IN PROGRESS
RAISE PROFILE
LOS OSOS VALLEY ROAD
AUTO PARK WAY
RET WALLS
EXISTING RC BOX CULVERT
Prefumo
Creek
CALLE JOAQUIN
Potential Staging Area
San Luis Obispo Creek
S. HIGUERA STREET
US-101
LEGEND
CONSTRUCTION LIMITS (ESA FENCING)
PROPOSED DRAINAGE IMPROVEMENTS
EXISTING FLOWS & FEATURES
ROCK SLOPE PROTECTION
FINE SEDIMENT REMOVAL LIMIT
STUDY AREA
EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
CUT / FILL
RETAINING WALL
325
0
325
650
Feet
FIGURE 2-2
LOS OSOS VALLEY RD/US-101 INTERCHANGE IMPROVEMENTS
ALTERNATIVE 3
JANUARY 2009


CALLE JOAQUIN
EXISTING RC BOX CULVERT
DITCH
NEW CULVERT
EXISTING RC BOX CULVERT
CALLE JOAQUIN CONSTRUCTION IN PROGRESS
EXTEND EXISTING RC BOX CULVERT
RAISE PROFILE
LOS OSOS VALLEY ROAD
AUTO PARK WAY
CONSTRUCTION LIMITS
RET WALL
NEW CULVERT
RETENSION AREA
RET WALL
NEW CULVERT
WIDEN BRIDGE
RET WALLS
Prefumo
Creek
REMOVE EXISTING OFF RAMP & CULVERT
REGRADE TO NATURAL CONDITIONS
TEMPORARY CREEK ACCESS EASEMENT
EXISTING TRIPLE BARREL ARCH BRIDGE
Potential Staging Area
TWO 7' DIAMETER RCP CULVERTS BORE & JACK UNDER US-101
CONSTRUCTION LIMITS
CALLE JOAQUIN
Potential Staging Area
San Luis Obispo Creek
S. HIGUERA STREET
US-101
LEGEND
CONSTRUCTION LIMITS (ESA FENCING)
PROPOSED DRAINAGE IMPROVEMENTS
EXISTING FLOWS & FEATURES
ROCK SLOPE PROTECTION
FINE SEDIMENT REMOVAL LIMIT
STUDY AREA
EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
CUT / FILL
RETAINING WALL
FIGURE 2-3
325
0
325
650
Feet
LOS OSOS VALLEY RD/US-101 INTERCHANGE IMPROVEMENTS
ALTERNATIVE 6
JANUARY 2008

7. Reconstruct northbound US 101 loop on-ramp.
8. Construct northbound US 101 diagonal on-ramp and merge lane to US 101.
9. Construct northbound US 101 on-ramp bridge & retaining walls at Prefumo Creek.
10. Construct stop controlled intersection of US 101 southbound ramps and Calle Joaquin.
11. Construct sidewalks and combined bike lane/shoulder along Los Osos Valley Road.
12. Construct new street lighting along Los Osos Valley Road and Calle Joaquin.
13. Modify existing signals at Los Osos Valley Road/US 101 northbound off-ramp intersection.
14. Construct additional box culvert capacity under US-101 for Prefumo Creek.
15. Remove existing southbound US 101 ramps and Prefumo Creek Box Culvert.
16. Widen/Reconstruct US 101 northbound off-ramp and construct retaining wall.
17. Extend the Prefumo Creek box culvert under US 101 for new southbound off ramp.
18. Construct storm drain systems for Los Osos Valley Road and reconstruct ramps.
19. Modify landscaping and sidewalks along Los Osos Valley Road at Los Verdes.
20. Modify striping, medians, and lane widths along Los Osos Valley Road at Los Verdes.
21. Restripe South Higuera Street to optimize the capacity of the South Higuera Street/Los Osos Valley Road intersection given the widening of Los Osos Valley Road.
22. Construct retention basin within the northbound loop on ramp.
23. Construct native landscaping within the intersection.

Chapter 3 Affected Environment, Environmental Consequences, and Mitigation Measures

This chapter describes the environmental setting (existing conditions and regulatory setting) for air quality relating to the proposed project, the impacts on air quality that would result from the proposed project, and mitigation measures that would reduce these impacts, if applicable.

3.1 Affected Environment

3.1.1 Regulatory Setting

The proposed project is located in the San Luis Obispo County that is included in the South Central Coast Air Basin (SCCAB). The San Luis Obispo County Air Pollution Control District (SLOAPCD) has jurisdiction over air quality issues in San Luis Obispo County. It administers air quality regulations developed at the federal, state, and local levels. Federal, state, and local air quality regulations applicable to the proposed project are described below.

Federal Requirements

The federal Clean Air Act (CAA), enacted in 1963 and amended twice thereafter (including the 1990 amendments), establishes the framework for modern air pollution control. The U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for criteria pollutants (Table 3-1). Criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone, particulate matter less than or equal to 10 microns in diameter (PM10), particulate matter less than or equal to 2.5 microns in diameter (PM2.5), and lead. Most standards have been set to protect public health. For some pollutants, standards have been based on other values (such as protection of crops, protection of materials, or avoidance of nuisance conditions).

Ozone, and its precursors, reactive organic gasses (ROG) and oxides of nitrogen (NO_x); sulfates; visibility reducing particles; NO_2; and PM10 and PM2.5 are considered to be regional pollutants because they or their precursors affect air quality on a regional scale; NO_2 reacts photochemically with ROG to form ozone, while PM10 and PM2.5 can form from chemical reaction of atmospheric chemicals, including NO_x, sulfates, nitrates, and ammonia. These processes can occur at some distance downwind of the source of pollutants. Pollutants such as CO, SO_2, lead, and PM10 are considered to be local pollutants because they tend to disperse rapidly with distance from the source. While PM10 is considered to be a regional pollutant, it can also be a localized pollutant, as direct emissions of PM10 from automobile exhaust can accumulate in the air locally near the emission source.

The CAA requires states to submit a state implementation plan (SIP) for areas designated as nonattainment for federal air quality standards. The SIP, which is reviewed and approved by the EPA, must demonstrate how the federal standards will be achieved. Failing to submit a plan or

secure approval could lead to denial of federal funding and permits. In cases where the SIP is submitted by the state but fails to demonstrate achievement of the standards, the EPA is directed to prepare a federal implementation plan.

Transportation Conformity

The concept of transportation conformity was introduced in the 1977 federal CAA. Transportation conformity requires that no federal dollars be used to fund a transportation project unless it can be clearly demonstrated the project would not cause or contribute to violations of the NAAQS. Conformity requirements were made substantially more rigorous in the CAA amendments of 1990, and the transportation conformity regulation that details implementation of the new requirements was issued in November 1993. Typically, conformity for transportation projects is assessed by evaluating whether a project is included in a conforming Regional Transportation Plan (RTP) and/or Transportation Improvement Program (TIP). In addition, a local pollutant impact analysis is usually required. Any project listed in an RTP and/or TIP must demonstrate conformity with the SIP. The SIP, which is reviewed and approved by the EPA, must demonstrate how the federal standards will be achieved.

The U.S. Department of Transportation and the EPA developed guidance for determining conformity of transportation plans, programs, and projects in November 1993 in the Transportation Conformity Rule (40 CFR 51 and 40 CFR 93). The demonstration of conformity to the SIP is the responsibility of the local Metropolitan Planning Organization (MPO). The local MPO is responsible for the preparation of regional transportation plans and associated demonstration of conformity to the SIP. The San Luis Obispo Council of Governments (SLOCOG) is the responsible MPO in San Luis Obispo County and the region's MPO, and develops the RTP and TIP for the region. The RTP and TIP include projects whose emissions are within the budget planned in the SIP, with the goal of attaining the NAAQS. The TIP is also in accord with EPA's Transportation Conformity Rule as it pertains to attainment of air quality standards in the SLOAPCD.

Typically, evaluating whether a project is included in a conforming RTP and/or TIP is done to determine transportation conformity for ozone precursors. Because PM10 and CO are localized pollutants, the determination of transportation conformity for these pollutants is assessed by identifying whether the proposed project would generate elevated "hotspot" concentrations for these two pollutants. For PM10 and PM2.5, the determination of conformity is qualitative; for CO, the determination is quantitative.

Mobile Source Air Toxics

The Clean Air Act identified 188 pollutants as being air toxics, which are also known as hazardous air pollutants (HAPs). From this list, the EPA identified a group of 21 as mobile source air toxics (MSATs) in their final rule, *Control of Emissions of Hazardous Air Pollutants from Mobile Sources* (66 FR 17235) in March 2001. From this list of 21 MSATs, the EPA has identified six MSATs, *benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene,* as being priority MSATs. To address emissions of MSATs, the EPA has issued a number of regulations that will dramatically decrease MSATs through cleaner fuels and cleaner engines. The area of air toxics analysis is a new and emerging issue and is a continuing area of research. Although much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the

Table 3-1. Ambient Air Quality Standards

Pollutant	Average Time	California Standards[a]		National Standards[b]		
		Concentration[c]	Measurement Method[d]	Primary[c, e]	Secondary[c, f]	Measurement Method[g]
Ozone	1 hour	0.09 ppm (180 μg/m^3)	Ultraviolet Photometry	–	–	Ultraviolet Photometry
	8 hour	0.07 ppm (137 μg/m^3)		0.08 ppm (157 μg/m^3)	0.08 ppm (157 μg/m^3)	
Respirable Particulate Matter (PM10)	24 hours	50 μg/m^3	Gravimetric or Beta Attenuation	150 μg/m^3	150 μg/m^3	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 μg/m^3		–	–	
Fine Particulate Matter (PM2.5)	24 hours	No Separate State Standard		35 μg/m^3	35 μg/m^3	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 μg/m^3	Gravimetric or Beta Attenuation	15 μg/m^3	15 μg/m^3	
Carbon Monoxide (CO)	8 hours	9.0 ppm (10 mg/m^3)	Non-Dispersive Infrared Spectroscopy (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Spectroscopy (NDIR)
	1 hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	–	Gas Phase Chemiluminescence	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/m^3)	Gas Phase Chemiluminescence
	1 hour	0.25 ppm (470 μg/m^3)		–	–	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	Ultraviolet Fluorescence	0.03 ppm (80 μg/m^3)	–	Spectrophotometry (Pararosaniline Method)
	24 hour	0.04 ppm (105 μg/m^3)		0.14 ppm (365 μg/m^3)	–	
	3 hour	–		–	0.5 ppm (1300 μg/m^3)	
	1 hour	0.25 ppm (655 μg/m^3)		–	–	
Lead[9]	30-day Average	1.5 μg/m^3	Atomic Absorption	–	–	High Volume Sampler and Atomic Absorption
	Calendar Quarter	–		1.5 μg/m^3	1.5 μg/m^3	
Visibility Reducing Particles	8 hour	Extinction coefficient of 0.23 per kilometer – visibility of 10 miles or more due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 hour	25 μg/m^3	Ion Chromatography			
Hydrogen Sulfide (H_2S)	1 hour	0.03 ppm (42 μg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[h]	24 hour	0.010 ppm (26 μg/m^3)	Gas Chromatography			

Table 3-1. Continued

Source: ARB 2006a. http://www.arb.ca.gov/aqs/aqs.htm (Ambient Air Quality Standards).

Notes: ppm = parts per million.

$\mu g/m^3$ = micrograms per cubic meter.

mg/m^3= milligrams per cubic meter.

[a] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter – PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[b] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 ug/3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

[c] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25oC and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

[e] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[f] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[g] Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

[h] The ARB has identified lead and vinyl chloride as ‘toxic air contaminants’ with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

tools and techniques available for assessing project-specific health impacts from MSATs are limited. Given the emerging state of the science and of project-level analysis techniques, there are no established criteria for determining when MSAT emissions should be considered a significant issue in the NEPA context. The FHWA is currently preparing guidance as to how mobile source health risks should factor into project-level decision-making under NEPA. In addition, the EPA has not established regulatory concentration targets for the six relevant MSAT pollutants appropriate for use in the project development process. In light of the recent development regarding MSATs, the FHWA has issued interim guidance for the assessment of on MSATs in NEPA documents.

State Requirements

Responsibility for achieving California's ambient air quality standards (CAAQS) (Table 3-1), which are more stringent than federal standards for certain pollutants and averaging periods, is placed on the California Air Resources Board (ARB) and local air pollution control districts. State standards are to be achieved through district-level air quality management plans that are incorporated into the SIP. In California, the EPA has delegated authority to prepare SIPs to ARB, which, in turn, has delegated that authority to individual air districts.

The ARB has traditionally established state air quality standards, maintained oversight authority in air quality planning, developed programs for reducing emissions from motor vehicles, developed air emission inventories, collected air quality and meteorological data, and approved state implementation plans.

Responsibilities of air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality related sections of environmental documents required by CEQA.

The California Clean Air Act (CCAA) of 1988 substantially added to the authority and responsibilities of air districts. The CCAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures.

The CCAA focuses on attainment of the state ambient air quality standards and requires designation of attainment and nonattainment areas with respect to these standards. The act also requires that local and regional air districts expeditiously adopt and prepare an air quality attainment plan (Clean Air Plan) if the district violates state air quality standards for CO, SO_2, NO_2, or ozone. These plans are specifically designed to attain state standards and must be designed to achieve an annual 5% reduction in districtwide emissions of each nonattainment pollutant or its precursors. No locally prepared attainment plans are required for areas that violate the state PM10 standards; the ARB is responsible for developing plans and projects that achieve compliance with the state PM10 standards.

The CCAA requires that the state air quality standards be met as expeditiously as practicable, but, unlike the federal CAA, does not set precise attainment deadlines. Instead, the act establishes increasingly stringent requirements for areas that will require more time to achieve the standards.

The CCAA emphasizes the control of "indirect and area-wide sources" of air pollutant emissions. The act gives local air pollution control districts explicit authority to regulate indirect sources of air pollution and to establish traffic control measures (TCM). The CCAA does not define the terms *indirect [sources]* and *area-wide sources*. However, Section 110 of the federal CAA defines an indirect source as

> "a facility, building, structure, installation, real property, road, or highway which attracts, or may attract, mobile sources of pollution. Such term includes parking lots, parking garages, and other facilities subject to any measure for management of parking supply…."

TCMs are defined in the CCAA as "any strategy to reduce trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing vehicle emissions."

Local and Regional Implementation of Federal Requirements

The air quality management agencies of direct importance to San Luis Obispo County include the EPA, ARB, and the SLOAPCD. The EPA has established federal ambient air quality standards for which the ARB and the SLOAPCD have primary implementation responsibility. The ARB and the SLOAPCD are also responsible for ensuring that State ambient air quality standards are met.

3.1.2 Physical Setting

Ambient air quality is affected by climatological conditions, topography, and the types and amounts of pollutants emitted. The following discussion describes relevant characteristics of the air basin and offers an overview of conditions affecting pollutant ambient air concentrations in the basin.

Climate and Topography

The climate of San Luis Obispo County can generally characterized as Mediterranean, warm, dry summers and cooler, relatively damp winters. Along the coast, mild temperatures are the rule throughout the year due to the moderating influence of the Pacific Ocean. The effect is diminished inland in proportion to distance from the ocean or by major intervening terrain features, such as the coastal mountain ranges. As a result, a considerably wider range of temperature conditions characterizes inland areas. Maximum summertime temperature average about 70 degrees Fahrenheit near the coast, while inland valleys are often in the high 90's. Average minimum winter temperatures range from the low 30's along the coast to the low 20's inland.

Regional meteorology is largely dominated by a persistent high pressure area which commonly resides over the eastern Pacific Ocean. Seasonal variations in the strength and position of this pressure cell cause seasonal changes in the weather patterns of the area. The Pacific High remains fixed several hundred miles offshore from May through September, enhancing onshore winds and opposing offshore winds. During the spring and early summer, as the onshore breezes pass over the cool water of the ocean, fog and low clouds often form in the marine air layer along the coast. Surface heating in the interior valleys dissipates the marine layer as it moves inland.

From November through April the Pacific High tends to migrate southward, allowing northern storms to move across the County. About 90% of the total annual rainfall is received during this period. Winter conditions are usually mild, with intermittent periods of precipitation followed by mostly clear days. Rainfall amounts can vary considerably among different regions in the County. In the Coastal Plain, annual rainfall averages 16 to 28 inches, while the Upper Salinas River Valley generally receives about 12 to 20 inches of rain. The Carrizo Plain is the direst area of the County with less than 12 inches of rain in a typical year.

Airflow around the County plays an important role in the movement and dispersion of pollutants. The wind speed and direction are controlled by the location and strength of the Pacific High pressure system and other general patterns, by topographical factors, and by circulation patterns resulting from temperature difference between the land and sea. In spring and summer months, when the Pacific High attains its greatest strength, onshore winds from the northwest generally prevail during the day. At night, as the sea breeze dies, weak drainage winds flow down the coastal mountains and valleys to form a light, easterly land breeze.

In the fall, onshore surface winds decline and the marine layer grows shallow, allowing an occasional reversal to a weak offshore flow. Along with the diurnal alteration of land-sea breeze circulation, this type of wind flow can sometimes produce a “sloshing” effect. Under these conditions, pollutants may accumulate over the ocean for a period of one or more days and are subsequently carried back onshore with the return of the sea breeze. Strong inversions can form at during this period, “trapping” pollutants near the surface.

This effect is intensified when the Pacific High weakens or moved inland to the east of Nevada. This may produce a “Santa Ana” condition in which air, often pollutant laden, is transported into the County from the east and southeast. This can occur over a period of several days until the high pressure system returns to its normal location, breaking the pattern. The breakup of this condition may result in relatively stagnant conditions and a buildup of pollutants offshore. The onset of the typical daytime seabreeze can bring these pollutants back onshore, where they combine with local emissions to cause high pollutant concentrations. Not all occurrences of the “post Santa Ana” condition lead to high ambient pollutant levels, but it does play an important role in the air pollution meteorology of the County.

Description of Pollutants

The federal and state governments have established ambient air quality standards for six criteria pollutants: ozone, CO, NO_2, SO_2, particulate matter, and lead. Ozone, NO_2, and particulate matter are generally considered to be “regional” pollutants, as these pollutants or their precursors affect air quality on a regional scale. Pollutants such as CO, SO_2, lead, and particulate matter are considered to be local pollutants that tend to accumulate in the air locally. Particulate matter is considered to be a localized pollutant as well as a regional pollutant. In the area where the proposed project is located, ozone and particulate matter are of particular concern. CO and toxic air contaminants (TACs) are also discussed below, although no state or federal ambient air quality standards exist for TACs. Brief descriptions of these pollutants are provided below.

The following is a general description of the pollutants for which there are standards (criteria pollutants) and ambient measurements.

Ozone

Ozone is a respiratory irritant that increases susceptibility to respiratory infections. It is also an oxidant that can cause substantial damage to vegetation and other materials.

Ozone is not emitted directly into the air, but is formed by a photochemical reaction in the atmosphere. Ozone precursors (ROG and NO_x) react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem.

Ozone is a regional pollutant. Because photochemical reactions take time to occur, high ozone levels often occur downwind of the emission source. Because the predominant wind direction in the project area is from the west, the inland valley areas of San Luis Obispo County are a receptor of regional pollutants, such as ozone.

State and federal standards for ozone have been set for 1- and 8-hour averaging times. The state 1-hour ozone standard is 0.09 parts per million (ppm), not to be exceeded. The EPA recently revoked the 1-hour ozone standard and replaced it with an 8-hour ozone standard of 0.08 ppm, which went into effect on June 15, 2005. However, the California 1-hour standard will remain in effect. The state 8-hour standard is 0.07 ppm, not to be exceeded. The federal 8-hour ozone standard is 0.08 ppm, not to be exceeded more than three times in any 3-year period.

Carbon Monoxide

CO is a public health concern because it combines readily with hemoglobin and reduces the amount of oxygen transported in the bloodstream. CO can cause health problems such as fatigue, headache, confusion, dizziness, and even death.

Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

State and federal CO standards have been set for 1- and 8-hour averaging times. The state 1-hour standard is 20 ppm, not to be exceeded, whereas the federal 1-hour standard is 35 ppm, not to be exceeded more than one day per year. Both state and federal standards for the 8-hour averaging period are 9 ppm, where the state standard may not be exceeded, and the federal standard may not be exceeded more than one day per year.

Inhalable Particulate Matter

Particulates can damage human health and retard plant growth. Health concerns associated with suspended particulate matter focus on those particles small enough to reach the lungs when inhaled. Particulates also reduce visibility and corrode materials.

PM10 sources in San Luis Obispo County comprise both rural and urban sources, including agricultural burning, tilling of agricultural fields, industrial emissions, dust suspended by vehicle traffic, and secondary aerosols formed by reactions in the atmosphere.

The federal and state ambient air quality standard for particulate matter applies to two classes of particulates: PM2.5 and PM10.

The state PM10 standards are 50 micrograms per cubic meter (μ/m^3) as a 24-hour average and 20 μ/m^3 as an annual geometric mean. The federal PM10 standards are 150 µ/m3 as a 24-hour average. The federal PM10 annual arithmetic mean of 50 μ/m^3 was revoked in 2006. For PM2.5, the state has adopted a standard of 12 μ/m^3 for the annual geometric mean. The federal PM2.5 standards are 35 μ/m^3 for the 24-hour average and 15 µ/m3 for the annual arithmetic mean.

Toxic Air Contaminants

Although ambient air quality standards exist for criteria pollutants, no standards exist for TACs. TACs are a category of air pollutants that have been shown to have an impact on human health but are not classified as criteria pollutants. Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer of because of their acute or chronic health risks. For TACs that are known or suspected carcinogens, the ARB has consistently found there are no levels or thresholds below which exposure is risk free. Individual TACs vary greatly in the risk they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. For certain TACs, a unit risk factor can be developed to evaluate cancer risk. For acute and chronic health risks, a similar factor called a Hazard Index is used to evaluate risk. In the early 1980s, the ARB established a statewide comprehensive air toxics program to reduce exposure to air toxics. Air toxics are generated by a number of sources, including stationary sources, such as dry cleaners, gas stations, and combustion sources; mobile sources, such as diesel trucks, ships and trains; and area sources, such as farms, landfills, and construction sites. Adverse health effects of TACs can be carcinogenic (cancer-causing), short-term (acute) non-carcinogenic, and long-term (chronic) non-carcinogenic.

Asbestos Risk Characterization

Asbestos is a term used for several types of naturally-occurring fibrous minerals found in many parts of California. Asbestos is commonly found in ultramafic rock, including serpentine, and near fault zones. The amount of asbestos that is typically present in these rocks range from less than 1% up to about 25%, and sometimes more. The most common type of asbestos is chrysotile, but other types are also found in California. Serpentine rock often contains chrysotile asbestos. Serpentine rock, and its parent material, ultramafic rock, is abundant in the Sierra foothills, the Klamath Mountains, and Coast Ranges. Serpentine rock is typically grayish-green to bluish-black in color and may have a shiny appearance.

Asbestos is released from ultramafic and serpentine rock when it is broken or crushed. This can happen when cars drive over unpaved roads or driveways, which are surfaced with these rocks, when land is graded for building purposes, or at quarrying operations. It is also released naturally through weathering and erosion. Once released from the rock, asbestos can become airborne and may stay in the air for long periods of time.

Asbestos Hazard Mitigation

SLOAPCD is responsible for implementing and enforcing asbestos-related regulations and programs. This includes implementation of Title 17, Sections 93105 and 93106 of the California Code of Regulations (Asbestos Airborne Toxic Control Measure – Asbestos containing Serpentine). Regulated activities include construction or digging on a site containing naturally

occurring asbestos in rocks or soils and the sale and use of serpentine material or rock containing asbestos materials for road pavement surfacing. According to the information from the California Geological Survey Map Report 2000-19, roadway construction of the proposed project is located in an area that is known to contain the presence of naturally occurring asbestos. Consequently, the generation of asbestos emissions could result from soil disturbances associated with roadway construction activities.

Greenhouse Gases and Climate Change

Carbon dioxide and similar "greenhouse gases" are not considered "pollutants" under the Federal Clean Air Act by the EPA, and are not subject to ambient air quality standards. That position by EPA is currently being litigated. EPA is, however, active in the global warming mitigation arena, and in most cases greenhouse gas emission reduction is approached through energy efficiency improvement. For more information, see: http://yosemite.epa.gov/oar/globalwarming.nsf/content/index.html.

Carbon dioxide and similar "greenhouse gases" are not considered criteria pollutants under the California Clean Air Act, and ambient air quality standards have not been set. They are, however, regulated by the California Air Resources Board (ARB) based on legislative direction and Governor's executive orders. Carbon dioxide emission reduction measures are required for on-road motor vehicles; ARB's 2005 motor vehicle greenhouse gas regulations are in litigation. For more information on ARB's climate change program see: http://www.arb.ca.gov/cc/cc.htm.

California has adopted the Global Warming Solution Act, which does not directly amend CEQA (and NEPA) requirements. There are no acceptable SLOAPCD, ARB and EPA thresholds for significance relative to global warming. As a result, there is no consistent means of determining whether a significant contribution to climate change would result from an individual project's greenhouse gas emissions.

Existing Air Quality Conditions

The air quality in a given location is described by the concentration of various pollutants in the atmosphere, expressed in units of parts per million (ppm), or micrograms of pollutant per cubic meter of air (µg/m). The significance of a given pollutant level can be evaluated by comparing its atmospheric concentration to state and national air quality standards, which are presented in Table 3-1. These standards represent allowable atmospheric contaminant levels at which the public health and welfare are protected, and include a margin of safety.

The primary factors affecting air quality in a given area are the quantity, type and location of pollutant emissions, the topographic and geographic features of the region, and the prevailing meteorological conditions. An emission rate represents the amount of pollutant released into the atmosphere by a given source over a specified time period; it is generally expressed in units such as pounds per hour (lb/hr) and tons per year (ton/yr). Local and regional meteorological conditions govern the transport and diffusion of emissions in the atmosphere. Wind speed, wind direction, atmospheric stability, temperature, and the presence or absence of inversions, are some of the key parameters which affect pollutant dispersion.

Background Air Quality

The region generally has good air quality, as it is attainment or unclassified for all National Ambient Air Quality Standards. . The SLOAPCD is required to monitor air pollutant levels to assure that Federal and State air quality standards are being met. Air quality measurements indicate that San Luis Obispo County is in attainment area for all Federal and State air quality standards, with the exception for the State ozone and PM10 standards.

The SLOAPCD maintains and operates a network of ambient air monitoring stations throughout San Luis Obispo County that measure ambient pollutant concentrations and determine whether the ambient air quality meets the CAAQS and the NAAQS. The ambient monitoring station nearest to the project site is located on 1160 Marsh Street and 3220 South Higuera Street stations, which measures ozone, particulate matter, CO, and NO2. Ambient concentrations of pollutants over the last three years from the monitoring stations are presented in Table 3-2. The table presents the 2004 data from the Marsh Street monitoring station and the 2005-2006 data from the South Higuera Street monitoring station. The Marsh Street monitoring station was discontinued in 2006 and the South Higuera Street monitoring station started up in 2005. Table 3-2 indicates the monitoring stations have experienced no violations of the state and federal standards for each criteria pollutants during the 3-year monitoring period.

Health Effects of Criteria Air Pollutants

Air pollutants are recognized to have a variety of health effects on humans. Research by the California Air Resources Board shows that exposure to high concentrations of air pollutants can trigger respiratory diseases, such as asthma, bronchitis, and other respiratory ailments; and cardiovascular diseases. A healthy person exposed to high concentrations of air pollutants may be become nauseated or dizzy, may develop a headache or cough, or may experience eye irritation and/or a burning sensation in the chest. Ozone is a powerful irritant that attacks the respiratory system, leading to the damage of lung tissue. Inhaled particulate matter, nitrogen dioxide, and sulfur dioxide can directly irritate the respiratory tract, constrict airways, and interfere with the mucous lining of the airways. Exposure to carbon monoxide, when absorbed into the bloodstream, can endanger the hemoglobin, the oxygen-carrying protein in blood, by reducing the amount of oxygen which reaches the heart, brain, and other body tissues. When air pollutants levels are high, a common occurrence in southern California, children, elderly, and people with respiratory problems are advised to remain indoors. Outdoor exercise also is discouraged because strenuous activity may cause shortness of breath and chest pains. A brief discussion of the criteria pollutants and their effect on human health and the environment is provided in Table 3-3.

Local CEQA Guidance

Guidance for the determination of significant air impacts under CEQA within San Luis Obispo County is found in the SLOAPCD document, *CEQA Air Quality Handbook: A Guide for Assessing the Air Quality Impacts for Projects subject to CEQA Review.*

SLOAPCD has established four separate categories of evaluation for determining the significance of project impacts.

- Comparison of calculated project emissions to District emission thresholds;

Table 3-2. Ambient Background Concentrations
Marsh Street/South Higuera Street Monitoring Station

Pollutant Standards	2004	2005	2006
Ozone (O_3)			
Maximum 1-hour concentration (ppm)	0.073	0.072	0.070
Maximum 8-hour concentration (ppm)	0.070	0.063	0.058
No. Days Standard Exceeded			
CAAQS (1-hour) > 0.09 ppm	0	0	0
NAAQS (8-hour) > 0.08 ppm	0	0	0
CAAQS (8-hour) > 0.07 ppm	NA	NA	NA
Particulate Matter (PM10)			
Maximum 24-hour concentration ($\mu g/m^3$)	35	31	23
Annual average concentration ($\mu g/m^3$)[a]	16.6	9.3	7.3
No. Days Standard Exceeded			
NAAQS (24-hour) > 150 $\mu g/m^3$	0	0	0
CAAQS (24-hour) > 50 $\mu g/m^3$	0	0	0
CAAQS (annual) > 20 $\mu g/m^3$ exceeded?	No	No	No
Particulate Matter (PM2.5)			
Maximum 24-hour concentration ($\mu g/m^3$)	19.4	11.4	24.0
Annual average concentration ($\mu g/m^3$)	6.8	8.3	6.4
No. Days Standard Exceeded			
NAAQS (24-hour) > 35 $\mu g/m^3$	0	0	0
NAAQS (annual) > 15 $\mu g/m^3$ exceeded?	No	No	No
CAAQS (annual) > 12 $\mu g/m^3$ exceeded?	No	No	No
Nitrogen Dioxide (NO_2)			
Maximum 1-hour concentration (ppm)	0.042	0.042	0.034
Annual average concentration (ppm)	0.009	0.009	0.006
No. Days Standard Exceeded			
CAAQS (1-hour) > 0.25 ppm	0	0	0
NAAQS (annual) > 0.053 ppm exceeded?	No	No	No
Carbon Monoxide (CO)			
Maximum 8-hour concentration (ppm)	1.49	0.71	0.78
Maximum 1-hour concentration (ppm)	2.6	1.3	1.1
No. Days Standard Exceeded			
NAAQS (8-hour) $\geq$ 9.0 ppm	0	0	0
NAAQS (1-hour) $\geq$ 35 ppm	0	0	0
CAAQS (8-hour) $\geq$ 9.0 ppm	0	0	0
CAAQS (1-hour) $\geq$ 20 ppm	0	0	0

Source: CARB 2007c. http://www.arb.ca.gov/adam/welcome.html (Air Quality Statistics, all pollutants except 1-hour CO) EPA 2007. www.epa.gov/air/data/monvals.html (Air Data, 1-hour CO).

Notes: NA = not available from current website data.
ppm = parts per million.
$\mu g/m^3$ = micrograms per cubic meter.
mg/m^3 = milligrams per cubic meter.
> = greater than.
$\geq$ = equal to or greater than.

[a] California averages reported for PM10.

Table 3-3. Criteria Air Pollutants and Their Effect on Human Health and the Environment

Physical Characteristics	Health Effects	Environmental Effects
CO is a colorless, odorless and at high levels is a poisonous gas. It is a component of motor vehicle exhaust. Peak CO concentrations typically occur during the colder months of the year and nighttime inversion conditions.	Exposure to CO reduces oxygen delivery to the body's organs and tissues. Elevated levels are dangerous to those who suffer from cardiovascular disease. CO can be poisonous; can cause visual impairment, reduce work capacity and manual dexterity, and inhibit learning ability.	None.
Ground-level ozone (the primary constituent of smog) is not emitted directly into the air but is formed by the reaction of volatile organic hydrocarbons (VOCs) and nitrogen oxides (NO_x) in the presence of heat and sunlight.	Exposure to ambient ozone has been linked to increased hospital admissions and emergency room visits for respiratory causes, including respiratory infection, asthma, significant decreases in lung function, chest pain, and cough.	Ozone also affects vegetation and ecosystems, leading to reductions in agricultural and commercial forest yields, reduced growth and survivability of tree seedlings, and increased plant susceptibility to disease, pests, and other environmental stresses (e.g., harsh weather).
NO_2 is a reddish brown, highly reactive gas. The major sources of man-made NO_x emissions are high-temperature combustion processes. Home heaters and gas stoves also produce substantial amounts of NO_2 in indoor settings.	Exposures to NO_2 may reduce airway and lung function, increase respiratory illnesses in children, and increase susceptibility to respiratory infection. Atmospheric transformation of NO_x can lead to the formation of ozone and PM which are both associated with adverse health effects.	NO_2 is a precursor of acid rain and is linked to a wide range of environmental effects, including changes in the composition and competition of some species of vegetation, visibility impairment, acidification of freshwater bodies, eutrophication of estuarine and coastal waters, and increases in levels of toxins harmful to fish and other aquatic life.
SO_2 is formed when fuel containing sulfur (mainly, coal and oil) is burned, and during metal smelting and other industrial processes. The highest concentrations of SO_2 occur in the vicinity of large industrial facilities.	Exposure to SO_2 can result in temporary breathing impairment, reduced lung function, wheezing, chest tightness, or shortness of breath, respiratory illness, alterations in the lungs' defenses, and aggravation of existing cardiovascular disease.	SO_2 is a major precursor of acid rain, which is associated with the acidification of soils, lakes, and streams, accelerated corrosion of buildings and monuments, and reduced visibility.
PM consists of a mixture of airborne solid particles and liquid droplets that originate from both man-made and natural sources. Fine particles (PM 2.5) are generally emitted from fuel combustion sources. Coarse particles (PM10) are generally emitted from sources that cause wind-blown or entrained dust. SO_x, NO_x, and VOC also interact with compounds in the air to form PM.	Inhalable PM can accumulate in the respiratory system and is associated with numerous health effects, including the aggravation of respiratory conditions (asthma), increased hospital admissions and emergency room visits for heart and lung disease, increased respiratory symptoms, decreased lung function, and even premature death.	PM is the major cause of reduced visibility in many parts of the United States. Airborne particles also can cause damage to paints and building materials.
Pb emissions to the atmosphere were formerly dominated by automotive sources. As a result of the elimination of leaded gasoline, metals processing facilities are currently the primary source of Pb emissions. The highest air concentrations of Pb are found in the vicinity of smelters and battery manufacturers.	Exposure to Pb occurs mainly through inhalation and ingestion pathways. It accumulates in the blood, bones, and soft tissues. Pb can adversely affect the kidneys, liver, nervous system, and other organs. Excessive exposure to Pb may cause neurological impairments, such as seizures, mental retardation, behavioral disorders, damage to the nervous systems of fetuses and young children, and may be a factor in high blood pressure and subsequent heart disease.	Lead can also be deposited on the leaves of plants, presenting a hazard to grazing animals.

- Consistency with the most recent Clean Air Plan (CAP) for San Luis Obispo County;
- Comparison of predicted ambient pollutant concentrations resulting from the project to state and federal health standards, when applicable; and
- The evaluation of special conditions, which apply to certain projects.

Emissions Thresholds for Criteria Pollutant Impacts

Emission thresholds are contained in the CEQA Air Quality Handbook (2003). The SLOAPCD has three tier levels of emission thresholds, and depending on the emissions produced from the proposed project, different mitigation measures would be required at different levels. Emission thresholds for operational emissions presented in Table 3-4.

Table 3-4. APCD Thresholds of Significance for Operational Emission Impacts

Pollutant	Threshold	Tier 1	Tier 2	Tier 3
ROG, NO_x, SO_2, PM10	<10 lbs/day	10 lbs/day	25 lbs/day	25 tons/yr
CO	<550 lbs/day	–	550 lbs/day	
Level of Significance	Insignificant	Potentially Significant Impacts	Significant Impacts	Significant Impacts
Environmental Document	ND	MND	MND or EIR	EIR

Source: County of San Luis Obispo APCD CEQA Air Quality Handbook 2003.

For project operations, the SLOAPCD identifies a significant air quality impact as being a:

- net increase in pollutant emissions of 25 pounds per day (ppd) or 25 tons per year (tpy) of ROG, NO_x, SO_2, or PM10; or
- project-related contribution to CO concentrations exceeding the CAAQS for the 1- and 8-hour standards. Use of CALINE4 is generally required whenever a project is expected to cause significant queuing of vehicles at an intersection. Projects which do not result in the following are presumed to result in less-than-significant levels of CO emissions, and no estimation of CO concentrations is necessary:
  - vehicle emissions of CO exceeding 550 ppd
  - project traffic causing intersection or roadway link LOS to decline to D, E or F

Mitigation of construction activities is required when the following emission thresholds are exceeded by both fugitive and combustion emissions, as presented in Table 3-5.

- Greater than 185 lbs/day of ROG or NO_x emissions requires Best Available Control Technology for construction equipment (CBACT)
- Between 2.5 and 6.0 tons/quarter of ROG and NO_x emissions requires CBACT
- Over 6.0 tons per quarter of ROG or NO_x emissions requires CBACT plus further mitigation, including emission offsets.
- Greater than 2.5 tons per quarter of PM10 requires CBACT.

Table 3-5. Level of Construction Activity Requiring Mitigation

Pollutant of Concern	Thresholds		Amount of Material Moved	
	Tons/Quarter	Pounds/Day	Cubic Yards/Quarter	Cubic Yards/Day
ROG	2.5	185	247,000	9,100
	6.0	185	593,000	9,100
NO_x	2.5	185	53,500	2,000
	6.0	185	129,000	2,000
PM10	2.5		Any project with a grading area greater than 4.0 acres of continuously worked area will exceed the 2.5-ton PM10 quarterly threshold. Combustion emissions should also be calculated based upon the amount of cut and fill expected.	

Source: County of San Luis Obispo APCD CEQA Air Quality Handbook 2003.

Note: All construction calculation assume working conditions of 8 hours per day, 5 days per week, for a total of 65 days per quarter.

3.2 Environmental Consequences

3.2.1 Methods

The proposed project would generate construction-related and operational emissions. The methodology used to evaluate construction and operational effects is described below.

Construction Impact Assessment Methodology

Construction activity is a source of dust and exhaust emissions that can have substantial temporary impacts on local air quality (i.e., exceed state air quality standards for ozone, CO, PM10, and PM2.5). Such emissions would result from earthmoving and use of heavy equipment, as well as land clearing, ground excavation, cut-and-fill operations, and the construction of roadways. Emissions can vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing weather. A major portion of dust emissions for the proposed project would likely be caused by construction traffic on temporary areas.

Construction Emissions Modeling

The Road Construction Emissions Model

Construction emissions of ROG, NO_x, CO, and PM10 were estimated using the Road Construction Emissions Model (Version 5.2). The road construction model is a public-domain spreadsheet model formatted as a series of individual worksheets. The model enables users to estimate emissions using a minimum amount of project-specific information. The model estimates emissions for load hauling (on-road heavy-duty vehicle trips), worker commute trips, construction site fugitive PM10 dust, and off-road construction vehicles. This analysis is based on anticipated construction equipment calculated by the Road Construction Emissions Model, which estimates construction equipment based on project size, duration of construction activities, and level of daily construction activities. Although exhaust emissions are estimated for each activity, fugitive dust estimates are currently limited to the major dust-generating activities, which include grubbing/land clearing and grading/excavation. In addition, dust estimates do not account for control measures required by the SLOAPCD.

The SLOAPCD CEQA Guidelines list control measures for construction emissions based on the size of the project area. The District considers the project's construction-related impacts to be less than significant if these control measures are undertaken as part of the project (or made a mandatory condition of the project). Without these measures, the impact is generally considered to be significant, particularly if sensitive land uses are located in the project vicinity. The control measures indicated in Table 3-7 (Table 3-7 appears under Impact AQ-1) should be included as part of the proposed project to minimize dust emissions and also be consistent with SLOAPCD guidelines for reducing construction impacts to a less-than-significant level.

Operational Impact Assessment Methodology

The primary operational emissions associated with the proposed project are CO, PM10, and ozone precursors (ROG and NO_x) emitted as vehicle exhaust. The effects of localized CO "hot spot" emissions were evaluated through CO dispersion modeling, as described below. The effects of criteria pollutants (CO, PM10 and ozone precursors) were evaluated through the conformity process and modeling conducted with the ARB's EMFAC2002 (version 2.2) emission rate program, also described below.

Carbon Monoxide Dispersion Modeling

Predicting the ambient air quality impacts of pollutant emissions requires an assessment of the transport, dispersion, chemical transformation, and removal processes that affect pollutant emissions after their release from a source. Gaussian dispersion models are frequently used for such analyses. The term "Gaussian dispersion" refers to a general type of mathematical equation used to describe the horizontal and vertical distribution of pollutants downwind from an emission source.

Gaussian dispersion models treat pollutant emissions as being carried downwind in a defined plume, subject to horizontal and vertical mixing with the surrounding atmosphere. The plume spreads horizontally and vertically with a reduction in pollutant concentrations as it travels downwind. Mixing with the surrounding atmosphere is greatest at the edge of the plume, resulting in lower pollutant concentrations outward (horizontally and vertically) from the center of the plume. This decrease in concentration outward from the center of the plume is treated as following a Gaussian ("normal") statistical distribution. Horizontal and vertical mixing generally occur at different rates. Because turbulent motions in the atmosphere occur on a variety of spatial and time scales, vertical and horizontal mixing also vary with distance downwind from the emission source.

The CALINE4 Model

The ambient air quality effects of traffic emissions were evaluated using the CALINE4 dispersion model (Benson 1989). CALINE4 is a Gaussian dispersion model specifically designed to evaluate air quality impacts of roadway projects. Each roadway link analyzed in the model is treated as a sequence of short segments. Each segment of a roadway link is treated as a separate emission source producing a plume of pollutants, which disperses downwind. Pollutant concentrations at any specific location are calculated using the total contribution from overlapping pollution plumes originating from the sequence of roadway segments.

When winds are essentially parallel to a roadway link, pollution plumes from all roadway segments overlap. This produces high concentrations near the roadway (near the center of the

overlapping pollution plumes), and low concentrations well away from the roadway (at the edges of the overlapping pollution plumes). When winds are at an angle to the roadway link, pollution plumes from distant roadway segments make essentially no contribution to the pollution concentration observed at a receptor location. Under such cross wind situations, pollutant concentrations near the highway are lower than under parallel wind conditions (fewer overlapping plume contributions), while pollutant concentrations away from the highway may be greater than would occur with parallel winds (near the center of at least some pollution plumes).

The CALINE4 model employs a "mixing cell" approach to estimating pollutant concentrations over the roadway itself. The size of the mixing cell over each roadway segment is based on the width of the traffic lanes of the highway (generally 3.7 meters [12 feet] per lane) plus an additional turbulence zone on either side (generally 3.0 meters [10 feet] on each side). Parking lanes and roadway shoulders are not counted as traffic lanes. The height of the mixing cell is calculated by the model.

Pollutants emitted along a highway link are treated as being well mixed within the mixing cell volume due to mechanical turbulence from moving vehicles and convective mixing due to the temperature of vehicle exhaust gases. Pollutant concentrations downwind from the mixing cell are calculated using horizontal and vertical dispersion rates which are a function of various meteorological and ground surface conditions.

Criteria Pollutant Emission Modeling

The estimation of criteria pollutant emissions associated with the proposed project was conducted using the ARB's EMFAC2002 (version 2.2) emission rate program and vehicle activity data provided by the project traffic engineer.

The EMFAC2002 (version 2.2) Model

Emissions of criteria pollutants (CO, PM10 and ozone precursors) were evaluated using the ARB's EMFAC2002 (version 2.2) emission rate program and vehicle activity data. The EMission FACtors (EMFAC) model calculates emission rates from all motor vehicles, such as passenger cars to heavy-duty trucks, operating on highways, freeways and local roads in California. In the EMFAC model, the emission rates are multiplied with vehicle activity data to calculate emission inventories associated with the proposed project. EMFAC can estimate emission factors and emission inventories for the following primary pollutants:

- **Hydrocarbons.** Hydrocarbons can be expressed as TOG (total organic gases), ROG, THC (total hydrocarbon), or CH_4 (methane). The THC class includes compounds with hydrogen and carbon atoms only, carbonyls and halogens are not included in the class. The TOG class includes all organic gases emitted into the atmosphere. The ROG class is same as the EPA's VOC definition and does not contain compounds exempt from regulation.
- **Carbon monoxide (CO).**
- **Nitrogen oxides (NO_x).**
- **Carbon dioxide (CO_2).**

- **Particulate matter (PM).** PM estimates are provided for total suspended particulate, particulate matter 10 microns or less in diameter (PM10), and particulate matter 2.5 microns or less in diameter (PM2.5).
- **Fuel consumption.** Although, this is not a pollutant, fuel consumption is calculated based on the emissions of CO, CO2 and THC using the carbon balance equation.
- **Oxides of sulfur (SO_x).** Emissions of oxides of sulfur are a function of the sulfur content of fuel. The model calculates these emissions by multiplying the fuel consumption by the weight fraction of sulfur in a gallon of fuel.
- **Lead (Pb).** Lead emissions are also a function of the lead content in fuel. Hence, the model calculates lead by multiplying the fuel consumption by the number of grams of lead per gallon.

Modeling Procedures

Carbon Monoxide Dispersion Modeling

Predicting the ambient air quality impacts of pollutant emissions requires an assessment of the transport, dispersion, chemical transformation, and removal processes that affect pollutant emissions after their release from a source. Gaussian dispersion models are frequently used for such analyses. The term “Gaussian dispersion” refers to a general type of mathematical equation used to describe the horizontal and vertical distribution of pollutants downwind from an emission source.

The CALINE4 Model

Future ambient CO concentrations from traffic emissions were evaluated using the CALINE4 dispersion model (Benson 1984, revised 1989). CALINE4 is a Gaussian dispersion model specifically designed to evaluate air quality impacts of roadway projects. Each roadway segment analyzed in the model is treated as a sequence of “links.” CALINE4 uses worst-case meteorological data to predict a concentration that would never be exceeded, thus producing a conservative estimate of a project’s potential impacts.

Modeling Procedures

Roadway and Traffic Conditions. Modeled traffic volumes and operating conditions were obtained from the traffic data prepared by the project traffic engineers, Fehr & Peers (Fehr & Peers 2006). Ambient CO concentrations near the roadway under future project conditions were modeled using CALINE4. Existing year (2005), interim year (2015) with no build, minimum build alternative 3 and alternative 6, and design year (2035) with no build, minimum build alternative 3 and alternative 6 conditions were modeled. Only the p.m. peak hour traffic was modeled, as the LOS and delays would be worse in the p.m. peak hour than in the a.m. peak hour. CO modeling was conducted at the following intersections because they represent the intersections with the greatest traffic volumes and worst LOS/delay:

- Los Osos Valley Road and Auto Park Way
- Los Osos Valley Road and Calle Joaquin (North)
- Los Osos Valley Road and U.S. 101 Southbound Off Ramp – Calle Joaquin (South)

- Calle Joaquin (South) and U.S. 101 Southbound On-Ramp
- Los Osos Valley Road and U.S. 101 Northbound Ramps
- Los Osos Valley Road and Los Verdes Drive
- Los Osos Valley Road and South Higuera Street
- South Higuera Street and Vachell Lane

Vehicle Emission Rates. Vehicle emission rates were determined using the ARB's EMFAC2002 (version 2.2) emission rate program. Free flow traffic speeds were adjusted to reflect congested speeds using methodology from the Highway Capacity Manual (Transportation Research Board 2000). EMFAC2002 modeling procedures followed the guidelines recommended by Caltrans (California Department of Transportation 2003). The program assumed San Luis Obispo County regional traffic data, averaged for each subarea, operating during the winter months. A mean January temperature of 3.0º C (30º F) and humidity of 30% were assumed.

Receptor Locations. CO concentrations were estimated at locations representing the nearest sensitive receptors in the vicinity of the modeled roadway segments. For roadway segments that did not have any nearby sensitive receptors, CO concentrations were estimated at receptor locations located 30.5 meters (100 feet) away from the centerline of each roadway, and located 152.4 meters (500 feet) from each other to represent a worst-case scenario. Receptors were chosen based on the CO protocol developed for Caltrans by the Institute of Transportation Studies at the University of California, Davis (Garza et al. 1997). Receptor heights were set at 1.8 meters (5.9 feet).

Meteorological Conditions. Meteorological inputs to the CALINE4 model were determined using methodology recommended in the CO protocol (Garza et al. 1997). The meteorological conditions used in the modeling represent a calm winter period. The worst-case wind angles option was used to determine a worst-case concentration for each receptor. The meteorological inputs include: 1.0 meter per second (3.3 feet per second) wind speed, ground-level temperature inversion (atmospheric stability class G), wind direction standard deviation equal to 10 degrees, altitude above seal level of 95.5 meters (315 feet), a mixing height of 1,000 meters (3,281 feet), and an ambient minimum temperature of 3.3º C (38º F).

Background Concentrations and Eight-Hour Values. To account for sources of ambient CO not included in the modeling, 1- and 8-hour background concentrations of 2.6 and 1.5 ppm, respectively, were added to the modeled 1- and 8-hour values for existing and future years. The one- and eight-hour background concentration data were taken from Table 3-2 ambient CO concentrations from the SLOAPCD's Marsh Street monitoring station (2004), and represent maximum estimated background concentrations. Actual 1- and 8 hour background concentrations in future years would likely be lower than those used in the CO modeling analysis because the trend in CO emissions and concentrations is decreasing because of continuing improvements in engine technology and the retirement of older, higher-emitting vehicles from the vehicle fleet. Modeled 8 hour values were calculated from the 1-hour values using a persistence factor of 0.6.

Transportation Conformity

State Implementation Plan

The proposed project is located in a serious maintenance area for the federal 1-hour ozone standard and a nonattainment (subpart 1) area for the federal 8-hour ozone standard. Because ozone and its precursors are regional pollutants, the proposed project must be evaluated under the transportation conformity requirements described earlier. An affirmative regional conformity determination must be made before the proposed project can proceed. Such a determination is not required if the proposed project is described in an approved RTP and/or TIP and the project has not been altered in design concept or scope.

The federally required RTP and TIP are comprehensive listings of all transportation projects that receive federal funds or that are subject to a federally required action, such as a review for impacts on air quality. The TIP sets forth SLOCOG's investment priorities for transit and transit-related improvements, highways and roadways, transit, and other surface transportation improvements in the San Luis Obispo County region. SLOCOG prepares and adopts the TIP every two years. On April 6, 2005, the SLOCOG adopted the region's RTP, *Vision 2025 – a Regional Transportation Plan for San Luis Obispo County*. The region's latest conforming TIP is the *2007 Transportation Improvement Program*, which was adopted by the SLOCOG on August 2, 2006. SLOCOG has identified the Los Osos Valley Road Interchange Project as *MPO ID # 22300000081* and the conformity analysis for the entire *2007 Transportation Improvement Program conforms to the SIP*.

Particulate Matter

The proposed project is located in an unclassified/attainment area for the federal PM10 and PM2.5 standards. Because the area is not classified as a maintenance or nonattainment area for this standard, a conformity determination for PM10 and PM2.5 are not required under the federal transportation conformity requirements.

Mobile Source Air Toxics

The FHWA has issued interim guidance on how MSATs should be addressed in NEPA documents for highway projects. The FHWA has developed a tiered approach for analyzing MSATs in NEPA documents. Depending on the specific project circumstances, FHWA has identified three levels of analysis:

1. No analysis for exempt projects or projects with no potential for meaningful MSAT effects;
2. Qualitative analysis for projects with low potential MSAT effects; or
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

As the proposed project adds no capacity to the highway, it is a project with low potential MSAT effects. This category of projects covers a broad range of projects, as projects included in this category are those that serve to improve operations of highway, transit or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase emissions.

A qualitative assessment of emissions projections should be conducted for projects of low potential MSAT effects. The qualitative assessment would compare, in narrative form, the expected effect of the project on traffic volumes, vehicle mix, or routing of traffic, and the associated changes in MSATs for the project alternatives, based on VMT, vehicle mix, and speed. It would also discuss national trend data projecting substantial overall reductions in emissions due to stricter engine and fuel regulations issued by the EPA. Because the emission effects of these projects are low, the FHWA expects there would be no appreciable difference in overall MSAT emissions among the various alternatives. In addition, quantitative emissions analysis of these types of projects will not yield credible results that are useful to project-level decision-making due to the limited capabilities of the transportation and emissions forecasting tools.

3.2.2 Impacts and Mitigation Measures

Impact AQ-1: Temporary Increase in Ozone Precursor (ROG and NO_x) and PM10 Emissions during Grading and Construction Activities. Implementation of the project would result in the construction of widened roads, overcrossings, and embankments, as well as intersection improvements. In addition, the proposed project would result in the reconfiguration of barriers at the truck scales, and some minor alterations to on- and off-ramps at the truck scales. Temporary construction emissions would result from grubbing/land clearing, grading/excavation, drainage/utilities/subgrade, and paving activities and construction worker commuting patterns. Pollutant emissions would vary daily, depending on the level of activity, specific operations, and prevailing weather. It is anticipated that construction activities would begin in 2007 and continue for approximately 24–36 months.

The Road Construction Emissions Model (Version 5.2) was used to estimate construction-related ozone precursors (ROG and NO_x), CO, and PM10 emissions from construction activities. It was assumed that construction activities would occur for 8 hours per day over a 12-month period. The total project length was assumed to be 0.52 miles, with a total acreage of 9 acres and a maximum of 1 acre disturbed per day. Construction activities were divided into separate phases and analyzed separately. The results of modeling for construction activities are summarized in Table 3-6.

Table 3-6. Construction Emission Estimates in kgs/day (lbs/day)

Construction Phase	ROG	CO	NO_X	PM10
Grubbing/land clearing	4 (8)	19 (41)	20 (45)	3 (7)
Grading/excavation	4 (9)	23 (50)	25 (54)	4 (8)
Drainage/utilities/subgrade	4 (9)	21 (46)	22 (48)	4 (8)
Paving	1 (3)	7 (16)	10 (23)	1 (1)
Maximum	**4 (9)**	**23 (50)**	**25 (54)**	**4 (8) [0.9 tons]**
Thresholds	84 (185)	84 (185)	84 (185)	34 (75) [2.5 tons]
Exceedance	No	No	No	No

Note: Emissions calculations based on Road Construction Emissions Model (Version 5.2).

Construction activities are subject to Caltrans requirements found in the Caltrans document, *Standard Specifications: For Construction of Local Streets and Roads* (Caltrans 2002). Standard

Specification 7-1.01F stipulates that construction activities must comply with all rules, regulations, ordinances, and statutes of the local air pollution control district, while Standard Specification 10 addresses dust control requirements. In addition, the SLOAPCD requires the implementation of all feasible, effective, and comprehensive control measures to reduce PM10 emissions from construction activities. These control measures are summarized in Table 3-7.

The project will require a federal asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAP) permit for work that affects the structural members of the LOVR bridge. Implementation of the following control measures would minimize air quality impacts from construction activities.

Control Measures AQ-1: Implement California Department of Transportation Standard Specification 7-1.01F and Standard Specification 10. The project proponent will follow Caltrans Standard Specification 7-1.01F and Standard Specification 10, which address the requirements of the local air pollution control district (SLOAPCD) and dust control, respectively.

Control Measures AQ-2: Implement SLOAPCD Control Measures for Construction Emissions of PM10. The project proponent will implement all feasible PM10 control measures required by the SLOAPCD, indicated in Table 3-7.

Control Measures AQ-3: Implement ARB ATCM Control Measures for Naturally Occurring Asbestos. In addition, naturally occurring asbestos may exist at the site. A geological survey is required for the site. If the naturally occurring asbestos is found, then the project proponent will implement all feasible control measures required by the SLOAPCD to comply with the requirements listed in the ARB's Asbestos Airborne Toxic Control Measures for Construction, Grading, Quarrying, and Surface Mining Operations. Such measures include, but are not limited to, the following:

a. The SLOAPCD is notified in writing at least fourteen (14) days before the beginning of the activity or in accordance with a procedure approved by the district.

b. All the following dust control measures are implemented during any road construction or maintenance activity:

    1. Unpaved areas subject to vehicle traffic must be stabilized by being kept adequately wetted, treated with a chemical dust suppressant, or covered with material that contains less than 0.25 % asbestos;

    2. The speed of any vehicles and equipment traveling across unpaved areas must be no more than 15 ph unless the road surface and surrounding area is sufficiently stabilized to prevent vehicles and equipment traveling more than 15 mph from emitting dust that is visible crossing the project boundaries;

    3. Storage piles and disturbed areas not subject to vehicular traffic must be stabilized by being kept adequately wetted, treated with a chemical dust suppressant, or covered with material that contains less than 0.25 % asbestos; and

Table 3-7. Construction Control Measures

Category	Control Actions
Standard Mitigation Measures for Construction Equipment	1. Maintain all construction equipment in proper tune according to manufacturer's specifications. 2. Fuel all off-road and portable diesel powered equipment, including but not limited to bulldozers, graders, cranes, loaders, scrapers, backhoes, generator sets, compressors, auxiliary power units, with ARB certified motor vehicle diesel fuel (non-taxed version suitable for use off-road). 3. Maximize to the extent feasible, the use of diesel construction equipment meeting the ARB's 1996 or newer certification standard for off-road heavy-duty diesel engines.
Discretionary Mitigation Measures for Construction Equipment	1. Electrified equipment where feasible. 2. Substitute gasoline-powered for diesel-powered equipment, where feasible. 3. Use alternative fueled construction equipment on site where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, or biodiesel. 4. Use equipment that has Caterpillar pre-chamber diesel engines.
Construction Best Available Control Technology	1. Install diesel oxidation catalysts (DOC), catalyzed diesel particulate filters (CDPF) or other District approved emission reduction retrofit devices where feasible.
Activity Management Techniques	1. Develop of a comprehensive construction activity management plan designed to minimize the amount of large construction equipment operating during any given time period. 2. Schedule of construction truck trips during non-peak hours to reduce peak hour emissions. 3. Limit the length of the construction work-day period, if necessary. 4. Phase construction activities, if appropriate.
Fugitive Dust Source Category	1. Reduce the amount of the disturbed area where possible. 2. Use of water trucks or sprinkler systems in sufficient quantities to prevent airborne dust from leaving the site. Increased watering frequency would be required whenever wind speeds exceed 15mph. Reclaimed (nonpotable) water should be used whenever possible. 3. All dirt stock-pile areas should be sprayed daily as needed. 4. Permanent dust control measures identified in the approved project revegetation and landscape plans should be implemented as soon as possible following completion of any soil disturbing activities. 5. Exposed ground areas that are planned to be reworked at dates greater than one month after initial grading should be sown with a fast-germinating native grass seed and watered until vegetation is established. 6. All disturbed soil areas not subject to revegetation should be stabilized using approved chemical soil binders, jute netting, or other methods approved in advance by the APCD. 7. All roadways, driveways, sidewalks, etc. to be paved should be completed as soon as possible. In addition, road surface should be laid as soon as possible after grading unless seeding or soil binders are used. 8. Vehicle speed for all construction vehicles shall not exceed 15 mph on any unpaved surface at the construction site. 9. All trucks hauling dirt, sand, soil, or other loose materials are to be covered or should maintain at least two feet of freeboard (minimum vertical distance between top of load and top of trailer) in accordance with CVC section 23114. 10. Install wheel washers where vehicles enter and exit unpaved roads onto streets, or wash off trucks and equipment leaving the site. 11. Sweep streets at the end of each day if visible soil material is carried onto adjacent paved roads. Water sweepers with reclaimed water should be used where feasible.
All categories	1. Any other control measures approved by the District where necessary.

4. Activities must be conducted so that no track-out from any road construction project is visible on any paved roadway open to the public.

c. Equipment and operations must not cause the emission of any dust that is visible crossing the project boundaries.

Impact AQ-2: No Violations of Carbon Monoxide NAAQS. Traffic conditions with and without the project for existing year (2005), interim year (2015) with no build, minimum build alternative 3 and alternative 6, and design year (2035) with no build, minimum build alternative 3 and alternative 6 conditions were modeled to evaluate CO concentrations relative to the NAAQS and CAAQS. Modeled CO concentrations, including background levels, are well below the NAAQS and CAAQS. Modeled concentrations for the year 2015 are higher than concentrations for the year 2035, although peak-hour traffic volumes are higher in the year 2035. This is due to the decrease in EMFAC2002 (version 2.2) emission factors for CO from the year 2015 to the year 2035 because of continuing improvements in engine technology and the retirement of older, higher-emitting vehicles.

As previously discussed, emissions of CO concentrations are estimated for the intersections of (1) Los Osos Valley Road and Auto Park Way, (2) Los Osos Valley Road and Calle Joaquin (North), (3) Los Osos Valley Road and U.S. 101 Southbound Off Ramp – Calle Joaquin (South), (4) Calle Joaquin (South) and U.S. 101 Southbound On-Ramp, (5) Los Osos Valley Road and U.S. 101 Northbound Ramps, (6) Los Osos Valley Road and Los Verdes Drive, (7) Los Osos Valley Road and South Higuera Street, and (8) South Higuera Street and Vachell Lane. These intersections were modeled because they represent the roadways with the greatest traffic volumes and worst LOS/delay; impacts at these locations would be higher than at any of the other project-affected roadway segments. Table 3-8 summarizes the results of CO modeling, and indicates that the highest CO concentrations are not anticipated to exceed the 1- and 8- hour NAAQS and CAAQS.

Impact AQ-3: Transportation Conformity Achieved. The proposed project is included in the adopted RTP, *Vision 2025 – a Regional Transportation Plan* and adopted TIP, *2007 Transportation Improvement Program.* The proposed project is identified in Appendix 1 from the RTP as MPO ID: 222300000081, *Los Osos Valley Road Interchange Project* (San Luis Obispo Council of Governments 2005). SLOCOG's TIP identifies the proposed project as TIP ID: MPO ID: 222300000081, *Los Osos Valley Road Interchange Project* (San Luis Obispo Council of Governments 2006).

Air quality modeling conducted by SLOCOG has been conducted showing that emissions associated with the RTP and TIP are within the allowable emission budgets for ozone precursors (San Luis Obispo Council of Governments 2006). Consequently, the proposed project is considered a conforming transportation project for these regional nonattainment pollutants.

Impact AQ-4: No Generation of Significant Levels of MSAT Emissions. The area of air toxics analysis is a new and emerging issue and is a continuing area of research. Currently, there are limited tools and techniques available for assessing project-specific health impacts from MSATs, as there are no established criteria for determining when MSAT emissions should be considered a significant issue in the NEPA context.

To comply with Council on Environmental Quality (CEQ) regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information, Appendix A contains discussion regarding how air toxics analysis is an emerging field and current scientific techniques, tools, and data are not sufficient to accurately estimate human health impacts that would result from a transportation project in a way that would be useful to decision makers. Also in compliance with 40 CFR 150.22(b), Appendix A contains a summary of current studies regarding the health impacts of MSATs.

Based on the FHWA's interim guidance for MSATs, the proposed project meets the criteria for a qualitative project-level MSAT analysis, as the proposed project does not create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location, or create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000, or greater, by the design year.

When conducting a qualitative analysis, following factors should be considered:

- For projects on an existing alignment, MSATs are expected to decline unless VMT more than doubles by 2020 (due to the effect of new EPA engine and fuel standards).
- Projects that result in increased travel speeds will reduce emissions of the VOC-based MSATs (acetaldehyde, benzene, formaldehyde, acrolein, and 1, 3 butadiene); the effect of speed changes on diesel particulate matter is unknown. This speed benefit may be offset somewhat by increased VMT if the more efficient facility attracts additional vehicle trips.
- Projects that facilitate new development may generate additional MSAT emissions from new trips, truck deliveries, and parked vehicles (due to evaporative emissions). However, these may also be activities that are attracted from elsewhere in the metro region (thus, on a regional scale there may be no net change in emissions).
- Projects that create new travel lanes, relocate lanes or relocate economic activity closer to homes, schools, businesses and other sensitive receptors may increase concentrations of MSATs at those locations relative to No Action.

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions—if any—from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives, found at: http://www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm.

Table 3-8. Modeled Carbon Monoxide Concentrations (ppm) at the Intersection Location of Maximum Impact

Intersections	Study Area	Existing Conditions (Parts Per Million)		Interim Year 2015 Conditions (ppm)						Design Year 2035 Conditions (ppm)					
				No Build		Minimum Build Alt. 3		Alt. 6		No Build		Minimum Build Alt. 3		Alt. 6	
		1-hour[a]	8-hour[b]	1-hour[a]	8-hour[b]	1-hour[a]	8-hour[b]	1-hour[a]	8-hour[b]	1-hour[a]	8-hour[b]	1-hour[a]	8-hour[b]	1-hour[a]	8-hour[b]
Los Osos Valley Rd/ Auto Park Way	1	10.3	6.1	5.6	3.3	5.6	3.3	5.6	3.3	3.2	1.8	3.2	1.8	3.2	1.8
Los Osos Valley Rd/ Calle Joaquin	2	10.0	5.9	5.7	3.4	5.7	3.4	5.7	3.4	3.2	1.8	3.2	1.8	3.2	1.8
Los Osos Valley Rd/ U.S. 101 SB Off-Ramp	3	10.0	5.9	5.6	3.3	5.6	3.3	--	--	3.2	1.8	3.2	1.8	--	--
Calle Joaquin (So)/ U.S. 101 SB On-Ramp	4	6.3	3.7	--	--	--	--	5.6	3.3	--	--	--	--	3.2	1.8
Los Osos Valley Rd/ U.S. 101 NB Ramps	5	9.3	5.5	5.4	3.2	5.4	3.2	5.4	3.2	3.2	1.8	3.2	1.8	3.2	1.8
Los Osos Valley Rd Los Verdes Dr	6	7.8	4.6	4.6	2.7	4.6	2.7	4.6	2.7	3.0	1.7	3.0	1.7	3.0	1.7
Los Osos Valley Rd/ South Higuera St	7	10.6	6.3	5.7	3.4	5.7	3.4	5.7	3.4	3.2	1.8	3.2	1.8	3.2	1.8
South Higuera St/ Vachell Lane	8	10.7	6.4	5.7	3.4	5.7	3.4	5.7	3.4	3.2	1.8	3.2	1.8	3.2	1.8

Notes: Background concentrations of 2.6 ppm and 1.5 ppm were added to the modeling 1-hour and 8-hour results, respectively.
Intersection eliminated with Alternative denote as "- -"

[a] The federal and state 1-hour standards are 35 ppm and 20 ppm, respectively.

[b] The federal and state 8-hour standards are both 9 ppm.

For the Build Alternatives, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT. The total vehicle delay estimated for each of the Build Alternative is slightly lower than that for the No Build Alternative, because the additional capacity increases the efficiency of the improvements to the roadway interchange. This decrease in vehicle delay at the interchange may lead to an increase in VMT would lead to higher MSAT emissions for the action alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to the EPA's MOBILE6 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models.

Emissions will likely be lower than present levels in the design year as a result of the EPA's national control programs that are projected to reduce MSAT emissions by 57–87% between 2000 and 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Impact AQ-5: No Generation of Operation-Related Emissions of Ozone Precursors, Carbon Monoxide, and Particulate Matter in Excess of San Luis Obispo County Air Pollution Control District Standards. Long-term air quality impacts are those associated motor vehicles operating on the roadway network, predominantly those operating in the project vicinity. Emission of ROG, NO_x, CO, and PM10 for base year (2005) interim year (2015) with no build, alternative 3, and alternative 6, and design year (2035) with no build, alternative 3, and alternative 6 project conditions were evaluated through modeling conducted using the ARB's EMFAC2002 (version 2.2) emission rate program.

The EMFAC2002 model and traffic data provided by Fehr & Peers (Fehr & Peers 2006) were used to estimate project-level, operation-related emissions of ozone precursors (ROG and NO_x), CO, and PM10.

Project-level emissions were obtained by comparing future with project alternative emissions to future no build alternative emissions. Future year emissions modeling was conducted for both interim year (2015) and design year (2035) scenarios. Table 3-9 presents the results of these calculations and indicates that the criteria pollutants for all alternatives are anticipated to be below the SLOAPCD's thresholds indicated in Table 3-4.

Table 3-9. Motor Vehicle Emissions for Cumulative Conditions (Pounds/Day)

Condition	ROG	NO_X	CO	PM10
Existing year (2005)	6.94	15.48	91.81	0.71
Interim year (2015)				
No Build	2.95	6.73	39.89	0.72
Alternative 3	2.37	6.97	39.40	0.67
Alternative 6	2.30	7.05	39.60	0.66
Design year (2035)				
No Build	0.58	1.45	10.33	0.72
Alternative 3	0.47	1.54	11.11	6.56
Alternative 6	0.48	1.60	11.56	6.83
Interim year (2015) with alt. 3 - interim year (2015) no project				
Alternative 3 – No Build	-0.58[a]	0.24	-0.49[a]	-0.06[a]
Alternative 3 – No Build	-0.65[a]	0.32	-0.29[a]	-0.07[a]
Design year (2035) with alt. 6 – design year (2035) no project				
Alternative 6 – No Build	-0.12[a]	0.09	0.77	5.84
Alternative 6 – No Build	-0.10[a]	0.16	1.23	6.11
SLOAPCD thresholds of significance	*25*	*25*	*550*	*25*

Note: Emissions calculations are based on EMFAC2002 Model.

[a] These negative values are due to the fact that vehicular emission rates are anticipated to lessen in future years due to continuing improvements in engine technology and the retirement of older, higher emitting vehicles.

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Appendix A Compliance with 40 CFR 1502.22

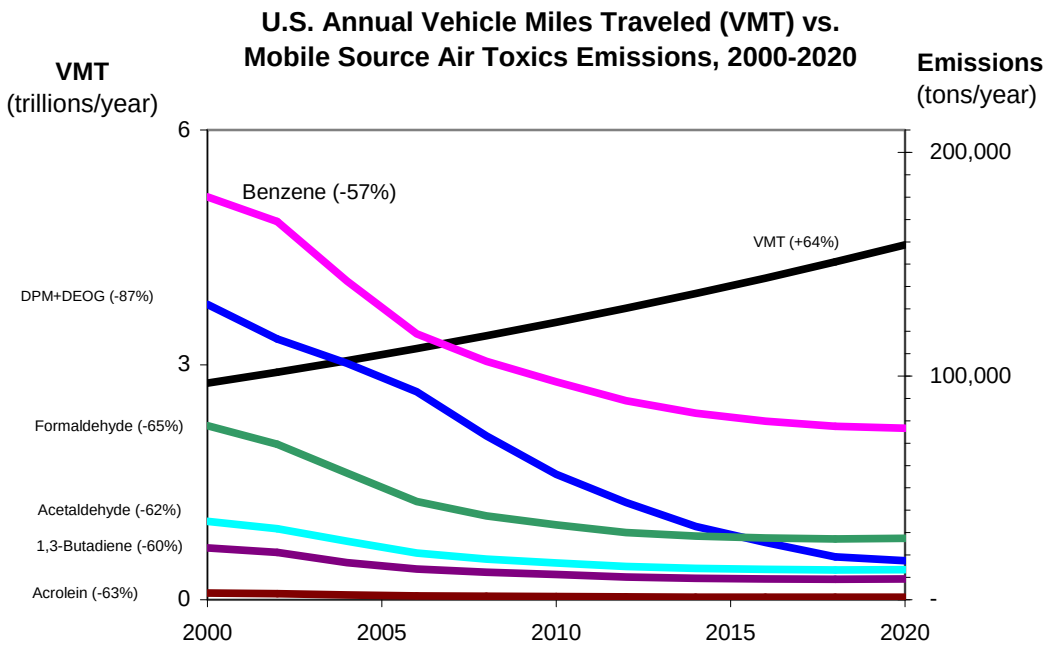
This text is taken from the FHWA's Interim Guidance on Air Toxic Analysis in NEPA Documents, Appendix C (Federal Highway Administration 2006).

Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. The EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources. 66 FR 17229 (March 29, 2001). This rule was issued under the authority in Section 202 of the Clean Air Act. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent, as shown in the following graph:



Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. MTBE proportion of market for oxygenates is held constant, at 50%. Gasoline RVP and oxygenate content are held constant. VMT: *Highway Statistics 2000*, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "DPM + DEOG" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and SO4 from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns.

As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

Unavailable Information for Project Specific MSAT Impact Analysis

This report includes a basic analysis of the likely MSAT emission impacts of this project. However, available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the alternatives in this report. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information:

Information that is Unavailable or Incomplete

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by

technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

1. Emissions: The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model--emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

   These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

2. Dispersion: The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

3. Exposure Levels and Health Effects: Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel

patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at <http://www.epa.gov/iris>. The following toxicity information for the six prioritized MSATs was taken from the IRIS database Weight of Evidence Characterization summaries. This information is taken verbatim from EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- **Benzene** is characterized as a known human carcinogen.
- The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.
- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.

- **Diesel exhaust** (DE) is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases.
- **Diesel exhaust** also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes -- particularly respiratory problems[1]. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of Impacts Based Upon Theoretical Approaches or Research Methods Generally Accepted in the Scientific Community

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

[1] South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); Highway Health Hazards, The Sierra Club (2004) summarizing 24 Studies on the relationship between health and air quality); NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles, Environmental Law Institute, 35 ELR 10273 (2005) with health studies cited therein.

In this document, FHWA has provided a quantitative analysis of MSAT emissions relative to the various alternatives, (or a qualitative assessment, as applicable) and has acknowledged that (some, all, or identify by alternative) the project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.