
V. ENVIRONMENTAL IMPACT ANALYSIS

J. TRANSPORTATION AND TRAFFIC

INTRODUCTION

This section describes the results of the transportation analysis conducted by Dowling Associates to evaluate the potential transportation and traffic related impacts of the proposed project. Supporting data for this analysis is provided in Appendix I.

ENVIRONMENTAL SETTING

Figure V.J-1 illustrates the project site at 3355 Petaluma Boulevard South. The figure also shows the current aggregate plant location at 1601 Petaluma Boulevard South.

Roadways in the area include:

- Highway 101 is a four-lane highway in the immediate project vicinity. South of Petaluma Boulevard South, Highway 101 transitions to an expressway class facility. Highway 101 provides the major transportation link between Sonoma County and Marin County and to San Francisco and Oakland further to the south.
- Petaluma Boulevard South is a two lane principal arterial roadway, which parallels the Petaluma River from its origin at the Highway 101/Petaluma Boulevard South northbound off-ramp to Downtown Petaluma.
- Landing Way is a minor private roadway serving a number of riverfront parcels to the east of Petaluma Boulevard South. A record of survey provided by the County indicates that an easement has been established where Landing Way crosses the rail right-of-way. This is currently used by the Shamrock Aggregate Import facility and other users to cross the rail tracks.

Existing Traffic Conditions

Dowling Associates studied the following intersections because of the project's potential to create level of service impacts:

1. Petaluma Boulevard South at Project Driveway
2. Petaluma Boulevard South at Highway 101 Northbound (NB) On-Ramp
3. Petaluma Boulevard South at Landing Way
4. Petaluma Boulevard South at Highway 101 Southbound (SB) Ramps

Dowling derived existing traffic volumes at each of the study intersections from studies performed between 2003 and 2004 (see Volume II, Appendix I). Based on guidance from County staff, Dowling increased the volumes by two percent annually to account for traffic growth between previous counts and the baseline year of this analysis (2006). All of the study intersections are currently unsignalized.

Through movements and right turns originating along Petaluma Boulevard South were all uncontrolled at the time the existing conditions were evaluated. Left turns from Petaluma Boulevard South and movements from

side streets are under STOP control. Recent improvements to the intersection of Petaluma Boulevard South at Highway 101 southbound ramps are considered under near-term cumulative conditions. Existing turning movements are illustrated in Figure V.J-1.

Traffic observations on northbound Petaluma Boulevard South indicate that about 11 percent of the total traffic consists of heavy trucks or buses. During a traffic observation made in June 2006, the 85th percentile speed on Petaluma Boulevard South, just north of the Highway 101 northbound off-ramp, was just less than 60 miles per hour.

Existing Levels of Service

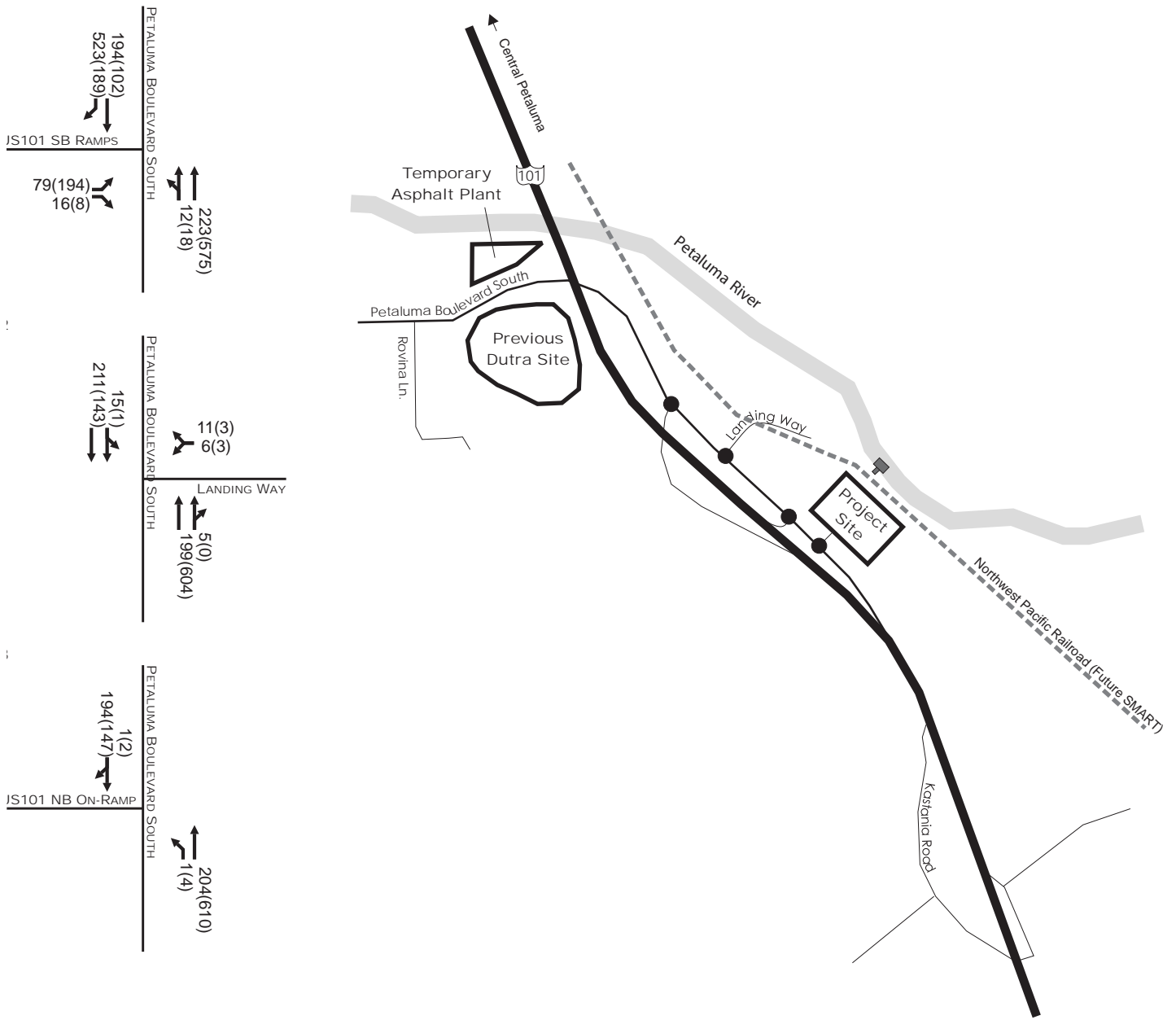
Levels of service (LOS) were calculated for existing conditions at the study intersections using the 2000 Highway Capacity Manual methodology (Transportation Research Board, 2000). The levels of service reported for all-way STOP control intersections were determined based on overall intersection average delay in seconds.

According to the Sonoma County level of service policy, the threshold for intersection level of service is LOS E. Facilities that operate at LOS E or worse are considered deficient. Table V.J-1 shows existing intersection levels of service. Downstream highway operations can affect intersection operations, but this source of congestion is addressed separately in the subsection entitled "Highway Operations."

As illustrated in Table V.J-1, all study intersections operate acceptably, and none meet peak hour warrants for signalization.

**Table V.J-1
Existing Conditions Intersection LOS Summary**

Location	AM		PM	
	Delay	LOS	Delay	LOS
Petaluma Blvd. South at Hwy 101 SB Ramps				
NB ThruLeft	9.2	A	7.9	A
EB Left	11.3	B	14.5	B
EB Right	9.4	A	8.9	A
Petaluma Blvd. South at Landing Way				
SB ThruLeft	7.7	A	8.8	A
WB Approach	9.7	A	12.5	A
Petaluma Blvd. South at Hwy 101 NB Ramp				
NB Left	7.7	A	7.6	A



Source: Dowling Associates, 2006.



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Figure V.J-1
Location Map and
Existing Turning Movements

Queuing

Table V.J-2 shows existing queues. The eastbound (EB) approach of the southbound (SB) Highway 101 off-ramps to Petaluma Boulevard South is assumed to serve primarily left turns, so the "short" lane is the right turn lane, although there is no clear marking dividing the two. Estimates are rounded to the nearest 25 feet reflecting the storage requirements for a passenger vehicle. Existing storage is adequate to accommodate expected queues.¹

**Table V.J-2
Existing Queues**

Location	Estimated Storage (feet per lane)	95 th Percentile Queue (feet per lane)	
		AM Peak Hour	PM Peak Hour
Petaluma Blvd. South / Highway 101 SB Ramps			
NB Left Turn	600	25	25
EB Left Turn	>1000	25	50
EB Right Turn	50	25	25
Petaluma Blvd. South / Landing Way			
SB Left Turn	600	25	25
Petaluma Blvd. South / Highway 101 NB On-Ramp			
NB Left Turn	450	25	25

Accident History

Collision records indicate that 22 accidents occurred along Petaluma Boulevard South from the northbound off-ramp to the southbound ramps in the period from 2003 to 2005. The primary factor in nine of these accidents was stated as failure to yield the right-of-way. This could be taken as an indication of inadequate controls at several of the study intersections. Three of the collisions, each at the intersection of Petaluma Boulevard South and Highway 101 southbound ramps, were caused by vehicles traveling the wrong way on the ramps. Four of the collisions involved trucks; one of these was at the same intersection with Highway 101 southbound ramps.

Highway Operations

Table V.J-3 summarizes existing highway operations in the vicinity of the Highway 101/Petaluma Boulevard South interchanges. The minimum acceptable level of service threshold applied to these facilities is LOS D. Under existing AM peak hour conditions, the southbound segment of Highway 101 south of Petaluma Boulevard South operates at LOS F. The merge of the southbound on-ramp operates at LOS F based on the principle that traffic merging with a facility that is over-saturated is typically, by definition, over-saturated. The other ramp merges and diverges operate acceptably at LOS C or better. Observations of northbound PM

¹ The distances provided adequately account for the likelihood that at the 95th percentile any queued vehicles would be a truck because trucks are converted to passenger car equivalents (and i.e. requiring up to 75 feet of storage).

peak hour traffic on Highway 101 indicate that this traffic is subject to break down in flow. As a result, the computed levels of service on northbound Highway 101 may be better than what drivers experience because the counts are attenuated by stop and go traffic. This is noted throughout this EIR section.

The northbound on-ramp from Petaluma Boulevard South to Highway 101 is non-standard with a radius of roughly 60 feet. Although this acceptably allows trucks to turn around the curve onto the ramp, the ramp speeds are impeded. Given the grade of the ramp, it is assumed that trucks would not begin to approach the merge at more than 20 miles per hour. At this speed, the AASHTO Greenbook recommends an acceleration distance of 1,100 feet to merge with traffic traveling 60 miles per hour.

The distance from the gore point of the ramp and the end of the lane taper is 650 feet. The merge area is only 300 feet before the acceleration lane is reduced to less than one vehicle width. This represents a serious safety concern. Trees on the east side of Highway 101 as it approaches this ramp exacerbate this problem by partially obscuring lines of sight. Existing truck trips from Dutra's temporary facility located north of the project site, including 23-ton trucks, are currently using this interchange, and project truck trips would continue to do so.

**Table V.J-3
Existing Highway Operations**

Location	LOS	
	AM	PM
Mainline Segments		
Highway 101 SB-North of Petaluma Blvd South	F	B
Highway 101 SB-South of Petaluma Blvd South	F	B
Highway 101 NB-South of Petaluma Blvd South	B	D*
Highway 101 NB North of Petaluma Blvd South	B	C*
Ramp Merge and Diverge		
SB Off-Ramp	C	B
SB On-Ramp	F	A
NB Off-Ramp	B	B
NB On-Ramp	A	B
<i>*Level of Service may be worse because traffic flow volumes are attenuated by congestion.</i>		

Existing Access and Circulation

Direct access from southbound Petaluma Boulevard South to the project site has involved illegal turns across the road on to the site. In 2007, bollards were placed in the median, preventing this maneuver. For vehicles traveling south towards the site, to avoid this substandard access condition, it is necessary for them to travel further south to Kastania Drive, then turn north on Highway 101 at the Highway 101/Kastania Drive at-grade intersection.

Several residential properties along the Petaluma River have limited access easements across the project site, allowing access to Petaluma Boulevard South. An existing access road crosses the Sonoma Marin Area Rail Transit (SMART) railroad right-of-way, providing access to the River.

Waterborne Traffic

An existing dock in use at Dutra's temporary facility north of the proposed project site currently serves barge trips. Another landing exists immediately north of the project site, at the Shamrock Aggregate site. Recreational boating facilities are located nearby in Petaluma. Existing barge traffic has been estimated at 40 trips per month on the Petaluma River. The Coast Guard regulates traffic on the Petaluma River.²

Cumulative Setting

Near-Term Cumulative Setting

Near-term cumulative conditions are existing conditions plus conditions resulting from approved and foreseeable development along Petaluma Boulevard South. Traffic from these projects has been added to existing traffic to establish near-term cumulative traffic conditions. The following background projects were considered in this scenario:

Royal Petroleum Card-Lock Gasoline Service - development of card-lock fueling stations at an existing truck stop and fueling station at 2645 Petaluma Boulevard South. This project would relocate existing Royal Petroleum operations from a site 0.5 miles north on Petaluma Boulevard South.

Shamrock Aggregate Import Facility - construction of aggregate storage, processing and conveyor systems, and replacement of existing docking facilities at an existing site at 210 and 222 Landing Way.

Novato Disposal Service - development of recycling facilities at an existing refuse sorting and transfer station at 2543 Petaluma Boulevard.

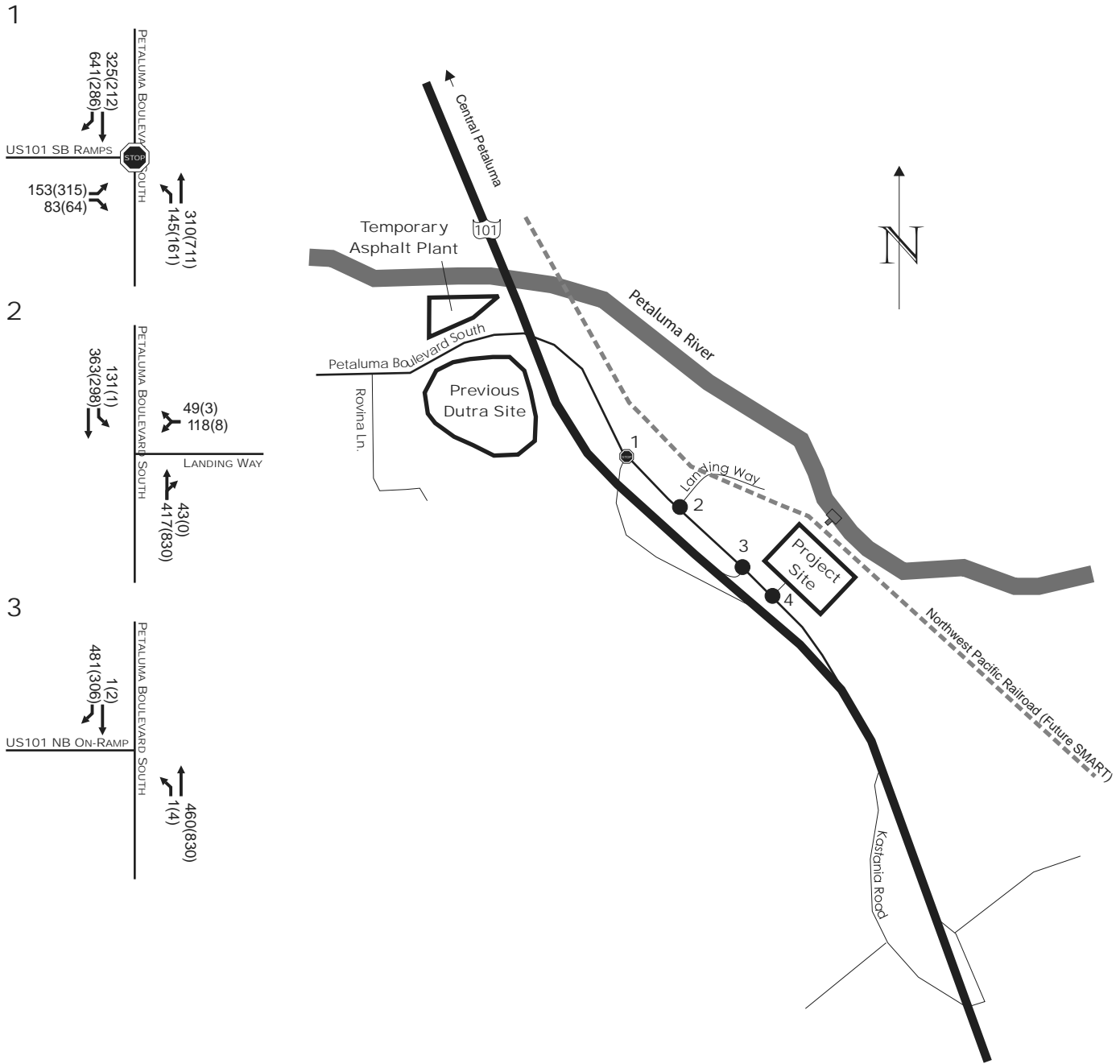
In addition to these approved projects, the background scenario evaluates foreseeable redevelopment of the quarry and the existing, temporary facility (Cumulative Impacts Evaluation, Whitlock & Weinberger Transportation, Inc., June 2004). This would consist of a residential development with 182 single family homes and 152 townhouses. Although this development is not approved³, it is included in the background scenario to provide a conservative assessment of background and background plus project conditions.

Table V.J-4 summarizes the trip generation for the background land use projects. The trip generation estimates background development projects generate 212 AM and 280 PM peak hour trips measured in passenger car equivalents (i.e. with trucks counting as three passenger cars). Figure V.J-2 shows near-term cumulative turning movements. These represent passenger car equivalents.

The County has proposed to modify Petaluma Boulevard South from the Highway 101 southbound ramps to the 101 northbound on-ramp to include a single through lane, bike lanes in each direction, and a center

² Steve Hart. "Black Point Bridge - Bridge Battle: Barge Company Rail Authority in Fight that could hinder River Traffic," *The Press Democrat*. June 25, 2005.

³ *The Petaluma City Council approved the Quarry Heights (Lomas) Residential Subdivision in February 2005, and development is underway. (Petaluma Major Development Projects List. April 2007.)*



Source: Dowling Associates, 2007.



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Figure V.J-2
Near-Term Cumulative without
Project Turning Movements

two-way left turn lane. The County recommended these modifications in previous studies to address safety concerns related to travel speeds and driveway access along Petaluma Boulevard South.

Table V.J-4
Near-Term Cumulative Trip Generation

Land Use	AM Peak Hour	PM Peak Hour
Royal Petroleum	124	124
Shamrock Aggregate	91	3
Novato Disposal	80	80
Existing Site Redevelopment	106	139
Total	401	346
<i>Source: Fehr and Peers, 2004.</i>		

Since the initiation of the study, the County has installed all-way stop control at the intersection of Petaluma Boulevard South/Highway 101 Southbound ramps and re-stripped the northbound lanes to include one through and one left turn lane. South of the northbound on-ramp bollards have been installed in the median of Petaluma Boulevard South to prevent all left turns. These improvements are considered with the Near-term Cumulative as opposed to the existing (2006) scenario.

Table V.J-5 shows near-term cumulative intersection levels of service. Under such conditions LOS becomes deficient at the intersections of Petaluma Boulevard South at Highway 101 southbound ramps during the PM peak period and for the westbound left turn from Landing Way during the AM peak period.

Table V.J-5
Near-Term Cumulative Without Project Intersection LOS

Location	Near-Term Without Project			
	AM		PM	
	Delay	LOS	Delay	LOS
Petaluma Blvd. South at Highway 101 SB Ramps	30.1	D	88.9	F
Petaluma Blvd. South at Landing Way				
SB Thru Left	8.9	A	9.7	A
WB Approach	39.3	E	20.6	C
Petaluma Blvd. South at Highway 101 NB On-Ramp				
NB Left	8.5	A	8.0	A

Table V.J-6 shows intersection queues at the 95th percentile. Note that with the modifications to Petaluma Boulevard South, northbound through movement queues would extend 800 feet, which is beyond Landing Way.

**Table V.J-6
Near-Term Cumulative Without Project Queuing**

Location	Estimated Storage (feet per lane)	95th Percentile Queue (feet per lane)	
		AM Peak Hour	PM Peak Hour
Petaluma Blvd. South / Highway 101 SB Ramps			
NB Left Turn	500	25	25
NB Through	500	50	800
SB Right Turn	>1000	250	50
SB Through	>1000	50	25
EB Left Turn	>1000	25	75
EB Right Turn	50	25	25
Petaluma Blvd. South / Landing Way			
SB Left Turn	200	25	25
Petaluma Blvd. South / Highway 101 NB On-Ramp			
NB Left Turn	450	25	25

Table V.J-7 shows near-term cumulative highway operations. Under near-term cumulative conditions, highway operations on the mainline section of Highway 101 southbound, south of Petaluma Boulevard, degrade from LOS E to LOS F. The southbound on-ramp continues to operate at LOS F whereas other facilities appear to operate acceptably.

**Table V.J-7
Near-Term Cumulative Highway Operations**

Location	LOS	
	AM	PM
Mainline Segments		
Highway 101 SB-North of Petaluma Blvd South	F	B
Highway 101 SB-South of Petaluma Blvd South	F	B
Highway 101 NB-South of Petaluma Blvd South	C	D*
Highway 101 NB North of Petaluma Blvd South	C	C*
Ramp Merge and Diverge		
SB Off-Ramp	F	B
SB On-Ramp	F	A
NB Off-Ramp	B	C
NB On-Ramp	A	B
*Level of Service may be worse because traffic flow volumes are attenuated by congestion.		

2020 Cumulative Conditions

The cumulative analysis was performed for a horizon year of 2020 to reflect conditions with foreseeable General Plan growth. Dowling obtained 2020 traffic from the Sonoma County model for the highway segments. The model incorporates a number of transportation and land use projects that comprise the cumulative setting. The 2020 model includes widening of Highway 101 north and south of the Petaluma Boulevard South interchanges to include High Occupancy Vehicle (HOV) lanes. The 2020 forecasts do not anticipate any interchange improvements as this was not included in the forecasting model and the Marin Sonoma Narrows (MSN) project was not fully funded at the time of the circulation of the Notice of Preparation. Considerations relating to completion of the MSN project are considered under the subheading "Marin Sonoma Narrows Project" incorporated at the end of the discussion of impacts and mitigations below.

On Petaluma Boulevard South, the results of the model did not reflect substantial background traffic growth. As a result, existing and near-term project traffic were increased by a growth factor of two percent per year. This is consistent with growth trends.

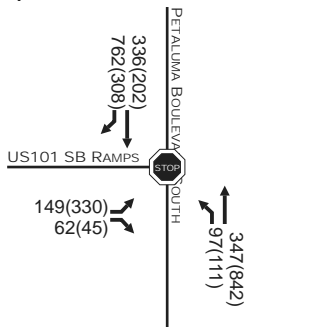
SMART Passenger Rail - The Sonoma-Marin Area Rail Transit District (SMART) proposes to use the tracks for commuter rail service from Cloverdale to Larkspur. Nearby stations would be located in Downtown Petaluma and Novato. Peak hour service is expected to run on 30-minute headways. The right-of-way would incorporate a pedestrian/bike path along its entire length. SMART has primary jurisdiction over the Northwest Pacific Railroad right-of-way, including air rights. The forecasts do not assume that any travel is taking place on the SMART railroad. No reductions have been made to the vehicle forecasts on the basis of rail ridership. The SMART railroad is only addressed to evaluate the project impact on the rail right-of-way.

Other Background Development - In addition to the projects specified under near term cumulative conditions the model also includes growth consistent with minor land use proposals throughout Sonoma County. The official travel demand forecasting model, the 2020 Sonoma County Model, includes all foreseeable background growth and transportation improvements throughout the region.

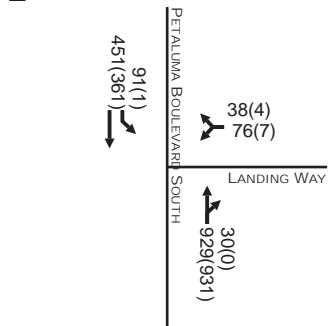
Figure V.J-3 shows projected lane configurations and peak hour intersection turning movements at the study intersections.⁴ Table V.J-8 shows 2020 cumulative intersection levels of service. Under cumulative 2020 conditions, Petaluma Boulevard South/Highway 101 southbound ramps would operate unacceptably at LOS F during the PM peak hour while the westbound left turn from Landing Way onto Petaluma Boulevard South would operate at LOS F during the AM peak period. Peak hour signal warrants would not be met at any of the unsignalized intersections.

⁴ *Minor adjustments to volumes have been made to account for links not included in the model; in this case the interchange proposal includes fronting roadways along the highway to provide access to properties south of Petaluma Boulevard South. For cumulative analysis a minimum peak hour volume of 10 vehicles per hour is used for all permissible turning movements.*

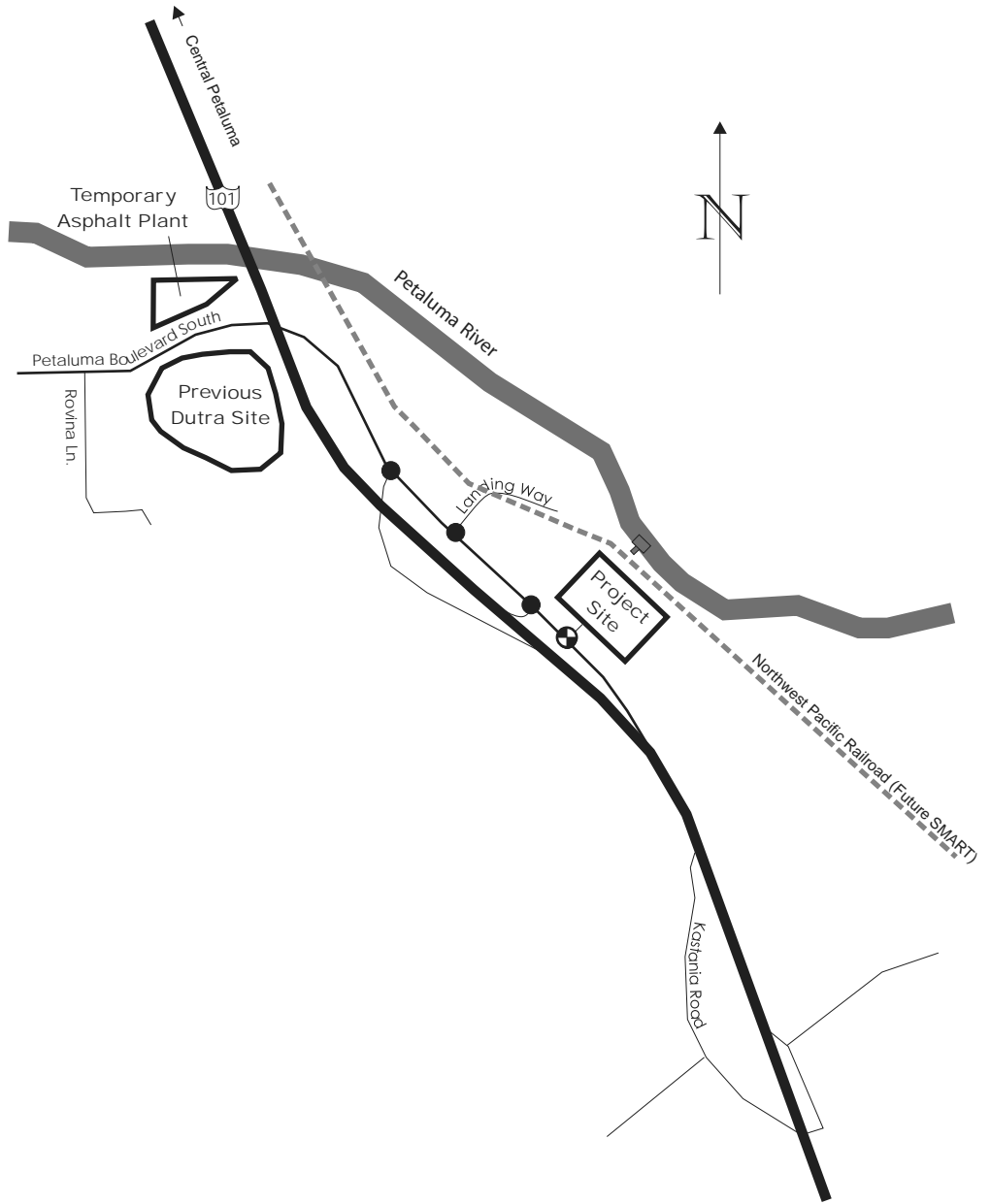
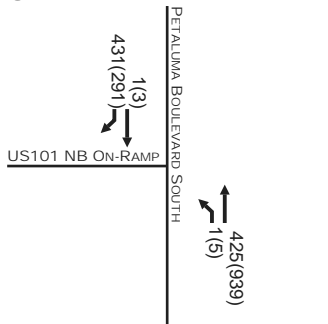
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2



3



Source: Dowling Associates, 2007.



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Figure V.J-3
Cumulative 2020 without Project
Turning Movements

**Table V.J-8
Cumulative 2020 Without Project Intersection LOS**

Location	Near-Term Cumulative Without Project			
	AM		PM	
	Delay	LOS	Delay	LOS
Petaluma Blvd. South at Highway 101 SB Ramps	53.3	F	148.7	F
Petaluma Blvd. South at Landing Way				
SB Thru Left	11.1	B	10.2	B
WB Approach	108.4	F	23.6	C
Petaluma Blvd. South at Highway 101 NB On-Ramp				
NB Left	83.3	A	8.0	A

Table V.J-9 illustrates queuing conditions under cumulative 2020 conditions. Note that the northbound queues at the Petaluma Boulevard South/Highway 101 southbound ramps intersection would extend beyond the available storage during the PM peak period.

**Table V.J-9
Cumulative 2020 Without Project Queuing**

Location	Estimated Storage (feet per lane)	95th Percentile Queue (feet per lane)	
		AM Peak Hour	PM Peak Hour
Petaluma Blvd. South / Highway 101 SB Ramps			
NB Left Turn	500	25	25
NB Through	500	50	1275
SB Right Turn	>1000	525	50
SB Through	>1000	50	25
EB Left Turn	>1000	25	75
EB Right Turn	50	25	25
Petaluma Blvd. South / Landing Way			
SB Left Turn	200	25	25
Petaluma Blvd. South / Highway 101 NB On-Ramp			
NB Left Turn	450	25	25

Under cumulative conditions the highway would be expanded to include an HOV lane in each direction. Under cumulative conditions the southbound segments north and south of Petaluma Boulevard South would operate unacceptably during the AM peak hour. The southbound on-ramp would operate unacceptably during the AM peak period. Table V.J-10 summarizes highway operations analysis.

**Table V.J-10
Cumulative 2020 Highway Operations**

Location	LOS	
	AM	PM
Mainline Segments		
Highway 101 SB-North of Petaluma Blvd South	D	B
Highway 101 SB-South of Petaluma Blvd South	F	B
Highway 101 NB-South of Petaluma Blvd South	B	D*
Highway 101 NB North of Petaluma Blvd South	B	C*
Ramp Merge and Diverge		
SB Off-Ramp	C	B
SB On-Ramp	F	A
NB Off-Ramp	B	B
NB On-Ramp	A	B
<i>*Level of Service may be worse because traffic flow volumes are attenuated by congestion.</i>		

REGULATORY SETTING

Federal and State

No Federal policies and/or regulations would supersede local transportation guidelines. The Caltrans' Guidelines for the Preparation of Traffic Impact Studies establishes the methodologies for the evaluation of impacts to State facilities. These are consistent with the thresholds of significance outlined in Appendix G of the CEQA Guidelines, the local policies and guidelines associated with circulation and transportation as defined by Sonoma County.

Regional and Local

The applicable transportation and traffic policies contained in the Sonoma County General Plan are analyzed in the Policy Analysis in Section V.H (Land Use). Additionally, applicable policies outlined within the Petaluma Daily Belt Area Plan are analyzed in further detail in Section V. H (Land Use).

The U.S. Coast Guard has jurisdiction over waterborne traffic along the Petaluma River. The Coast Guard's policy is to refer changes to traffic along the San Francisco Bay and tributary waterways before the Harbor Safety Committee for a hearing before issuing findings. The Harbor Safety Committee is the body mandated by the State to adopt and review a Harbor Safety Plan for the San Francisco Bay and tributary waterways. The Harbor Safety Committee works with the Coast Guard in an advisory role to propagate guidelines for safe navigation of tankers, barges and other commercial vessels.

ENVIRONMENTAL IMPACTS

Proposed Project

The proposed project consists of relocating an existing asphalt facility from a site approximately one mile north of the proposed Haystack Landing site. The proposed facility would produce asphalt, recycled asphalt and concrete products, and general aggregate construction materials such as sand and rock, accessible by truck for public works and private construction projects in southern Sonoma County and Marin County. Figure V.J-4 shows the project site layout and major circulation paths.

The project site is located adjacent to the Highway 101 northbound off-ramp and is divided by the SMART railroad tracks. A barge off-loading facility would be constructed in the Petaluma River (Area A) for use in the delivery of raw materials for aggregate processing on-site.

The new asphalt plant would operate similarly as it currently does at the nearby existing site, with little change in the hours of operation or number of employees. This consists of operation from 6 AM to 6 PM, Monday through Friday with ten employees on site. The proposed facility is anticipated to process 664,175 tons of material annually.

As discussed in Section III (Project Description), the site would receive 500,000 tons of material annually by barge. This would result in roughly 125 annual barge trips along the Petaluma River. Material would be transported from the barge onto the new dock and then to the processing areas on-site by way of an elevated conveyor. This conveyor would be constructed 24 feet above the ground in order to clear the SMART railroad tracks and on-site truck circulation paths.

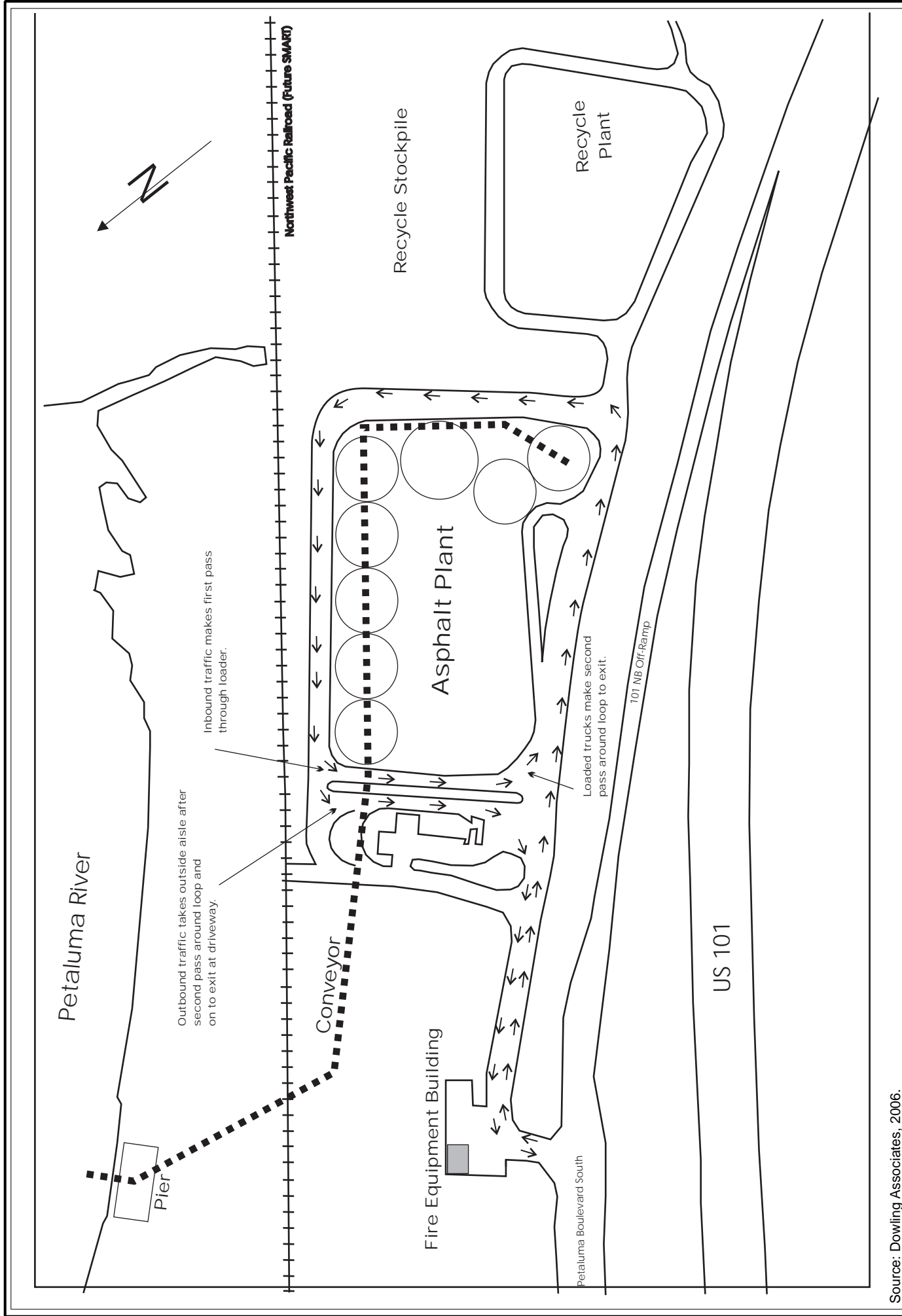
Recycled asphalt product (RAP) and concrete, derived from construction and demolition projects in the region, would be imported and processed on the site. Materials coming in via truck would include approximately 150,000 tons of RAP and concrete.

The proposed project also includes the relocation of the San Antonio Volunteer Fire Department to the project site.

Improvements to Petaluma Boulevard South

As described in Section III (Project Description), the project would make improvements to Petaluma Boulevard South. The applicant has committed to reconstructing the road to bring the northbound and southbound lanes of Petaluma Boulevard South to the same level. The preliminary plans provided by the applicant include a cross-section between the project site and the northbound on-ramps providing one southbound lane, one northbound left turn lane, one northbound through lane, and one northbound acceleration lane extending 560 feet north of the project driveway. Barriers would be installed opposite of the project driveway as no access points would be provided south of the project site.

The proposed driveway would be elevated above the existing driveway, and a vegetation-free buffer has been required for a minimum setback of 20 feet from the public right-of-way. As a result of these improvements a clear line-of-sight would exist between the project driveway and the gore point of the northbound off-ramp 1,200 feet further to the south. This is adequate site distance for off-ramp traffic.



Source: Dowling Associates, 2006.



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Figure V.J-4
Project Site Layout

According to the Caltrans Highway Design Manual, a stopping distance of 600 feet is adequate at 60 miles per hour. The safety of inbound left turns would benefit from stopping distances in excess of the minimum, as they would be visible from the gore point of the ramp.

The County would require that the project driveway meet its standard commercial driveway standards. The final requirements would be consistent with the Highway Design Manual and any design requirements of the San Antonio Volunteer Fire Department. The Northbound (inbound) right turn lane would be served by a deceleration lane with 575 feet of deceleration distance. Figure V.J-5 shows the preliminary site access condition with the proposed improvements to Petaluma Boulevard South. Note that in the final design the northbound and southbound approach lanes would need to be designed for transition to eliminate the existing offset.

As a condition of approval for the project the County expects to require an asphalt overlay from Highway 101 northbound exit ramp (within Caltrans right-of-way) to north of northbound Highway 101 hook ramp intersection for lane striping continuity.

Start-Up Phase

The project may undergo a start-up period where aggregate production at the site would draw material primarily from the San Rafael quarry prior to completion of the barge off-loading facility. The applicant has indicated that this phase would entail temporarily trucking in aggregate to sustain a scaled down level of production. Potential impacts related to this start-up period are considered under the subheading entitled "Start-up Phase" below.

As mentioned above, the project also includes an equipment building and training facility for the San Antonio Volunteer Fire Department. The building would provide storage for four vehicles. It is anticipated that up to 150 emergency calls would occur per year in addition to training activities scheduled during non-peak commute hours.

Trip Generation

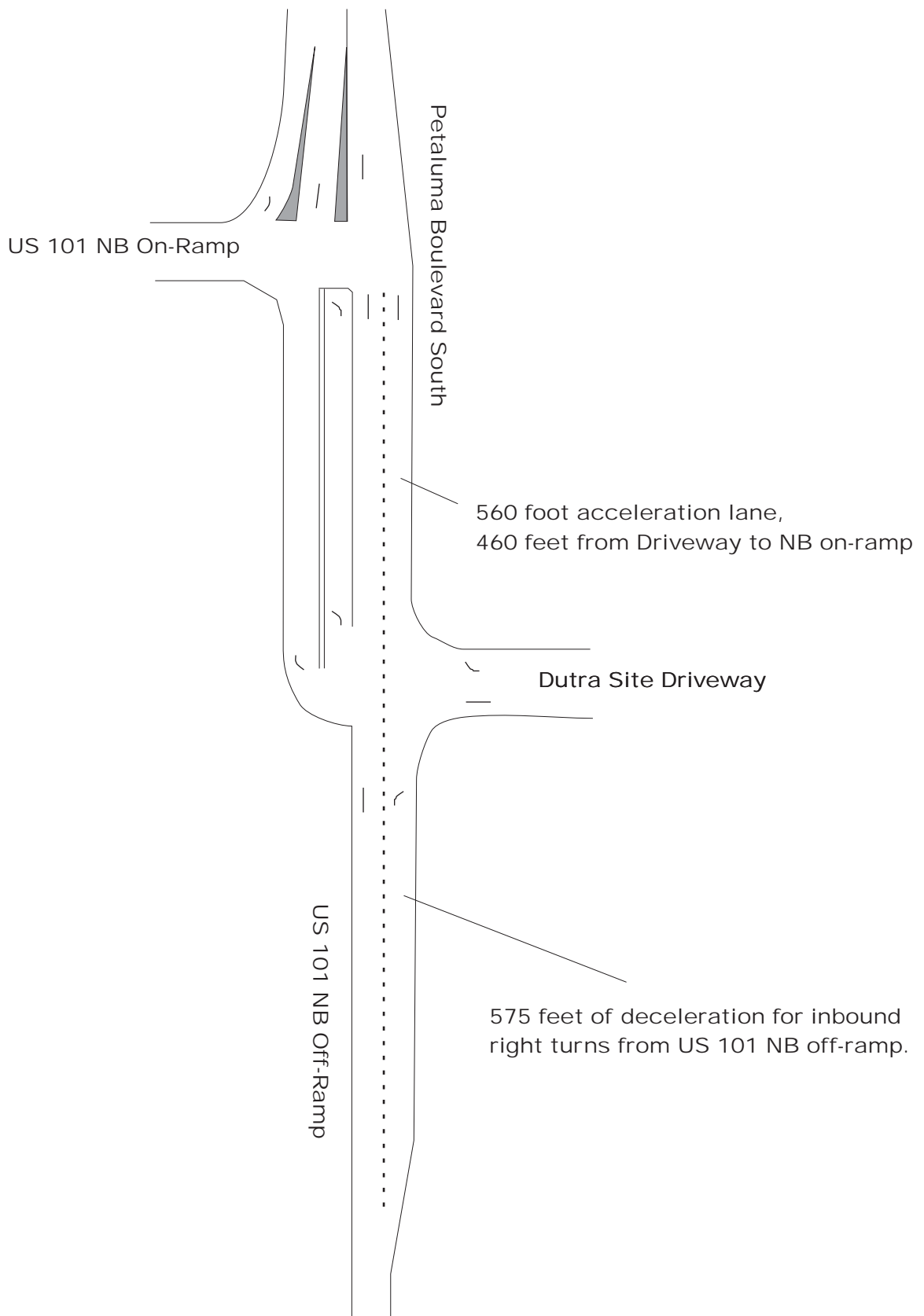
Project traffic impacts are evaluated by adding project trip generation to background levels of traffic. Project trip generation is established by converting the amounts of material imported and exported to the site into trips based on the capacity of each conveyance.

The methodology for calculating project traffic is described below and illustrated in Table V.J-11. The contribution of miscellaneous traffic is also described and shown. After project trip generation is determined these trips must be assigned to the study network for analysis. At the traffic assignment stage, it is important to remove traffic that currently is generated at the temporary facility.

New Truck Traffic Assumptions

The truck and barge trip generation is established by converting loads into trips based on load capacity. The annual throughput of material through the site is obtained from the project description. It is assumed that all importing conveyances leave the site empty and that all exporting conveyances arrive at the site empty. In the next step, the annual traffic is converted to average daily traffic by dividing the annual traffic generation by 250 working days per year. The truck traffic is then adjusted to include a seasonal peaking factor. Based on previous studies, the County has set the factor at three (3.0). This adjustment results in the average peak

daily traffic. Daily truck traffic is converted into hourly truck traffic by dividing the peak daily traffic by ten hours, which assumes hauling occurs from 6 AM to 4 PM and that no hauling occurs from 4 PM to 6 PM. This assumption is consistent with the observations provided by Fehr and Peers at the existing temporary facility (see Appendix I). Each truck trip is evaluated as three passenger car equivalents, as is consistent with other County Studies. Note that exhibits in the study reflect trips in terms of actual vehicles and not passenger car equivalents.



Source: Dowling Associates, 2006.



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Figure V.J-5
Preliminary Site Access Proposal

The project description indicates that the material importation would be conducted using a mix of barges and 23 ton trucks, while exportation would be conducted using a mix of trucks from 1-ton light pickups to 23-ton trucks, with an average of 12-tons per truck assumed.

Non-Truck Vehicle Traffic Assumptions

Additional traffic would be generated by the San Antonio Volunteer Fire Department's vehicle trips to and from the fire facility proposed on-site. It is assumed that vehicle trips to and from the San Antonio Volunteer Fire Department facility would not occur during peak hours.

Total New Trip Generation at Project Site

The total new trip generation is obtained by adding the truck and non-truck vehicle traffic assumptions summarized above. Table V.J-11 summarizes total new project trip generation. On the basis of the trip generation, assessment of an aggregate fee consistent with Sonoma County's Aggregate Resource Management (ARM) Plan would be required. The applicant would be required to pay the ARM fee on the basis of the increment of new truck traffic generated by the project.

**Table V.J-11
New Project Trip Generation**

Description	Amount	Mode and Capacity	Barge Trips			Trips			
			In	Out	TOT	In	Out	TOT	
IMPORT									
Aggregate	425,000 tons	Barge	4,000 tons	106	106	213			
Sand	75,000 tons			19	19	38			
Crumb Rubber	675 tons	Truck	23 tons				29	29	59
Recycled Asphalt & Concrete	150,000 tons						6,522	6,522	13,043
Water Tank	3,250,000 gals	Tanker	10,000 gallons				325	325	650
Asphalt Oil*	*3,172,000 gals	Truck					317	317	634
Subtotal	650,675 tons 6,422,000 gals			125	125	250	7,193	7,193	14,387
EXPORT									
Aggregate	245,800 tons	Truck	12 tons				20,483	20,483	40,967
Sand	43,375 tons						3,615	3,615	7,229
Recycled Asphalt	150,000 tons						12,500	12,500	25,000
Asphalt	225,000 tons						18,750	18,750	37,500
Subtotal	664,175 tons			0	0	0	55,348	55,348	110,696
Total Annual Trips							62,541	62,541	125,082
Average Annual Daily Traffic (AADT) (= Annual / 250 work days per year)				0.5	0.5	1	250	250	500
Adjusted Daily Trips (with Peaking Factor = AADT x3.0)				2	2	3	750	750	1501
AM Peak Hour Truck Trips (= Daily Trips / 10 hours per day)							75	75	150
PM Peak Hour Truck Trips (none based on existing pattern)							0	0	0
AM Peak Hour Passenger Care Equivalents (= Truck Trips x 3)							225	225	450
PM Peak Hour Passenger Care Equivalents (= Truck Trips x 3)							0	0	0
Peak Hour Non-Truck Vehicle Trips									
AM Peak Trips (Employee Trips only)							10	0	10
PM Peak Trips (Employee Trips only)							0	10	10
Total Peak Hour Trip Generation									
Total Trips AM							235	225	460
Total Trips PM							0	10	10
* 3,172,000 gallons of oil equals 13,500 tons									
Source: Fehr and Peers, 2004.									

Calculation of ARM Fee

The County has determined that the basis for calculating the ARM fee for the proposed project will be the difference between the annual asphalt production from the proposed project and the baseline asphalt production from the existing temporary site. This allows the applicant to receive the appropriate level of credit for the baseline level of production.

Under the proposed project the site would export 225,000 tons of asphalt per year. County staff has determined that the baseline condition is best represented by the five-year average asphalt production at the temporary facility. This five-year average has been calculated to be 131,500 tons of asphalt per year. The difference, which represents the project increment, is therefore 93,500 tons per year.

As established under the section on trip generation above, the average capacity of vehicles used to export asphalt from the site is 12 tons. Therefore, the annual increment of asphalt production traffic will be 7,792 vehicles. The ARM fee can be assessed upon the proposed project based on a net increment of 93,500 tons per year and 7,792 annual truck trips.

Trip Distribution

The distribution of project trips was based upon existing travel data, information contained in the Fehr and Peers Study, and information supplied by the applicant. Table V.J-12 shows the project's estimated macro distribution. It should be noted that this distribution is subject to some fluctuation given the distribution of customers for the asphalt material.

**Table V.J-12
Project Trip Distribution**

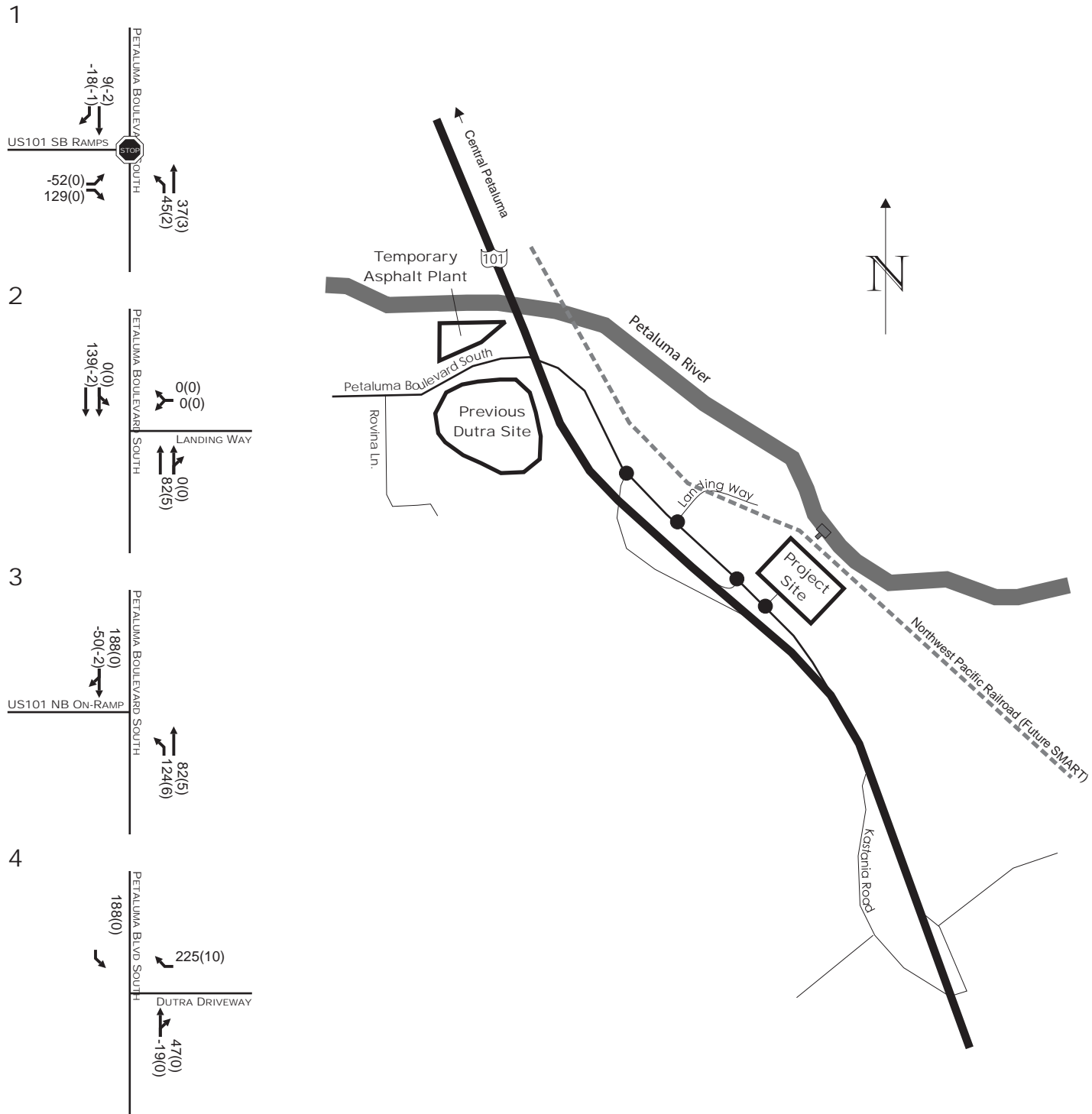
Distribution	To / From
55%	Highway 101 to / from the North
25%	Petaluma Blvd South to / from the West
20%	Highway 101 to / from the South

Figure V.J-6 shows the micro distribution, or assignment, of project trips. Trips are shown as passenger car equivalents, so truck trips are represented as three passenger car trips each. As trips are assigned, new project trip generation is added to the network at study locations, while traffic from the temporary facility is deducted from turning movements.

Baseline Peak Hour Traffic

Peak hour baseline traffic was counted at the driveway of the temporary site and recorded in the 2004 Fehr and Peers Study, Dutra Asphalt Relocation Project. Baseline peak hour traffic is 130 AM and 10 PM peak hour passenger car equivalents (PCE). When the temporary facility is eliminated, this traffic will be shifted to the new site and is already reflected in the project trip generation.

Figure V.J-7 shows the final existing plus project turning movements. This represents the peak hour "delta" or increment between the baseline and the project conditions. The peak hour baseline as represented by the observed driveway volumes is assumed to be representative of the average asphalt production activity at the temporary site.



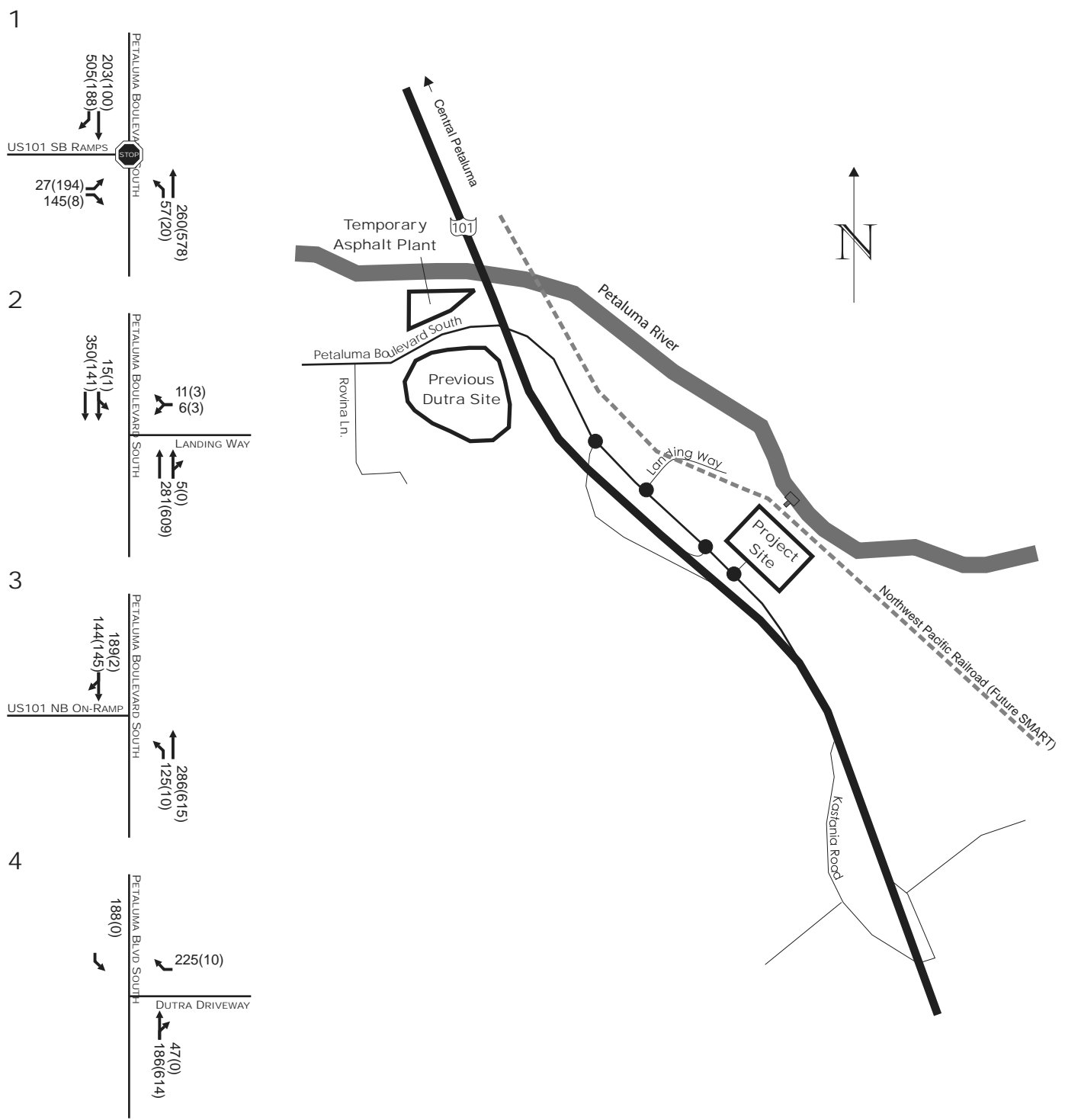
Source: Dowling Associates, 2007.



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Figure V.J-6
Project Traffic Assignment



Source: Dowling Associates, 2007.



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Figure V.J-7
Existing Plus Project
Turning Movements

Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, a project would have a significant transportation/traffic impact if it would:

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number or vehicle trips, the V/C ratio on roads, or congestion at intersections);
- Exceed, either individually or cumulatively, a LOS standard established by the county congestion management agency for designated roads or highways;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access;
- Result in inadequate parking capacity; or
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

The following are Sonoma County criteria:

Intersection LOS Criteria

Intersection LOS criteria apply to all signalized, all-way stop controlled, and side street controlled intersections with project traffic volumes over 30 vehicles per hour on any approach or exclusive left turn movement.

The thresholds apply to unsignalized intersections only where peak hour signal warrants are satisfied. This incorporates the evaluation of warrants at unsignalized intersections between public roads and private driveways. This represents a refinement of the Sonoma County Traffic Assessment Guidelines, particularly in that the guidelines do not explicitly contemplate the evaluation of signal warrants at private driveways. It is appropriate in this case given the nature of the traffic along Petaluma Boulevard South and the volume of traffic at the proposed project driveway and at Landing Way.

The County level of service standard for intersections is LOS D or better. A project would have a significant traffic impact if the project's traffic would cause an intersection currently operating at an acceptable level of service (LOS D or better) to operate below standard (LOS E or F).

If an intersection currently operates, or is projected to operate below the County standard at LOS E, an impact is identified if the project causes the LOS to further degrade to LOS F. If an intersection is already operating at LOS F, the project's impact is significant and cumulatively considerable if it causes the delay to increase by five seconds or more. The delay would be determined by comparing intersection operations with and without the project's traffic for both the existing baseline and project future conditions.

Delay on side streets where traffic does not satisfy peak hour warrants is considered a less-than-significant impact.

Highway LOS Impact Criteria

Highway facilities, including highway mainline segments and ramp merge and diverge areas, would normally be evaluated based on Caltrans urban area level of service threshold which is LOS D. A project would result in a significant impact if it would cause degradation from LOS D to LOS E. For facilities already operating at LOS E, significant impacts would result if the project would cause the level of service to degrade to LOS F. Where facilities already operate at LOS F, a significant impact would result if the project adds any additional peak hour traffic.

Queuing Impact Criteria

The project would cause significant intersection queuing impacts if it would cause queues to extend beyond available storage or contribute to existing queues that already extend beyond the available storage area.

Traffic Impact Safety Criteria

The project would cause a significant impact to traffic safety if it would cause traffic movements that are unsafe, or includes design features that conflict with established standards.

Transportation Policy Impact Criteria

The project would cause a significant impact if it would cause conditions that are not consistent with the adopted plans and policies of state or local agencies, or agencies with planning jurisdiction over transportation routes and facilities.

Issues Not Analyzed Further

Section IV (Summary of the Initial Study) of the Draft EIR discusses the use of the Initial Study to scope the potential impacts evaluated in this Draft EIR. The Transportation and Traffic impacts that the Initial Study determined would not rise to the level of significance are discussed below but do not require further analysis in this section. This includes the following:

- The project would not result in inadequate emergency access.
- The project would not result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.
- The project would not result in inadequate parking capacity.
- The project would not conflict with adopted policies, plans, or programs supporting alternative transportation.

Start-up Phase

Depending on the timing of project approvals, there may be a period where some production would take place on the site prior to completion of the barge off-loading facility. In this situation, all of the material would be trucked to the site, with 80 percent expected to come from the San Rafael quarry. The applicant has established that the amount of production during start-up would be reduced in comparison to the build out production levels and has supplied figures for the amount of import and export activity at the site during the temporary start up-period. Table V.J-13 shows the level of import and export activity at the site and converts

this into AM peak hour trips. Since PM peak hour trips only consist of employee trips, and these are not expected to change, PM trips are not considered in the start-up condition.

**Table V.J-13
Start-up Production and AM Peak Hour Traffic**

Material	Amount	Capacity/ Vehicle	Vehicles	Trips per day @ 250 work days per year	Adjusted AADT ¹ (w/Peaking factor=3.0)	Peak Hour Trips @ 10 hrs/day	PCE ²	In	Out	Total
IMPORT										
Asphalt Oil*	*3,172,000 gals	10,000 gals	317	1	4	0	3	3	3	6
Aggregate	260,000 tons	23 tons	11,304	45	136	14	42	42	42	84
Sand	47,000 tons	23 tons	2,043	8	25	2	9	9	9	18
Crumb Rubber	675 tons	23 tons	29	0	0	0	3	3	3	6
Total Import								57	57	114
EXPORT										
Aggregate	155,000 tons	12 tons	12,197	52	155	16	48	48	48	96
Sand	28,175 tons	12 tons	2,348	9	28	3	9	9	9	18
RAP**	50,000 tons	12 tons	4,167	17	50	5	15	15	15	30
Asphalt	138,000 tons	12 tons	11,500	46	138	17	42	42	42	84
Total Export								114	114	228
Subtotal								171	171	342
AM Peak Hour Employee Trips								10	0	10
Total AM Peak Hour Trips								181	171	352
¹ Annual Average Daily Traffic ² Passenger Car Equivalents *3,172,000 gallons of oil equals 13,500 tons ** Recycled Asphalt Product										

The total traffic, 352 peak hour trips, is less than the 460 AM peak hour trips expected for the full build out production conditions.⁵ The distribution of the traffic is slightly different under the two situations. The delivery of aggregate during the start-up phase would follow a pattern of 80 percent from the San Rafael quarry from the south, and 20 percent from the north on Highway 101 (rather than the 20 percent from the south, 55 percent from the north and 25 percent from the west for all other traffic). As a result, traffic on the Highway 101 northbound off-ramp, the Highway 101 southbound off-ramp and at the northbound left turn

⁵ Note also that for the Start-up condition, the rate of traffic assumed for raw aggregate import is within the allowable limit established for the San Rafael Quarry of 30 per hour (ESA, 2007, San Rafael Rock Quarry Amended Quarry Permit Initial Study).

at Petaluma Boulevard South/Highway 101 Ramps would be 20 passenger car equivalents higher than under the full build out condition (roughly 7 trucks).

The increment additional traffic at these three locations occurring during the start-up phase has been evaluated for intersection levels of service, queuing and freeway impacts. There are no impacts resulting from the start-up phase that exceed what is anticipated for conditions with the project's production process in full operation.

Project Impacts and Mitigation Measures for Project Build Out Conditions

Project impacts are evaluated by comparing traffic conditions and measures of performance with project traffic against the significance criteria described above. Mitigation measures listed below for the project's significant traffic impacts would be required in addition to the project's proposed improvements to Petaluma Boulevard South described above and in Section III (Project Description).

Impact TRANS-1 Intersection Level of Service Impacts

Table V.J-14 shows existing plus project intersection levels of service in 2006 at the time the study was initiated. Subsequent roadway improvements and traffic from projects approved but not yet constructed at that time are included in the near-term cumulative scenario, rather than the existing (2006) conditions. All intersections operate acceptably under existing plus project conditions. None of the intersections warrants signals. Impacts related to intersection level of service would be *less than significant* and no mitigation measures are required.

**Table V.J-14
Existing and Existing Plus Project Intersection Levels of Service**

Location	Existing				Existing Plus Project			
	AM		PM		AM		PM	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Petaluma Blvd South at Highway101 SB Ramps								
NB Thru Left	9.2	A	7.9	A	9.5	A	7.9	A
EB Left	11.3	B	14.5	B	12.2	B	14.7	B
EB Right	9.4	A	8.9	A	10.3	B	8.9	A
Petaluma Blvd South at Landing Way								
SB Thru Left	7.7	A	8.8	A	7.8	A	8.9	A
WB Approach	9.7	A	12.5	B	10.4	B	12.6	B
Petaluma Blvd South at Highway 101 NB On-Ramp								
NB Left	7.7	A	7.6	A	8.4	A	7.6	A
Petaluma Blvd south at Project Driveway								
SB Left	-	-	-	-	8.2	A	0.0	A
WB Right	-	-	-	-	11.1	B	12.7	B

Impact TRANS-2 Queuing Impacts

Queuing is shown in Table V.J-15. At no location would the existing plus project queue longer than available storage at the 95th percentile. Although the project would add truck traffic to the northbound left turn lane from Petaluma Boulevard South to the US 101 northbound on-ramp, significant queues would not form because there is a very low volume of cross traffic headed southbound on Petaluma Boulevard South. Impacts related to queuing would be *less than significant* and no mitigation measures are required.

**Table V.J-15
Existing Plus Project Queuing**

Location	Estimated Storage (feet per lane)	95th Percentile Queue (feet per lane)	
		AM Peak Hour	PM Peak Hour
Petaluma Blvd. South / Highway 101 SB Ramps			
NB Left Turn	500	25	25
EB Left Turn	>1000	25	75
EB Right Turn	50	25	25
Petaluma Blvd. South / Landing Way			
SB Left Turn	200	25	25
Petaluma Blvd. South / Highway 101 NB On-Ramp			
NB Left Turn	450	25	25
Petaluma Blvd South / Project Driveway			
SB Left Turn	100	25	25

Impact TRANS-3 Highway Impacts

The project would add traffic to ramp movements and to Highway 101 mainline in both directions. Under existing conditions the highway mainline operates unacceptably in the southbound direction during the AM peak hour. Additional traffic from the project would exacerbate already unacceptable conditions; therefore, this is a *significant* impact. County staff indicate that although flow volumes are not high in the northbound direction during the PM peak hour, this is often because highway flow breaks down. Additional truck traffic would exacerbate this condition. This is a *potentially significant* impact. The project would also add traffic to the congested southbound ramps during the AM peak hour. This is also a *significant* impact. Overall, the project creates *significant* impacts to Highway 101 operations. Table V.J-16 summarizes highway operations.

**Table V.J-16
Existing and Existing Plus Project Highway Operations**

Location	Existing		Existing Plus Project	
	LOS		LOS	
	AM	PM	AM	PM
Mainline Segments				
Highway 101 SB-North of Petaluma Blvd South	F	B	F	B
Highway 101 SB-South of Petaluma Blvd South	F	B	F	B
Highway 101 NB-South of Petaluma Blvd South	B	D*	C	D*
Highway 101 NB-North of Petaluma Blvd South	B	C*	C	C*
Ramp Merge and Diverge				
SB Off-Ramp	F	B	F	B
SB On-Ramp	F	A	F	A
NB Off-Ramp	B	B	B	C
NB On-Ramp	A	B	A	B
<i>*Level of Service may be worse because traffic flow volumes are attenuated by congestion.</i>				

Mitigation Measure TRANS-3a

The project shall be conditioned to require a fair share contribution towards the planned construction of High Occupancy Vehicle (HOV) lanes along the highway mainline. The added HOV capacity would improve highway operations to a minimum level of service (LOS E) in the southbound direction south of Petaluma Boulevard South. This would be an improvement over the existing conditions of LOS F.

This is a planned improvement that Caltrans intends to serve existing traffic and background growth in traffic, therefore the project's fair share would be computed as a proportion of total near term cumulative traffic.

The project sponsor shall fund a fair share towards any planned interchange improvements for the Highway 101/Petaluma Boulevard South interchange project. Since improvements have been planned and are intended to address existing conditions, and not simply future growth, a fair share is calculated as the project share of total peak hour traffic on the northbound and southbound ramps. Such an interchange is planned by Caltrans as part of the Marin Sonoma Narrows Project. Participation by the project sponsor would need to be coordinated with Caltrans. The future dedication of Caltrans right-of-way situated within the project site for the Highway 101/Petaluma Boulevard South interchange project may be used in part or all of the fair share contribution.

Mitigation Measure TRANS-3b

The project shall be conditioned to prohibit material export during the PM peak period from 4 PM to 6 PM. The trip generation determination assumes that no truck traffic would occur during the PM peak hour, based on existing patterns at the temporary site. The condition would eliminate the potential for some truck traffic to slip through during the PM peak hour. County staff anticipates that Caltrans input would be required.

Impact TRANS-4 Safety Impacts

The path of trucks onto Petaluma Boulevard South and between the project driveway and the Highway 101 northbound on-ramp would create potential conflicts with traffic exiting on the northbound Highway 101 off-ramp. Because traffic exits Highway 101 at speeds around 60 miles per hour, sufficient gaps in the off-ramp traffic must be provided to allow trucks to enter. The applicant's proposed acceleration lane would allow trucks to enter Petaluma Boulevard South with smaller gaps in the northbound Highway 101 off-ramp traffic, but would create a weaving problem.

The acceleration requirements for the entering traffic can be analyzed by reference to AASHTO and other studies on the acceleration requirements of heavy trucks. Weaving is assessed by considering the space available for the weaving maneuver.

Acceleration of Northbound Trucks

The proposed acceleration lane would extend 560 feet north from the project driveway and would terminate just north of the northbound on-ramps. The American Association of State Highway and Transportation Officials' (AASHTO) reference, A Policy on Geometric Design of Highways and Streets (referred to as the Greenbook) indicates that the minimum acceleration distance for a design vehicle to travel from stop to merge with 45 mile per hour traffic is 560 feet, which matches the proposal. The design vehicle is assumed to have a weight-to-power ratio of 100 pounds-to-horsepower, however, which does not represent a fully loaded 23-ton truck. When fully loaded, such larger capacity vehicles would have a substantially higher weight-to-power ratio. National Cooperative Highway Research Program (NCHRP) Report 505-Review of Truck Characteristics specifies a more appropriate ratio of 180 pounds-to-horsepower. Given this parameter, the appropriate acceleration distance would be 800 feet. The NCHRP report acknowledges that this parameter may lead to excessive acceleration distances, but given that the weight-to-power ratio of a fully loaded 23-ton capacity truck may exceed 200 pounds-to-horsepower, it is evident that 560 feet is potentially inadequate.

Weaving from Driveway to Highway 101 Northbound Ramps

The Highway Capacity Manual establishes a methodology to evaluate weaving between two high-speed highway facilities, but not to evaluate weaving between driveways and surface streets like Petaluma Boulevard South. Instead, the weave must be evaluated by judging the dimensions of the area available for it to occur.

The proposed access would force northbound project truck traffic on Highway 101 to weave across the northbound through lane to make left turns onto the on-ramp, this must occur within 460 feet neglecting any queues. So even though the modified design of Petaluma Boulevard South would result in reduced speeds, trucks would be forced to accelerate, then weave, and brake all within a distance less than the minimum recommended acceleration distance. This condition is unsafe and constitutes a ***potentially significant*** impact.

Note that the weaving and acceleration concerns are not directly related to queuing for the northbound left turn at the Petaluma Boulevard South/Highway 101 northbound ramp intersection, but are a function of the short distance to the turning lane and the speed of northbound traffic. As indicated under impact TRANS-2, queuing is not significant enough to affect the weave maneuver.

Mitigation Measure TRANS-4

The project sponsor shall install an actuated signal at the new intersection of Petaluma Boulevard South at the project driveway. The applicant shall also coordinate with Caltrans and the County to design the northbound off-ramp lane and shoulder striping to "narrow" width perception in an effort to lower driver exit speeds so they are closer to posted advisory speeds. Figure V.J-8 illustrates the proposed signal.

The levels of service with signalization would be LOS B in the AM peak hour and LOS A in the PM peak hour. Outbound right turns from the driveway shall not be permitted on red. It should be noted that the intersection does not meet peak hour warrants for signalization, and given the low volume of cross traffic there is the risk that drivers along Petaluma Boulevard South may grow complacent with the signal after becoming conditioned to approaching it without being stopped by a red light. The applicant shall get Caltrans' comments on the signalized intersection mitigation for AM/PM signal timing in order to give priority to exiting Highway 101 northbound traffic and avoid excessive queuing. Advance signal detection warning devices shall be required for off-ramp traffic combined with long green times and short recall times for the northbound through movement. Lines of site to the proposed project entrance extend to the mainline of Highway 101, so this shall mitigate the impact to less-than-significant levels.

All future maintenance costs for signal maintenance shall be borne by applicant. Agreement between Caltrans and County shall be necessary for operational control.

Other Measures Considered but Rejected

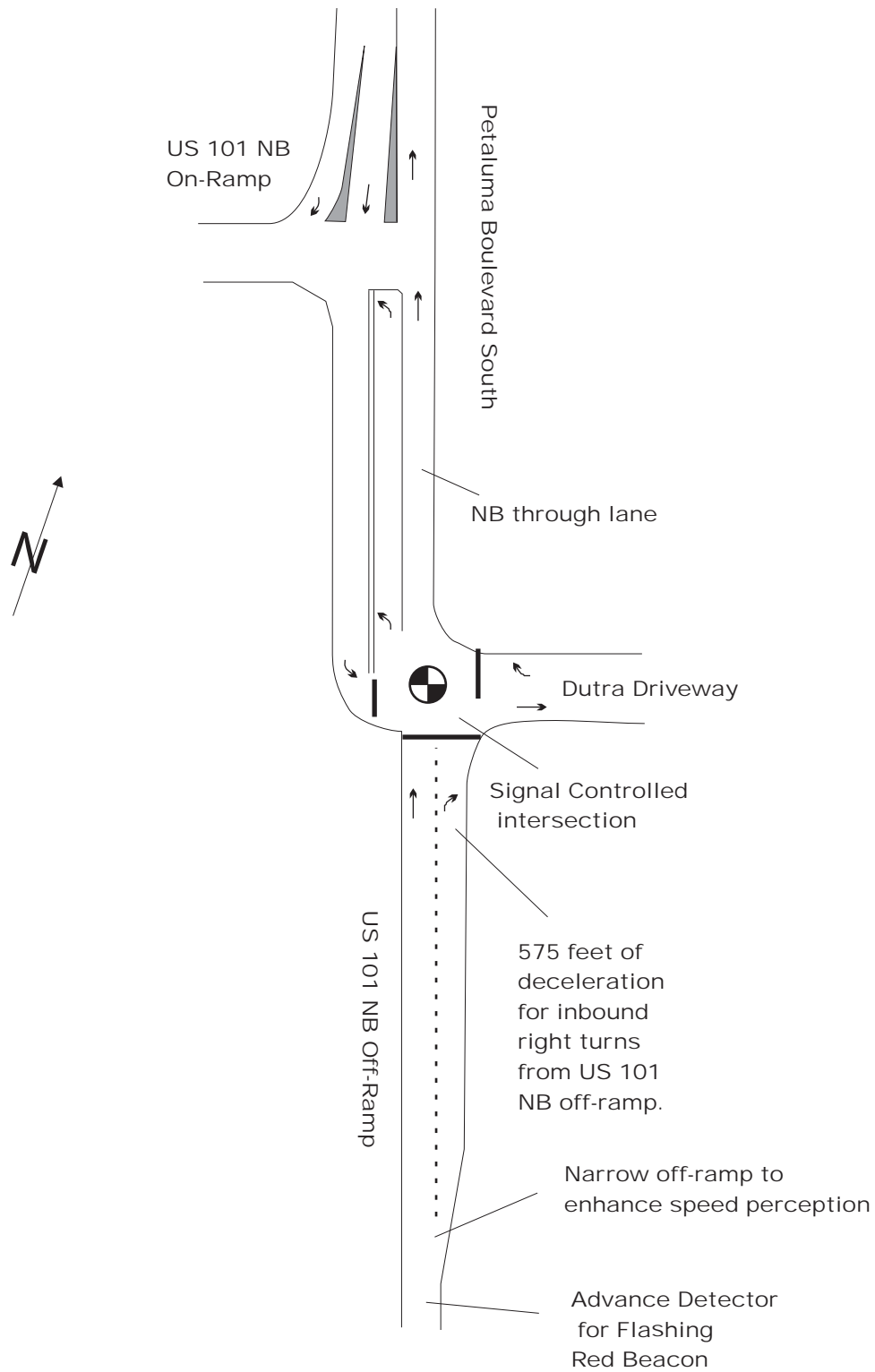
Alternative measures to address Impact TRANS-4 were considered but rejected. Elimination of the acceleration lane was considered but this would force trucks to wait for larger gaps in Highway 101 northbound off-ramp traffic. Given the speed of off-ramp traffic and the truck acceleration requirements, elimination of the acceleration lane would cause an increased risk of rear end collisions, a significant secondary safety impact. Mitigation Measure TRANS-4 (signalization of the intersection) addresses that risk by providing a gap for exiting vehicles to enter the northbound lanes.

Installation of all-way STOP signs at the new intersection of Petaluma Boulevard South and the project driveway was also considered, along with supplementing the STOP signs with a flashing red STOP beacon (per Manual of Uniform Traffic Control Devices Standard 4K.05) actuated by approaching vehicles on the project driveway. Although this would have the benefit of eliminating the need for the outbound acceleration lane from the project driveway, it would cause a PM peak hour LOS impact of F at the new intersection, a significant secondary impact.

Impact TRANS-5 *Barge Operation Impacts*

The project description calls for imported material to be brought to the site by barge. Dutra proposes to employ 4,000-ton-capacity barges that would be pushed up the Petaluma River from the San Pablo Bay on a rising tide. Unloading would take up to about four hours, then the tugs would push the empty barges back to be reloaded. The project would generate 125 round trips per year. Given the applicant's familiarity with barge operations in the Petaluma River as a result of the temporary asphalt facility, no significant impacts are anticipated relative to coordination with the existing barge traffic along the River. Impacts would be *less than significant*.

Mitigation TRANS-4 Signal Control



Source: Dowling Associates, 2007



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Figure V.J-8
Mitigation Measure TRANS-4

CUMULATIVE IMPACTS

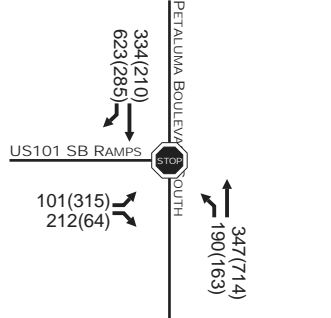
Impact TRANS-6 Near-Term Cumulative Impacts

Project traffic was added to existing traffic and traffic from cumulative projects along Petaluma Boulevard South to evaluate near-term project impacts. This would include development of Shamrock Aggregate, Novato Disposal, Royal Petroleum and redevelopment of the previous Dutra Quarry site with residential uses. The roadway improvements listed under the Cumulative Setting section are not included here, but instead later under "Cumulative 2020" impacts.

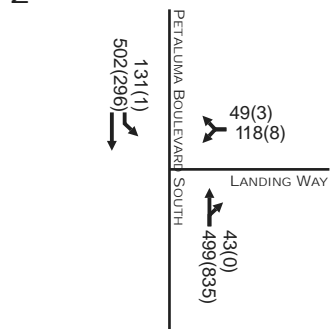
Figure V.J-9 shows intersection turning movements. Table V.J-17 shows a comparison of levels of service under background with and without the proposed residential development. The intersection of Petaluma Boulevard South at Highway 101 southbound ramps would operate at LOS F with 90 seconds of delay during the AM peak hour. This is only an increase of two seconds over the no project condition; therefore, it is a *less-than-significant* impact (this intersection would be improved by mitigation measure TRANS-7, described under Near-Term Cumulative Queuing impacts below).

The westbound left turn from Landing Way onto Petaluma Boulevard South would operate at LOS F, with 80.9 seconds of delay degrading from LOS E during the AM peak hour under near-term conditions without project traffic. The increase in delay is due to the increase in project traffic along Petaluma Boulevard South, which would reduce the gaps available for vehicles to turn from Landing Way. The intersection of Petaluma Boulevard South at Landing Way does not meet peak hour warrants for signalization. Therefore, according to the significance criteria identified above, the impact is *less than significant*. The finding of less than significant will not be affected if Landing Way becomes publicly dedicated in the future to accommodate crossing the rail right-of-way. However, the Sonoma County Department of Transportation and Public Works does not at this time anticipate accepting Landing Way for dedication in the future. This analysis assumes that any future traffic along Landing Way would be limited to approved development plus traffic from the private residences at Haystack Landing, with intermittent maintenance trips to service the loading dock for the proposed project.

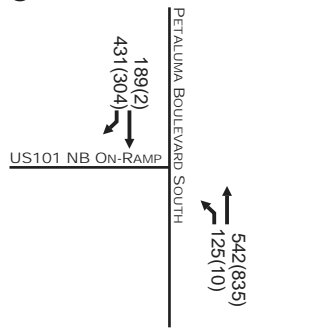
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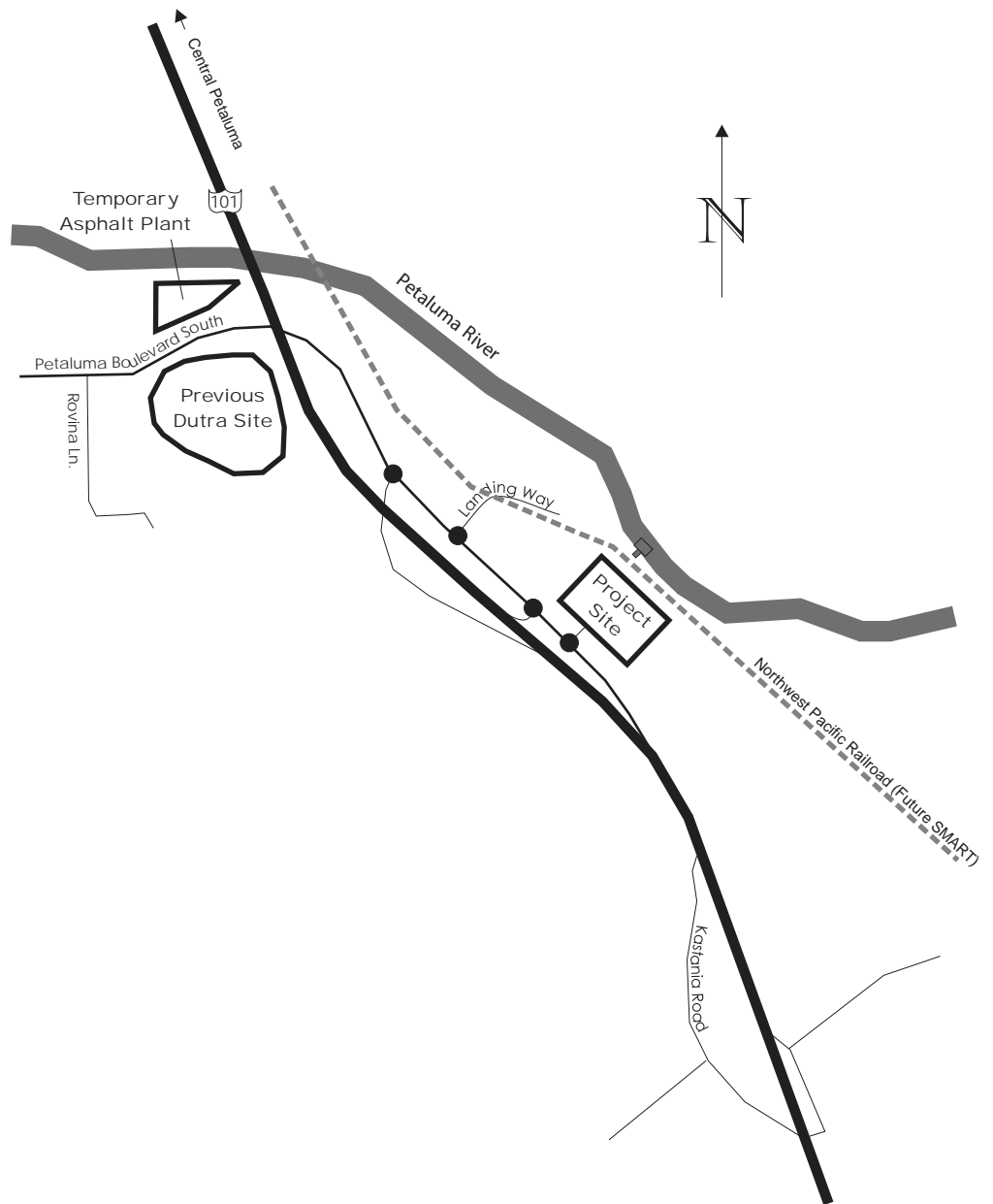
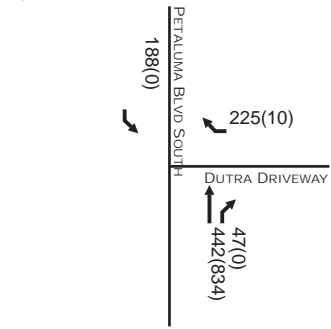
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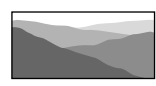
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Source: Dowling Associates, 2007.



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Figure V.J-9
 Near-Term Cumulative with Project
 Turning Movements

**Table V.J-17
Near-Term Cumulative Without and Plus Project Intersection Levels of Service**

Location	Near-Term No Project				Near-Term Plus Project			
	AM		PM		AM		PM	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Petaluma Blvd South at Highway 101 SB Ramps	30.1	D	88.9	F	34.4	D	89.9	F
Petaluma Blvd South at Landing Way								
SB Thru Left	8.9	A	9.7	A	9.2	A	9.7	A
WB Approach	39.3	E	20.6	C	78.8	F	20.6	C
Petaluma Blvd South at Highway 101 NB On-Ramp								
NB Left	8.5	A	8.0	A	9.5	A	8.0	A
Petaluma Blvd south at Project Driveway								
SB Left	-	-	-	-	9.3	A	0.0	A
WB Right	-	-	-	-	14.6	B	15.4	C

Mitigation Measure TRANS-6

The project sponsor shall provide a plan for the improvements within the public right-of-way to accommodate a paved right turn lane from Landing Way to Petaluma Boulevard. Improvements shall include a "keep clear" designation on the pavement to allow for left turn movements. All improvements shall be designed to County standards.

Private driveways could be widened to allow for left turn and right turn movements without becoming public right-of-way and/or publicly maintained.

Impact TRANS-7 Near-Term Cumulative Queuing Impacts

Table V.J-18 shows queuing under near-term cumulative with project conditions. The project contributes to additional queuing at the northbound through approach to Petaluma Boulevard South at Highway 101 southbound ramps where the queue without the project would already exceed available storage. This queue would already extend beyond Landing Way. Therefore, impacts would be **potentially significant**.

**Table V.J-18
Near-Term Cumulative Plus Project Queuing**

Location	Estimated Storage (feet per lane)	95th Percentile Queue (feet per lane)	
		AM Peak Hour	PM Peak Hour
Petaluma Blvd South / Highway 101 SB Ramps			
NB Left Turn	500	25	25
NB Through	50	75	825
SB Right Turn	>1000	300	50
SB Through	>1000	50	25
EB Left Turn	>1000	25	75
EB Right Turn	50	25	25
Petaluma Blvd South / Landing Way			
SB Left Turn	200	25	25
Petaluma Blvd South / Highway 101 NB On-Ramps			
NB Left Turn	450	25	25
Petaluma Blvd South / Project Driveway			
SB Left Turn	100	25	25

Mitigation Measure TRANS-7

The exclusive northbound left-turn lane from Petaluma Boulevard South onto the Highway 101 southbound on-ramp shall be re-striped as a shared left turn/through lane. The exclusive lane is not necessary to avoid delay or queuing on the northbound left turn. The opposing (north) leg of the intersection already has a second receiving lane and the approach is brought to a complete stop so there are no operational constraints preventing the return to a shared left turn/through configuration. Under this configuration the intersection would have improved level of service (from LOS F with 90 seconds delay in the AM to LOS E with 35.5 seconds delay). This mitigation measure would result in queuing on the northbound approach would improve from 825 feet to 125 feet on both the through and the shared lane.

Impact TRANS-8 Near-Term Cumulative Highway Impacts

The project would add trips to congested segments of southbound Highway 101 during the AM peak hour, which is a ***potentially significant*** impact. The project could potentially add traffic to northbound Highway 101 during the PM peak hour where traffic has been observed to break down which is also a potentially significant impact. The project would add traffic to the congested southbound ramps during the AM peak hour where operation would be LOS F without project traffic. This is a ***potentially significant*** impact. Overall the project has a ***significant*** impact on highway operations. Table V.J-19 summarizes highway levels of service.

**Table V.J-19
Near-Term Cumulative Without and Plus Project Highway Operations**

Location	Near-Term		Near-Term Plus Project	
	LOS		LOS	
	AM	PM	AM	PM
Mainline Segments				
Highway 101 SB-North of Petaluma Blvd South	F	B	F	B
Highway 101 SB-South of Petaluma Blvd South	F	B	F	B
Highway 101 NB-South of Petaluma Blvd South	C	D*	C	D*
Highway 101 NB-North of Petaluma Blvd South	C	C*	C	C*
Ramp Merge and Diverge				
SB Off-Ramp	F	B	F	B
SB On-Ramp	F	A	F	A
NB Off-Ramp	B	C	B	C
NB On-Ramp	A	B	B	B
<i>*Level of Service may be worse because traffic flow volumes are attenuated by congestion.</i>				

Mitigation Measure TRANS-8a

Mitigation Measure TRANS-3 (funding a fair share of the construction of planned HOV lanes, right-of-way dedication) would also address the significant impact identified in Impact TRANS-8. With this improvement the LOS would improve from LOS F to LOS E for the southbound AM condition and the impact would be reduced to less-than-significant levels. Improvements to the highway mainline are planned to address cumulative conditions and serve existing deficiencies as well as future growth. The near-term cumulative plus project condition is the ultimate scenario where the improvement would constitute a mitigation measure as it is assumed as part of the 2020 no-project cumulative condition. Therefore, the fair share is calculated based on near-term plus project conditions. It is evaluated as the project share of total peak hour mainline traffic.

The project shall fund a fair share towards the construction of any new interchange between Highway 101 and Petaluma Boulevard South. The fair share for this improvement would be calculated under cumulative 2020 plus project impacts. Such an interchange is planned by Caltrans as part of the Marin Sonoma Narrows Project. Participation by the project sponsor would need to be coordinated with Caltrans.

The future dedication of Caltrans right-of-way situated within the project site for the Highway 101/Petaluma Boulevard South interchange project may be used in part or all of the fair share contribution.

Mitigation Measure TRANS-8b

As indicated under Mitigation Measure TRANS-3b, the project sponsor shall establish that no material export occur during the PM peak hour. Caltrans input would be required.

Impact TRANS-9 Other Near-Term Cumulative Impacts

There are no near-term cumulative safety or transportation policy impacts above those identified under the existing plus project scenario under Impact TRANS-4. Therefore, additional impacts would be *less than significant* and no mitigation measures are required.

Impact TRANS-10 Cumulative 2020 LOS Impacts

Cumulative 2020 impacts are evaluated by considering cumulative 2020 traffic plus traffic from the proposed project. Table V.J-20 compares the results of the intersection level of service for cumulative conditions with and without the project. Figure V.J-10 shows projected peak hour intersection turning movements at the study intersections. Under 2020 plus project conditions, the intersection of Petaluma Boulevard South at Highway 101 southbound ramps would operate with 150 seconds of delay at LOS F. This is a *less-than-significant* impact, however, because the increase in delay would be less than two seconds above conditions without the project.

Under 2020 plus project conditions, the project causes delay on the westbound left turn from Landing Way onto Petaluma Boulevard South to increase by more than four seconds where it is already at LOS F. However, peak hour warrants were reevaluated based on 2020 plus project conditions and were not satisfied. Therefore, according to the significance criteria the impact is *less than significant*. As stated in the discussion under Impact TRANS-6, the finding is not affected if Landing Way becomes publicly dedicated in the future or by any easement granted to allow access to Haystack Landing. As stated before, it is assumed that Haystack Landing traffic would be limited to a few private residences and intermittent maintenance trips to service the loading dock.

**Table V.J-20
Cumulative 2020 Without and Plus Project Intersection Levels of Service**

Location	2020 No Project				2020 Plus Project			
	AM		PM		AM		PM	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Petaluma Blvd South at Highway 101 SB Ramps	53.3	F	148.7	F	59.7	F	150.0	F
Petaluma Blvd South at Landing Way								
SB Thru Left	11.1	B	10.2	B	11.6	B	10.2	B
WB Approach	108.4	F	23.6	C	221.4	F	23.6	C
Petaluma Blvd South at Highway 101 NB On-Ramp								
NB Left	8.3	A	8.0	A	9.3	A	8.0	A
Petaluma Blvd south at Project Driveway								
SB Left	-	-	-	-	9.1	A	0.0	A
WB Right	-	-	-	-	14.0	B	17.2	C

Mitigation Measure TRANS-10

Although Impact TRANS-10 was found to be less than significant, Mitigation Measure TRANS-6 requires the installation of exclusive right and left turning lanes, which would further improve conditions at the intersection to a delay of 148.4 seconds at LOS F.

Impact TRANS-11 Cumulative 2020 Queuing Impacts

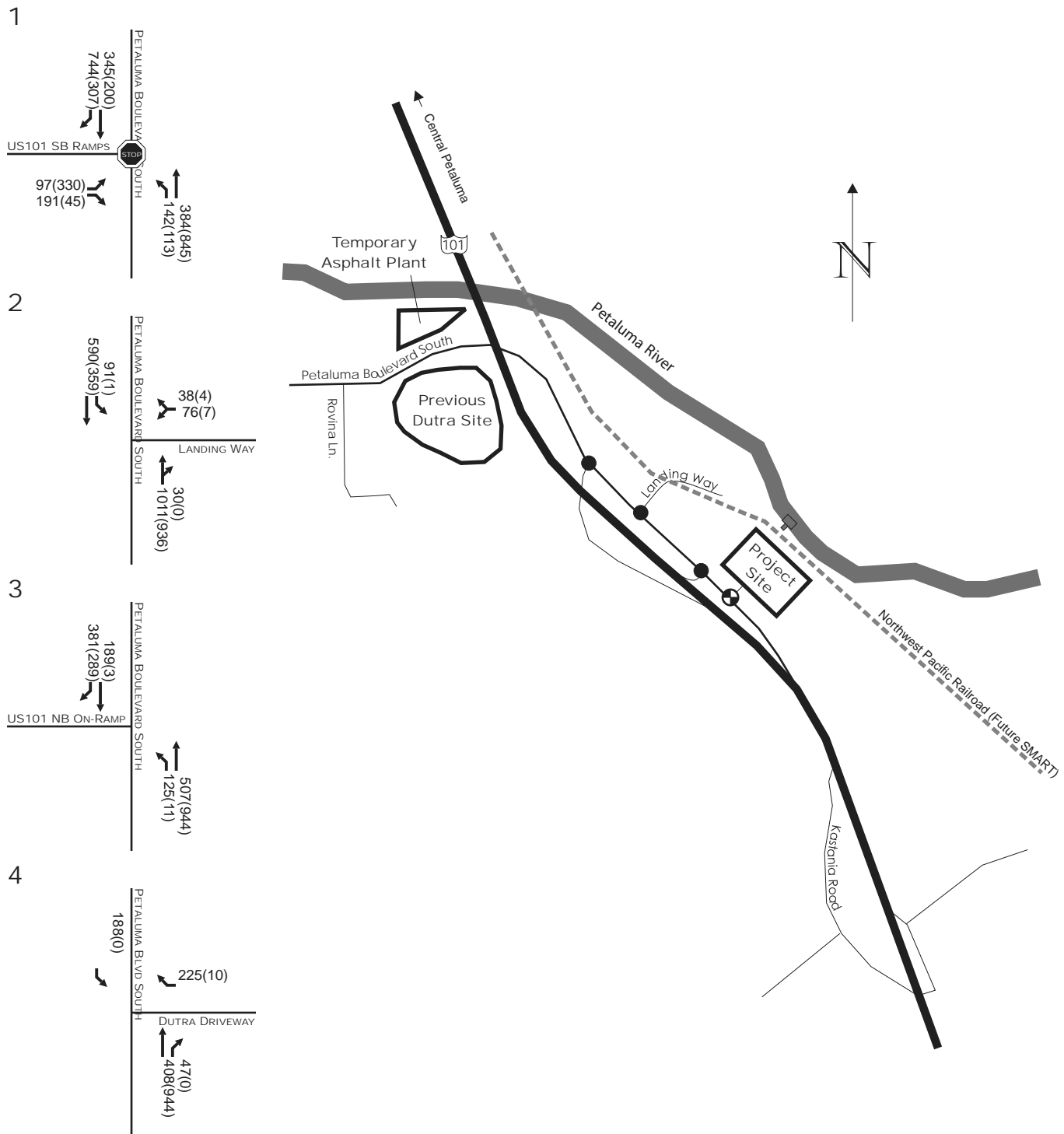
Table V.J-21 shows queuing under Cumulative 2020 with project conditions. The project would cause 95th percentile queues to grow where they already exceed available storage on the eastbound approach to the proposed Petaluma Boulevard South/Highway 101 southbound ramps intersection. The project would extend the queuing on the northbound through approach to 1,300 feet, well beyond the Landing Way intersection. This is a *significant* impact.

**Table V.J-21
Cumulative 2020 Plus Project Queuing**

Location	Estimated Storage (feet per lane)	95th Percentile Queue (feet per lane)	
		AM Peak Hour	PM Peak Hour
Petaluma Blvd South / Highway 101 SB Ramps			
NB Left Turn	500	25	25
NB Through	500	75	1300
SB Right Turn	>1000	600	50
SB Through	>1000	50	25
EB Left Turn	>1000	25	75
EB Right Turn	50	25	25
Petaluma Blvd South / Landing Way			
SB Left Turn	200	25	25
Petaluma Blvd South / Highway 101 NB On-Ramps			
NB Left Turn	450	25	25
Petaluma Blvd South / Project Driveway			
SB Left Turn	100	25	25

Mitigation Measure TRANS-11

As under near-term cumulative conditions, Mitigation Measure TRANS-7 would reduce the queuing impact to less-than-significant levels. Under 2020 plus project conditions returning to a shared left turn/through lane and an exclusive through lane on the northbound approach of Petaluma Boulevard South to the Highway 101 southbound ramps would reduce the queuing to 175 feet without adversely affecting the northbound left turn (which would also be at 175 feet). Also, the AM peak intersection level of service would improve to 60.7 seconds of delay, which is better than cumulative 2020 conditions without the project.



Source: Dowling Associates, 2007.

Impact TRANS-12 2020 Cumulative Highway Impacts

Under 2020 conditions, the segments of Highway 101 being studied would already have HOV lanes in the no project condition. This is expected to improve operations in both peak commute directions. The project would add trips to congested segments of southbound Highway 101 south of Petaluma Boulevard South during the AM peak hour, but would not cause the segment to fall from LOS E to LOS F. Therefore, according to the significance criteria this is a *less-than-significant* impact.

The project would add traffic to the Highway 101 southbound on-ramp, which is already at LOS F. This is a *significant* impact similar to Impact TRANS-3. Highway facility levels of service are shown on Table V.J-22.

**Table V.J-22
Cumulative 2020 Without and Plus Project Highway Operations**

Location	Near-Term		Near-Term Plus Project	
	LOS		LOS	
	AM	PM	AM	PM
Mainline Segments				
Highway 101 SB-North of Petaluma Blvd South	D	B	D	B
Highway 101 SB-South of Petaluma Blvd South	E	B	E	B
Highway 101 NB-South of Petaluma Blvd South	B	D*	B	D*
Highway 101 NB-North of Petaluma Blvd South	B	C*	B	C*
Ramp Merge and Diverge				
SB Off-Ramp	C	B	C	B
SB On-Ramp	F	A	F	A
NB Off-Ramp	B	B	B	B
NB On-Ramp	A	B	A	B
*Level of Service may be worse because traffic flow volumes are attenuated by congestion.				

Mitigation Measure TRANS-12a

The project sponsor shall contribute a fair share towards interchange improvements for the planned Highway 101/Petaluma Boulevard South interchange. Since improvements have been planned and are intended to address existing conditions, and not simply future growth, a fair share is calculated as the project share of total peak hour traffic on the northbound and southbound ramps.

The future dedication of Caltrans right-of-way situated within the project site for the Highway 101/Petaluma Boulevard South interchange project may be used in part to contribute to the fair share contribution.

Mitigation Measure TRANS-12b

As indicated under Mitigation Measure TRANS-3b, the project sponsor shall establish that no material export occur during the PM peak hour from 4 PM to 6 PM. Caltrans input would be required.

Impact TRANS-13a Transportation Policy Impacts

As indicated under the cumulative setting, the SMART railroad tracks located along the project site may be utilized for rail transit in the future. The proposed project is predicated upon obtaining permission to utilize an at-grade crossing and to construct a conveyor system above the tracks. The crossing would allow for access to Area A, off-loading facilities, and the barge. Trucks would need to use this crossing to access the docks when barges are scheduled, and for occasional maintenance and refueling. SMART sent a letter to the applicant in January 2007 conceptually agreeing to give permission (via an easement) for the conveyor system to cross the railroad tracks.

Agreement would be conditioned on limiting access to all of the parcels east of the railroad tracks along the waterfront to one crossing only for the Haystack Landing area. Specifically, the rail crossing at the project site would be terminated, leaving only one crossing in the area at Landing Way. Without SMART approval, neither the conveyor nor the rail crossing would be permissible. This would prevent the use of barges to import aggregate material, requiring that the resources instead be brought in by truck. Although the SMART Board has met with the project applicant, the final approval has not been obtained. Because the project sponsor does not yet have the entitlements necessary to service the site with material imported by barge, impacts would be *significant*.

Mitigation Measure TRANS-13a

The project sponsor shall obtain the necessary entitlement from SMART to allow for both a rail crossing and the conveyor system.

It is assumed that SMART will allow the conveyor to be constructed on the condition that the at-grade rail crossing be closed. This could result in a secondary impact by eliminating the local access to the Area A for project traffic and for a few private residences along the River.

To address this secondary impact the applicant/owner shall make an irrevocable offer to the County of Sonoma for a 50-foot public access and utility easement parallel to the SMART railroad tracks on APN 019-220-001 for the purposes of ingress, egress and utilities. This would preserve options for a future public roadway through Landing Way to allow access to Area A and neighboring residential properties along the River if the existing railroad crossing is closed. This measure will cause a small number of passenger vehicles to be mixed with the larger volume of truck trips along the right-of-way. This is not a substantial concern, however, because most of this traffic would be from residents who are familiar with the area and currently there are employee and other passenger vehicle trips in the area so this increase will not represent a new condition for truck drivers using this route.

The closure of the at-grade rail crossing at the project site would also increase the distance for emergency vehicles to access the residences along the River in the event of an emergency. This is not anticipated to result in a significant increase in response times to the residences along the River because the current access route to these residences through the project site includes a gate at the project entrance at Petaluma Boulevard South. The project would also include relocating the San Antonio Volunteer Fire Department to the project site.

Impact TRANS-13b Access for Neighboring Residential Land Uses

Neighboring residents currently cross part of the Landing Way easement, SMART railroad tracks, and the project site to access the County's Petaluma Boulevard South. The same access route used by these residents is also used by emergency and service vehicles as well as the project proponent. Traffic circulation impacts to these existing access arrangements may occur as a result of the proposed project because SMART has expressed concern to the applicant about allowing the continued use of the existing railroad track crossing with the installation of a new overhead conveyer. In addition, mixing residential, emergency and service vehicle traffic with the proposed site plan and asphalt manufacturing activities could also affect safe traffic circulation in and around the facility. Landing Way was viewed as a possible solution to these potential traffic circulation and access impacts because it adjoins and partly crosses the project site before connecting to Petaluma Boulevard South. However, the private properties in the project area and the underlying interests that have the recorded use of the easement is unclear. Until such time that it is clear whether access to and from Petaluma Boulevard South can be provided to these residents via Landing Way, a **potentially significant** impact to existing and proposed traffic circulation and access could occur with the implementation of the proposed project.

Mitigation Measure TRANS-13b

The applicant shall provide neighboring residents an all-weather vehicular access route to Petaluma Boulevard South. Access shall be designed, operated, maintained and recorded to the satisfaction of SMART, DTPW, PRMD and the County Fire Marshall prior to building permit issuance.

LEVEL OF SIGNIFICANCE AFTER MITIGATION

Because the County of Sonoma does not have control over whether continued use of the railroad crossing would be allowed, impacts related to Trans-13b would be **significant and unavoidable**. All other mitigation measures identified in this section would mitigate each of the significant impacts identified to **less-than-significant** levels.

Marin Sonoma Narrows Project

The Marin Sonoma Narrows Project encompasses a number of improvements to the US 101 corridor. In the project vicinity it would consist of widening of the facility and upgrading to a uniform highway class roadway. High occupancy vehicle (HOV) lanes would be added in both directions and the Petaluma Boulevard South interchanges would be consolidated into one diamond interchange served by frontage roads. On the east side, Petaluma Boulevard South would continue south of the project site as the east frontage road to Highway 101.

While the addition of HOV lanes is consistent with the 2020 Travel Demand Forecasting Model, the interchange improvement and the frontage roads were not fully funded and are not considered in the cumulative scenario. Nonetheless it is possible to consider the effect that the Marin Sonoma Narrows Project will have on project impacts and mitigations.

- 1) The intersections of Petaluma Boulevard South/Highway 101 Northbound Ramps and Petaluma Boulevard South/Highway 101 Southbound Ramps would both be eliminated. This would eliminate virtually all project traffic north of the new interchange. Impacts TRANS-1, 2, 4, 6, 7, 8, 9, 10 and

11 would all be obviated by this improvement as there would no longer be project truck traffic on Petaluma Boulevard South north of the interchange.

- 2) The highway ramp impacts would be subject to improvement due to better design of the merge conditions. This may include dual ramp lanes, auxiliary highway lanes and or extended merge areas.
- 3) Queuing and LOS at the ramp intersections and the frontage road intersections cannot be evaluated without additional information on the intersection configuration and control. Queuing may be a concern on the highway overcrossing given the short distance between the ramps and the frontage road. This should be addressed as a design consideration of the finalized MSN project.
- 4) The site access and circulation provision on the project site would need to be reconfigured to avoid outside of the boundaries for the MSN project. This would require the demolition and/or relocation of the Fire Department facilities and the rerouting of the driveway. These measures must be taken as future design considerations consistent with the MSN project and in coordination with Caltrans.