

Nexus Study Bethel Island Area of Benefit

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in association with Urban Economics

Prepared For:
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Public Works Department

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1. Introduction

1.1 Background and Purpose

The purpose of the Bethel Island Area of Benefit (AOB) Program is to help fund improvements to the County's roadway, transit, bicycle, and pedestrian facilities needed to accommodate travel demand generated by new land development within the unincorporated portion of this AOB.

Contra Costa County has various methods for financing transportation improvements. One of the methods is the AOB Program. The AOB Program funds are collected from new development in the unincorporated portion of the AOB to finance a portion of the transportation improvements associated with travel demand generated by that development. Fees are differentiated by type of development in relationship to their relative impacts on the transportation system. The intent of the fee program is to provide an equitable means of ensuring that future development contributes its proportional share of the cost of transportation improvements, so that the County's General Plan Circulation policies and quality of life can be maintained.

One of the objectives of the County General Plan is to relate new development directly to the provision of community facilities necessary to serve that new development. Accordingly, there is a mechanism in place to provide the funding for the infrastructure necessary to serve that development. The Bethel Island AOB Program is a fee mechanism providing funds to construct transportation improvements to serve new residential, commercial and industrial development within the AOB. Requiring that all new development pay a transportation improvement fee will help ensure that it participates fairly in the cost of improving the transportation system. This Program applies only to new development within the unincorporated portions of the Bethel Island AOB.

Each new development project or expansion of an existing development will generate new travel demand for all travel modes. Where the existing transportation system is inadequate to meet future needs based on new development, improvements are required to meet the new demand. The purpose of this development program is to determine improvements that will ultimately be needed to serve estimated future development and to require new development to pay a fee to fund its proportional share of these improvements. Because the fee is based on the relative impact of new development on the transportation system and the costs of the necessary improvements to mitigate this impact, the fee amount is roughly proportional to the development impact. This Nexus Study documents the analytical approach for determining the nexus between the fees proposed to be imposed on new development the local impact of proposed development, and the transportation improvements to be funded with fee revenue.

1.2 Bethel Island AOB

The Countywide Area of Benefit was first adopted by the Board of Supervisors on March 15, 1988 with seven regions, each with its own fee schedule: West County, Central County, Lamorinda, Alamo, South County, East County, and Bethel Island. At the time, the County estimated a substantial growth potential for the Bethel Island AOB and the existing transportation system was inadequate to handle the additional traffic generated from the projected development. In 1993 the Area of Benefit program was reviewed.

The Bethel Island AOB has experienced changes in the area's development potential and circulation needs. First, in 2006, the City of Oakley annexed a large area south of Dutch Slough. Second, the County's 2005 General Plan includes policies that significantly limit potential residential development on Bethel Island until financing for the island's perimeter levee system can be assured. Since there is currently no financing plan or program in place, the County has estimated limited growth potential for the Bethel Island AOB.

The Bethel Island Road Bridge over Dutch Slough (one of the key Area of Benefit improvement projects), has been replaced with a new, widened structure. However, other AOB improvements to Cypress Road and Bethel Island Road have not been implemented.

The changes in development potential have prompted a revision to the Bethel Island AOB Program, resulting in a new project list and fee schedule.

The purpose of this Nexus Study is to provide the technical basis for a comprehensive update of the Bethel Island AOB Program. The focus of the updated program is to support an overall transportation system in the Bethel Island AOB that serves the expected future demand based on changes in regional and local land use projections, planned and approved development projects, and associated changes to capital improvements and updated cost estimates.

This Nexus Study documents the analytical approach for determining the nexus between the transportation fees proposed to be imposed on new development, the local impact created by anticipated development in the Bethel Island AOB, and the transportation improvements to be funded with fee revenues. A traffic and fair-share cost analysis was conducted to equitably distribute the costs of the necessary transportation improvements to developments that cause the impacts, in accordance with the provisions of the Mitigation Fee Act.¹ The most up-to-date versions of the analytical tools and techniques available at the time this study commenced were used to ensure the highest level of consistency with current information and practices.

The Bethel Island AOB boundary, which was established in 1985, is shown in **Figure 1**. The area within the boundary includes a portion of the City of Oakley. However, fees will only be collected within the unincorporated portions of the AOB and will only fund projects within the unincorporated portions of the AOB.

2. Evaluation of Current AOB Program

The current Bethel Island AOB Program was last updated in 1993. The current Bethel Island AOB Program project list, shown in **Table 1**, has four projects, which were estimated in 1993 to cost about \$9.2 million, with about \$8.8 million to be funded by the AOB Program. This 2015 update of the Bethel Island AOB Program has included a new needs analysis to update this project list along with new project cost estimates, which are described in Sections 3, 4 and 5 of this Nexus Study.

The current AOB Program uses “peak hour factors” to allocate trips by land use types based on Institute of Transportation Engineers (ITE) trip generation rate estimates for the evening (PM) peak hour. However, ITE trip rates only reflect the amount of traffic coming in and out of development’s entrances, not the extent of the roadway system that is impacted by those trips. This Nexus Study refines this approach to reflect current best practices for impact fee programs when estimating the impact of new development on the transportation system.

¹ California Government Code, Sections 66000 through 66026.

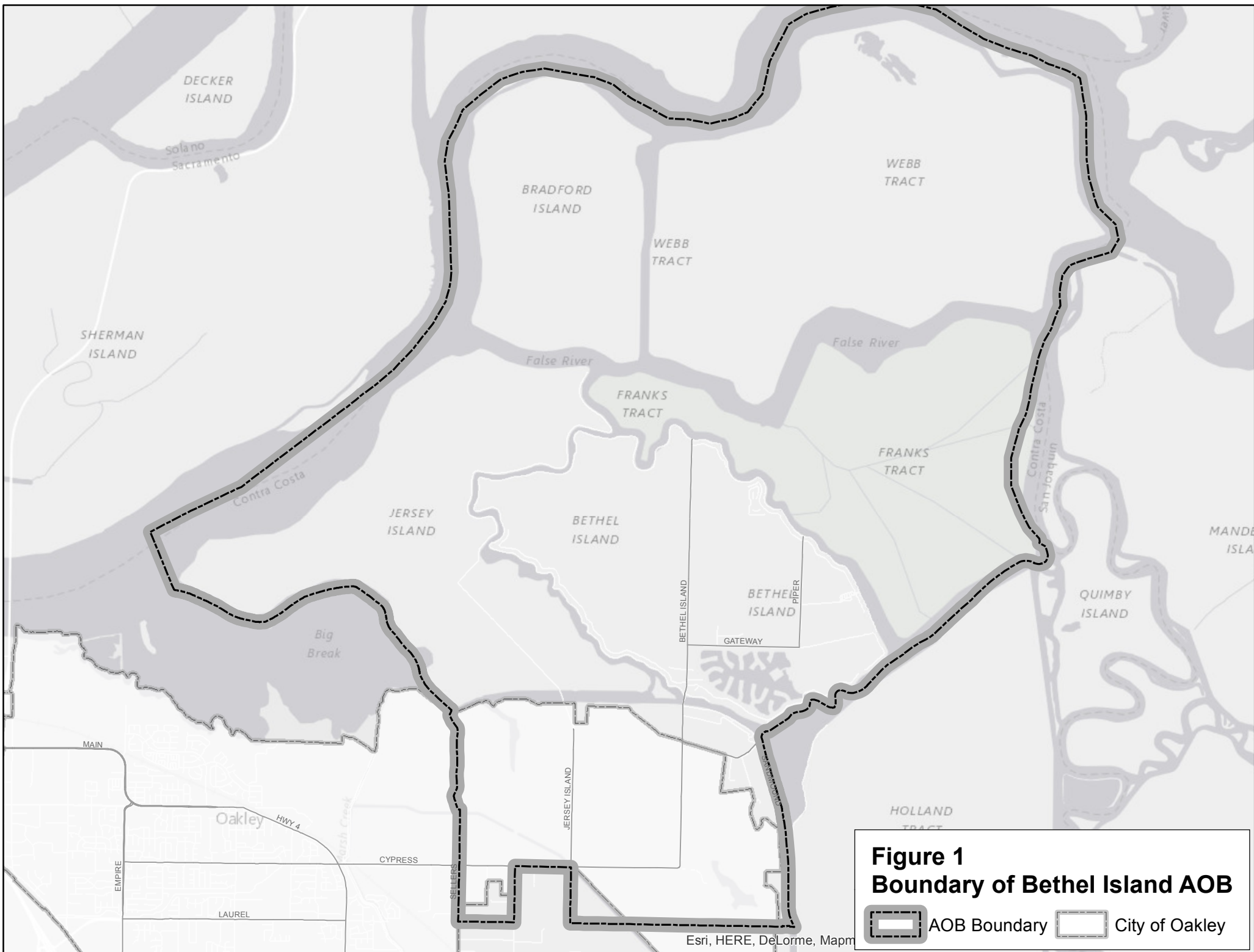


Table 1 1993 Project List for Bethel Island AOB Program		
Roadway	Project Description	Estimated Project Cost (1993 Dollars)
1 Bethel Island Road	Widen to four lane arterial standard from Cypress Road to Gateway Road including realignment of curve and construction of new bridge	\$6,000,000
2 Bethel Island Road	Install signal at Sandmound Boulevard	\$100,000
3 Cypress Road	Construct new two lane arterial from Bethel Island Road to Sandmound Boulevard.	\$600,000
4 Cypress Road	Widen to four lane arterial standard from Highway 4 to Bethel Island Road with grade separation at AT&SF and signal at Highway 4	\$2,500,000
Total		\$9,200,000
Source: Development Program Report for Bethel Island AOB, 1993		

For example, simple trip rates over-estimate the traffic impact of retail development on the overall roadway system. The average length of trips coming in and out of a new residential development is longer than trips coming in and out of a retail development. Furthermore, studies show that about 25 to 50 percent of the trips that will go in and out of a new retail development will already be traveling on roadways near that development, and thus are “pass-by” or “diverted” trips, not “new trips” to the surrounding roadway system. All of the trips going to and from a new residential unit are “new trips”

To integrate best practices, the updated Bethel Island AOB Program will instead use estimates of vehicle-miles of travel (VMT) added by new development. The VMT rates multiply the trip rate for a land use type by its average trip length and also use percentages to reflect “pass-by trips” versus “new trips.” The calculation of fee rates based on this methodology is discussed in Section 4 of this study.

3. Determination of AOB Development Potential

The transportation needs analysis and allocation of transportation improvement costs for the Bethel Island AOB is based on the countywide travel demand model developed by the Contra Costa Transportation Agency (CCTA) using a 2040 horizon year. The calculation of fees is based on the following general land use categories and associated measurement units that are used as a basis for the land use inputs in CCTA’s travel demand model:

<u>Land Use Type</u>	<u>Units</u>
Single-Family	Dwelling units (DU)
Multi-Family	Dwelling units (DU)
Commercial/Retail	Jobs
Office	Jobs
Industrial	Jobs

CCTA’s latest land use estimates of existing conditions and 2040 forecasts of new development by Traffic Analysis Zones (TAZs) in the AOB were summarized and reviewed with County Planning

(Department of Conservation and Development) staff. The County Planning staff determined that CCTA's 2040 forecasts varies from the County General Plan policies for the Bethel Island area, and, importantly, new state laws establishing higher standards for local jurisdictions to approve urban development behind levee systems.

The County's 2005 General Plan includes policies that significantly limit potential residential development on Bethel Island until financing for the island's perimeter levee system can be assured. There is no financing plan or program in place to provide for improvements to the perimeter levee needed to enable additional residential density on the island. Coupled with uncertainty about how and when the island's perimeter levee improvement would occur with the changes in state laws regarding urban development in areas protected from flood by levees, significant downward adjustments in the growth forecasts were needed. The County has indicated that it is reasonable to assume that both the Delta Coves project and the Coronado Village project could be developed by 2040.

The County's estimates of the development potential for the AOB are summarized in **Table 2**. The table shows estimates of jobs for nonresidential land uses according to CCTA's model. It also applies estimates of square footage per employee to estimate the growth in building square feet, which are used in the AOB fee program.

Table 2 Summary of Estimated 2010 to 2040 Development Growth Bethel Island Area of Benefit										
Land Use Category	Units	Unincorporated Portion of AOB			City of Oakley Portion of AOB			Total AOB		
		2010	2040	Growth	2010	2040	Growth	2010	2040	Growth
Single-Family	DU	846	1,665	819	313	1,468	1,155	1,159	3,133	1,974
Multi-family	DU	622	692	70	47	57	10	669	749	80
Total	DU	1,468	2,357	889	360	1,525	1,165	1,828	3,882	2,054
Retail	Jobs	48	241	193	0	7	7	48	248	200
Office	Jobs	230	620	390	11	260	249	241	880	639
Industrial	Jobs	64	117	53	32	170	138	96	287	191
Total	Jobs	342	978	636	43	437	394	385	1,415	1,030
Retail	1,000 sq. ft.	24.0	120.7	96.7	0.0	3.5	3.5	24.0	124.2	100.2
Office	1,000 sq. ft.	63.3	170.5	107.3	3.0	71.5	68.5	66.3	242.0	175.7
Industrial	1,000 sq. ft.	38.4	70.2	31.8	19.2	102	82.8	57.6	172.2	114.6
Total	1,000 sq. ft.	125.7	361.4	235.8	22.2	177.0	154.8	147.9	538.4	390.5
Notes:										
¹ See Figure 1 for AOB Boundary and portion within City of Oakley								Assumed Square Feet per Job		
Land Use										
Retail								500		
Office								275		
Industrial								600		
Source: DKS Associates, 2013										

4. Transportation Needs Analysis

Defining the transportation needs and project list for the Bethel Island AOB involved the following steps:

1. Collecting traffic count data (intersections and roadway segments)
2. Identifying existing deficiencies, including level of service (LOS) and roadway standard deficiencies
3. Preparing travel demand forecasts of 2040 conditions
4. Conducting transportation system analysis to identify improvement needs
5. Identifying pedestrian and bicycle facilities/improvements
6. Preparing a draft Bethel Island AOB project list
7. Presenting analysis and findings at the Bethel Island Municipal Advisory Council (MAC) meetings to obtain input on the draft project list.
8. Finalizing project list

The key technical tasks used to determine the transportation improvements needed to accommodate new development within the Bethel Island AOB and select a project list are described in Sections 4.1 through 4.8 below.

4.1 Traffic Count Data

Traffic count data is required to determine existing deficiencies and to support the future year roadway/intersection needs analysis. Traffic counts were collected on weekdays in March 2013 on major roadway segments within the AOB (see **Table 3**).

4.2 Existing Deficiencies

The technical methods and standards used to identify the impact of new development on roadway and intersection vehicular congestion are described in Section 4.4 below. The same methods and standards are used to identify existing deficiencies in the roadway network. When an existing deficiency is identified, it affects how the cost of an improvement is allocated to new development. New development can only fund its fair share of the total cost of an improvement not associated with correcting an existing deficiency (see Section 6).

4.3 Travel Demand Forecasting

The transportation needs analysis and allocation of improvement costs were based on CCTA's travel demand model using a 2040 horizon year and the development assumptions summarized in Table 2. Before its use, the output of the CCTA travel demand model for existing conditions was compared to existing traffic count data in the AOB area and some adjustments were made to the model within and near the AOB to improve its accuracy and detail.

4.4 Roadway System Analysis

This section describes the analysis used to determine the roadway improvements needed to accommodate new development within the AOB.

Signal Warrants

Traffic signal warrants are a series of standards that provide guidelines for determining if a traffic signal is appropriate. A planning-level signal warrant analysis based on traffic volumes was conducted to determine if the traffic signals would be warranted at the following intersections under existing and future (2040) conditions:

Table 3
Roadway Segment Level of Service Analysis
Bethel Island Area of Benefit

Roadway	From	To	2013			2040			Comments
			Lanes	Daily Volume	LOS	Lanes	Daily Volume	LOS	
Bethel Island Road	Sandmound Blvd	Taylor Rd	2	4,270	A	2	9,990	A	2040 LOS assumes current roadway geometry
	Taylor Rd	Sandy Ln	4	4,740	A	4	5,990	A	
	Sandy Ln	Gateway Rd	4	3,790	A	4	4,900	A	
	Gateway Rd	W Willow Rd	2	250	A	2	560	A	
Sandmound Boulevard	Holland Tract Rd	E Cypress Rd	2	180	A	2	180	A	
	E Cypress Rd	Mariner Rd	2	630	A	2	1,110	A	
	Mariner Rd	Bethel Island Rd	2	1,100	A	2	1,950	A	
Gateway Rd	Bethel Island Rd	Piper Rd	2	5,900	A	2	6,710	A	
	Piper Rd	Riverview/N Stone Rd	2	860	A	2	860	A	
Piper Rd	Gateway Rd	N/S Willow Rd	2	1,880	A	2	2,580	A	
LOS highlighted in bold does not meet County’s standard									
Traffic volumes on roadway segments highlighted in grey warrant shoulder or sidewalk improvements to meet County standards									
Source: DKS Associates, 2013									

- Bethel Island Road and Sandmound Boulevard
- Bethel Island Road and Gateway Road
- Gateway Road and Piper Rd

The analysis indicated that none of these major intersections within the unincorporated portion of the AOB would warrant signals

Level of Service

The needs analysis for the AOB Program used the level of service (LOS) standards in the County's General Plan, which has different standards for different areas, based on land use types. In the Bethel Island Area, LOS D or better conditions are considered acceptable while LOS E or F conditions are considered unacceptable. The relatively low existing and projected 2040 traffic volumes would not result in unacceptable LOS at intersections within the unincorporated portion of the AOB. Roadway segment LOS analysis compares traffic levels with roadway segment capacities determined by the number of travel lanes and the roadway type. The roadway segment LOS analysis is summarized in **Table 3** as well as **Figures 2 and 3**

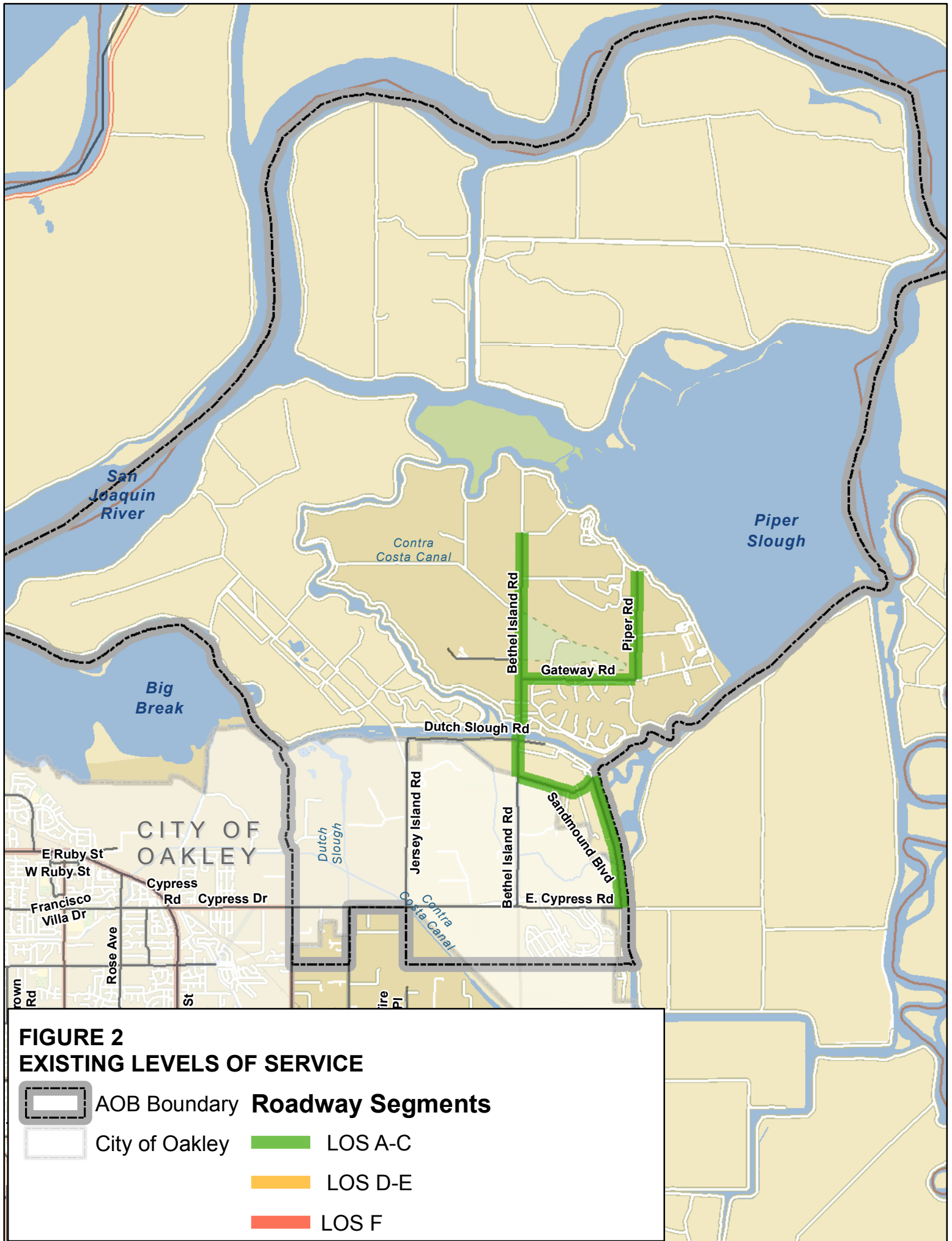
Roadway Pavement Width Standards

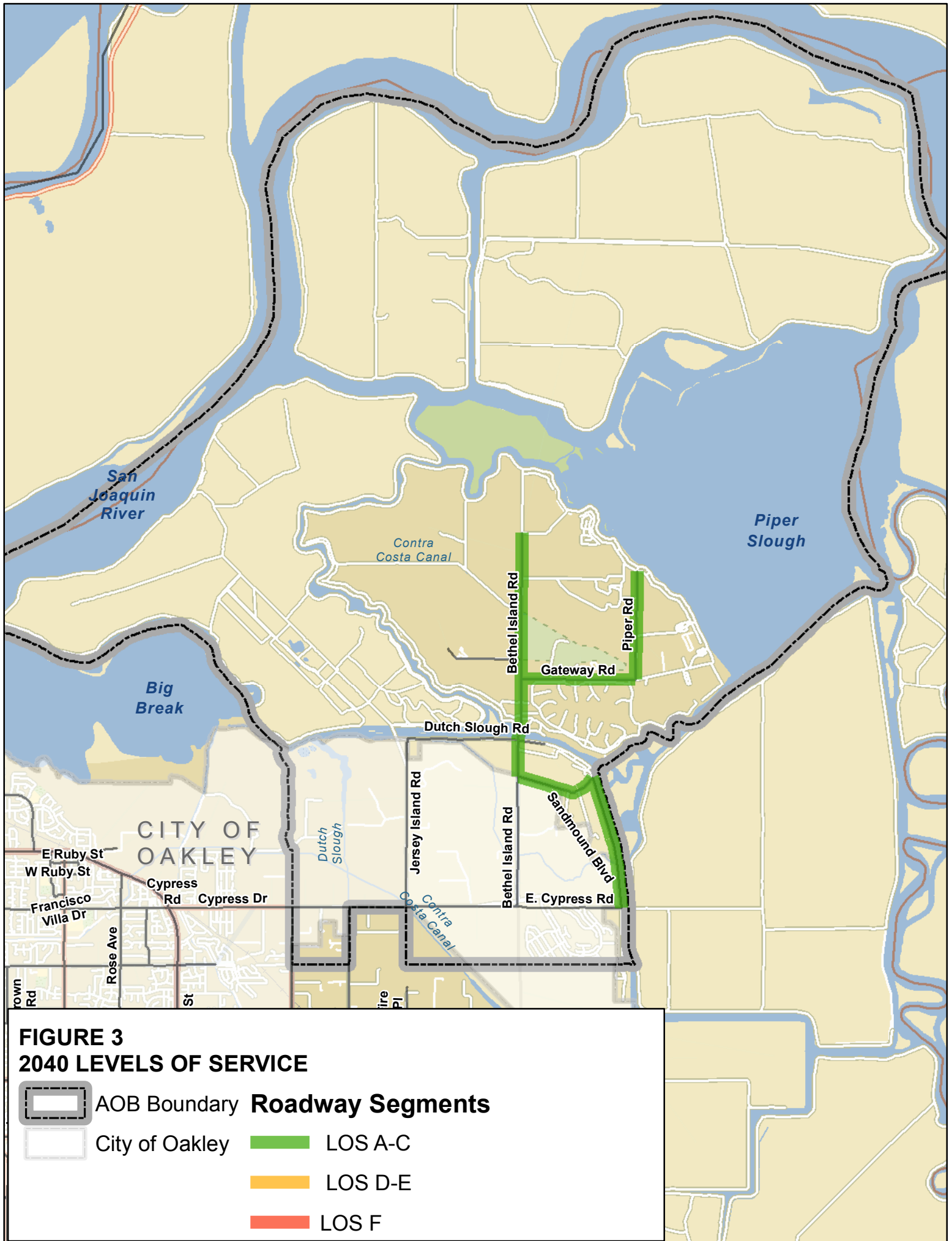
Many of the County's two-lane roads within the Bethel Island AOB will not have LOS problems but volume increases on narrow roads within the AOB is a safety issue that should be addressed in the AOB Program. Providing adequate roadway width, including the addition of shoulders to two-lane roadways would increase the safety as traffic increases and they would provide a bicycle lane/walkway. The Federal Highway Administration (FHWA) recommends that rural roadways that carry more than 2,000 average daily traffic (ADT) should have 5 to 6 foot wide shoulders. Contra Costa County's standards for two-lane roadways, shown in **Table 4**, call for shoulders on roadways with more than 1,000 ADT.

Table 4 Two Lane Rural Shoulder/Lane Widths Contra Costa County Public Works Department Standard Plans			
Average Daily Traffic	Shoulder Backing (ft.)	Shoulder (ft.)	Lane (ft.)
< 250	0	1	11
< 400	2	1	11
< 1,000	2	4	12
< 3,000	2	5	12
< 6,000	2	6	12
> 6,000	0	8	12
Source: Contra Costa County Public Works Department Standard Plans, 2008			

4.5 Transit and Pedestrian/Bicycle Needs Analysis

New development also has impacts on roadway design that are not accommodated by increases in vehicle capacity and improvements to enhance vehicle safety. New development generates non-vehicular trips (bicycle and pedestrian) that are accommodated by improving roadway shoulders to provide bicycle lanes and pedestrian walkways. On roadways that require improvements based on the roadway/intersection analysis described above bicycle and pedestrian facilities will be implemented to the extent that they are represented in the County's current standard roadway designs. Transit, bicycle, and pedestrian improvements may also reduce vehicular congestion by shifting trips from autos to these alternative modes.





4.6 Draft AOB Project List

A draft list of capital improvements to the transportation system in the AOB Program was prepared.

The improvements selected for the project list involved upgrading several two lane roadways to County design standards, which would add shoulders to improve safety and provide bicycle lanes and pedestrian walkways.

4.7 Presenting Findings at MAC Meetings

The draft project list was presented to the Bethel Island Municipal Advisory Council (MAC) who supported the list as shown in **Table 5** and **Figure 4**.

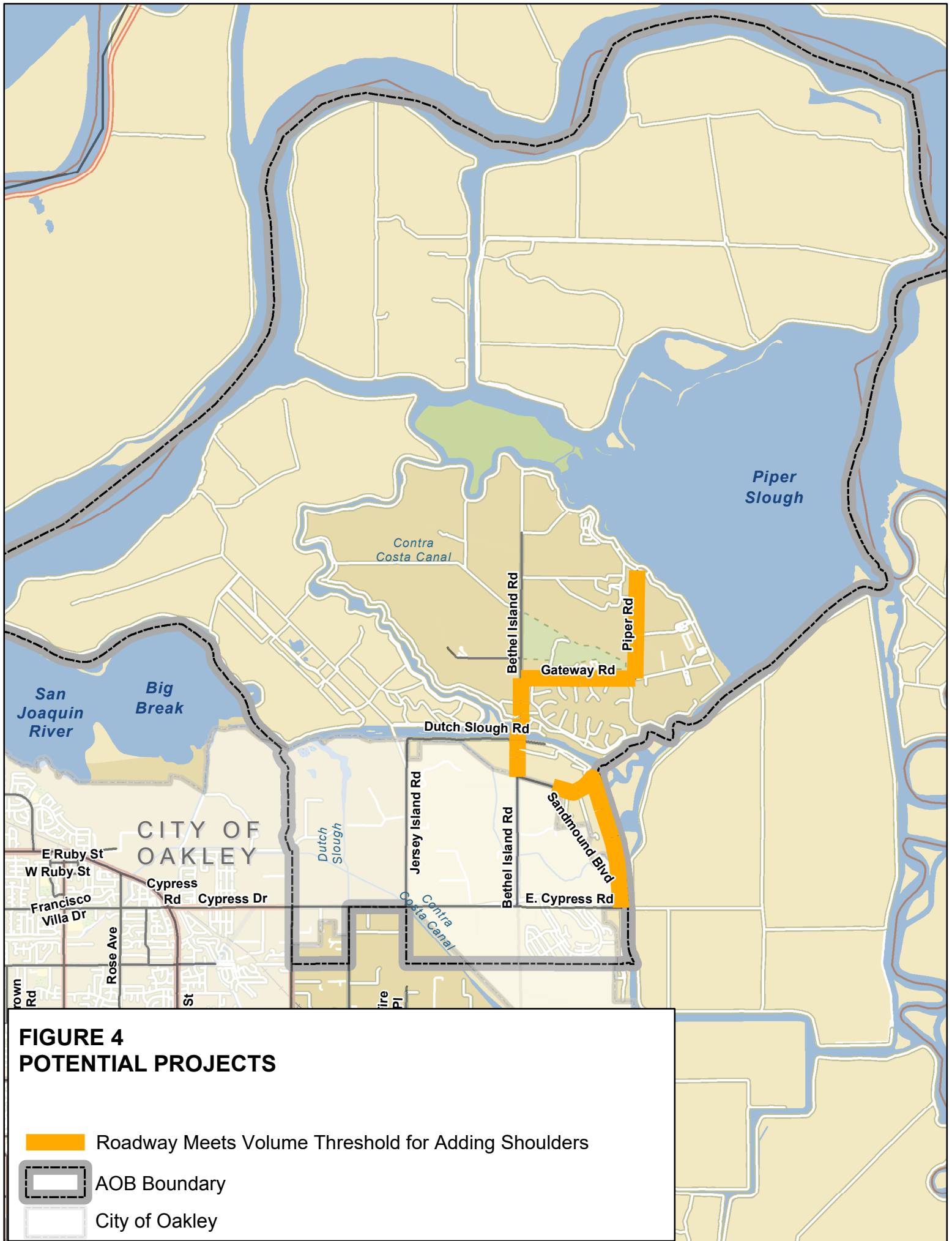
4.8 Finalize AOB Project List

The final AOB project list below incorporates refinements suggested by the MAC.

Table 5 Selected Bethel Island AOB Project List							
Roadway	Location	Existing Conditions			2040 Conditions		Recommended Project
		Daily Volume	LOS	Deficiency	Daily Volume	LOS	
Bethel Island Rd	Taylor Rd to Sandmound Blvd	4,270	A	Design	9,990	A	Add bicycle and pedestrian improvements
Sandmound Blvd	Oakley City Limits to Mariner Rd	1,100	A	Design	1,950	A	Add bicycle and pedestrian improvements
	Mariner Rd to Cypress Rd	630	A	Design	1,110	A	Add bicycle and pedestrian improvements
Gateway Rd	Bethel Island Rd to Piper Rd	5,900	A	Design	6,710	A	Add bicycle and pedestrian improvements
Piper Rd	Gateway Rd to Willow Rd	1,880	A	Design	2,580	A	Add bicycle and pedestrian improvements
Project list approved by Bethel Island Municipal Advisory Council (MAC)							
Source: DKS Associates, 2013							

5. Improvement Cost Estimates

Planning-level cost estimates were prepared for the selected AOB projects in Table 5 based on conceptual designs for each project. The estimates for roadway segment improvements are based on implementing the County's design standards (for roadway cross-sections) by facility type and number of lanes. The cost estimates reflect the known issues, such as creek crossings, relocation of major known utilities, etc. Typical excavation quantities were used except in areas where significant excavation was identified. The cost estimating does not have geotechnical or survey support information. Thus unknowns (such as rock excavation, removal of unsuitable material, relocation of unseen utilities, etc.) were assumed in a project contingency percentage.



The cost estimates include the following appropriate percentages that are key elements in the implementation of each project:

- Project contingencies,
- Survey, design and construction management,
- Environmental mitigation,
- Right-of-way acquisition.

The cost estimates for each of the selected projects for funding by the Bethel Island AOB, shown in **Table 5** are provided in **Appendix A**.

6. Basis for Allocating Costs to New Development

This section describes the process used to allocate improvement costs to new development in the Bethel Island AOB and the estimated development fees that result from this analysis.

The allocation of costs of roadway and intersection improvements in the AOB is based on answering the following questions:

- Is there an existing deficiency?
- Would the improvement project be required without new development?
- Who uses the roadway/intersection?

The allocation of costs is based on estimates of who will use, through 2040, the roadways or intersections that require improvements. This allocation of improvement costs is based on the percentage of trips from 1) existing development, 2) new development in the AOB, and 3) new development outside the AOB (referred to as “through traffic”). An increase in through traffic represents an increase in trips that both start and end outside the AOB and pass through the AOB. **Table 6** summarizes the estimated percentages for the selected AOB project list. The methods used to allocate costs are described below.

6.1 Improvements to Meet County LOS Standards

No improvements are needed to address LOS impacts (either intersection or roadway LOS) in the Bethel Island AOB

6.2 Widening to meet Roadway Pavement Width Standards

Costs to improve a roadway to County cross-section standards are allocated using one of the following methods:

- For a roadway segment that is currently below the traffic volume thresholds shown in Table 5 but would exceed those thresholds by 2040, the entire cost of improving that segment to the County standard will be allocated to new development. This method did not apply to any of the selected projects on the Bethel Island project list.
- For a roadway segment that currently has a traffic volume above the volume thresholds in Table 5 and does not meet the County’s applicable cross-section standards (an existing deficiency), the percent cost share for new development in the AOB is equal to the number of new trips on a roadway segment that have either their origin or destination within the AOB divided by all trips on that roadway, both from existing and new development. This method was used for improvements on Bethel Island Road, Gateway Road and Piper Road, as well as on improvements along Sandmound Boulevard between the Oakley City limits and Mariner Rd.

Table 6
Cost Allocation Analysis for Bethel Island AOB Project List

Roadway	Location	Recommended Project	Existing Conditions			2040 Conditions		Percent of 2040 Total Volume			Percent of 2013 to 2040 Growth		Percent Allocated to AOB
			Daily Volume	LOS	Deficiency	Daily Volume	LOS	Existing	Growth		Local	Through	
Bethel Island Rd	Taylor Rd to Sandmound Blvd	Add bicycle and pedestrian improvements	4,270	A	Design	9,990	A	42.7	57.3	0	100	0	57.3
Sandmound Blvd	Oakley City Limits to Mariner Rd	Add bicycle and pedestrian improvements	1,100	A	Design	1,950	A	56.4	43.6	0	100	0	43.6
	Mariner Rd to Cypress Rd	Add bicycle and pedestrian improvements	630	A		1,110	A	56.8	43.2	0	100	0	43.2
Gateway Rd	Bethel Island Rd to Piper Rd	Add bicycle and pedestrian improvements	5,900	A	Design	6,710	A	87.9	12.1	0	100	0	12.1
Piper Rd	Gateway Rd to Willow Rd	Add bicycle and pedestrian improvements	1,880	A	Design	2,580	A	72.9	27.1	0	100	0	27.1

Percentages were estimated using Contra Costa Transportation Authority's (CCTA) travel demand model with the growth estimates summarized in Table 2
Percent allocated to AOB is based on percentage shaded in grey

Source: DKS Associates, 2013

6.3 Bikeway and Walkway Improvements

For projects that focus on bicycle and pedestrian safety, the improvements will benefit both existing and future residents and the cost allocated to new development will equal new development's proportional share of the total future traffic volumes on those roadways. This method was used for improvements on Sandmound Boulevard between Mariner Rd and Cypress Rd

6.4 Summary of Cost Allocation

Table 7 summarizes the allocation of the cost for each of the selected projects that will have funding from the Bethel Island AOB Program.

Table 7 Allocation of Project Costs to Bethel Island AOB Program					
Roadway	Location	Recommended Project	Estimated Total Cost	Percent Allocated to AOB	Cost Allocated to AOB
Bethel Island Rd	Taylor Rd to Sandmound Blvd	Add bicycle and pedestrian improvements	\$544,000	57.3	\$311,712
Sandmound Blvd	Oakley City Limits to Mariner Rd	Add bicycle and pedestrian improvements	\$772,000	43.6	\$336,592
	Mariner Rd to Cypress Rd	Add bicycle and pedestrian improvements	\$2,629,000	43.2	\$1,135,728
Gateway Rd	Bethel Island Rd to Piper Rd	Add bicycle and pedestrian improvements	\$1,690,000	12.1	\$204,490
Piper Rd	Gateway Rd to Willow Rd	Add bicycle and pedestrian improvements	\$1,293,000	27.1	\$350,403
Total			\$6,928,000	33.8%	\$2,338,925
Source: DKS Associates, 2014					

The County has various methods for funding the transportation improvements within the Bethel Island AOB boundary. While the AOB fee program is one method, additional funding will be obtained from Federal, State and local grants (such as the Active Transportation Program, Safe Routes to School, Bicycle transportation Account, etc.). On an on-going basis, the County will assess the unconstructed projects on the AOB project list and define priorities. As enough funding is available from all sources to implement "priority" projects, the County will implement those projects.

7. Method for Calculating Fees

Land Use Categories

The calculation of fees for the AOB Program Updates will be based on the general land use categories that can be derived for all areas of the County from CCTA's travel demand model. These general categories are the following:

<u>Land Use Type</u>	<u>Units</u>
Single-Family	Dwelling units (DU)
Multi-Family	Dwelling units (DU)
Commercial/Retail	Square feet
Office	Square feet
Industrial	Square feet

Dwelling Unit Equivalents

In the allocation of costs to various types of development, each development type will be assigned a "dwelling unit equivalent" or "DUE" rate. DUEs are numerical measures of how the trip-generation characteristics of a land use compare to the trip generation of a typical single-family residential unit, which is assigned a DUE of 1. Land uses that have greater overall traffic impacts than a typical single-family residential unit are assigned due values greater than 1, while land uses with lower overall traffic impacts are assigned due values less than 1.

DUEs are developed by comparing both the trip-generation and trip-length characteristics of various land uses to those of a typical single-family residential unit. Since roadway needs are primarily based on traffic flows and conditions during the PM peak hour on an average weekday, the DUEs reflect the relative trip generation for the PM peak hour. Also considered in the calculation of DUEs are "percent new" trips, since some of the vehicles attracted to non-residential land uses would have been on the roadway system regardless of the presence of the trip generator. Average trip lengths for the remaining "primary" trips generated by a development are then utilized to better reflect overall impact of longer trips on the County's roadway system.

The DUE rates will thus be based on estimates of the average vehicle-miles of travel (VMT) generated during the PM peak hour for each general land use type. The DUE rates used to estimate the AOB fees are shown in **Table 8**. For example, one square foot of office development is estimated to have a traffic impact on the roadway system which is 0.00142 times that of a typical single-family residential unit.

Table 8 Dwelling Unit Equivalent (DUE) Rates						
Land Use Category	PM Peak Hour Trip Rate per Unit ¹	Unit	Trip Length (miles) ²	Percent New trips ²	VMT per Unit	DUE per Unit
Singe Family	1.01	Dwelling Unit	5.0	100	5.050	1.00
Multi-Family	0.62		5.0	100	3.100	0.61
Retail	4.10	Square Feet	2.3	76	7.167	0.00142
Office	1.40		4.5	92	5.796	0.00115
Industrial	0.98		5.1	92	4.598	0.00091
¹ ITE Trip Generation 7th Edition ² ITE Journal, May 1992 Source: DKS Associates, 2013						

Fee Calculation

The cost per DUE (i.e. cost for a typical single-family dwelling unit) is calculated by dividing the total costs allocated to new development in the AOB (methods described above) by the total growth in DUEs in the AOB by 2040 (see **Table 9**). The cost for each land use type is then based on its DUE rate. The nexus-based fee rates are shown in **Table 10**.

Table 9 Growth in DUEs				
Land Use Category	Unit	Growth in Units¹	DUE per Unit	Growth in DUEs
Singe Family	Dwelling Unit	819	1.00	819.0
Multi-Family		70	0.61	42.7
Retail	Square Feet	96,700	0.00142	137.3
Office		107,300	0.00115	123.4
Industrial		31,800	0.00091	28.9
				1,151.3
¹ See Table 2: "Summary of Estimated Development 2010 to 2040 Growth"				
Source: DKS Associates, 2013				

Table 10 Nexus-Based Fee Rates for Bethel Island AOB			
Cost of Improvements Allocated to AOB Growth			\$2,338,925
Current AOB Fund Balance			\$477,000
Unfunded Costs of Improvements Allocated to AOB Growth			\$1,861,925
Growth in Dwelling Unit Equivalents (DUE's)			1,151.3
Cost per DUE			\$1,617
Land Use	Units	DUE per Unit	Fee per Unit
Single Family	Dwelling Unit	1.00	\$1,617
Multi-Family	Dwelling Unit	0.61	\$986
Retail	Square Foot	0.00142	\$2.30
Office	Square Foot	0.00115	\$1.86
Industrial	Square Foot	0.00091	\$1.47
Other	Dwelling Unit Equivalent	1.00	\$1,617
¹ Fee per Unit = (Cost per DUE) x (DUE per Unit)			
Source: DKS Associates, 2014			

8. Nexus Analysis

A nexus analysis has been prepared for the Bethel Island AOB Program in accordance with the procedural guidelines established in AB1600 which is codified in California Government Section 66000 *et seq.* These statutes set for the procedural requirements for establishing and collecting various development

impact fees. These procedures require that “a reasonable relationship or nexus must exist between a governmental exaction and the purpose of the condition.” Specifically, each local agency imposing a fee must:

- Identify the purpose of the fee;
- Identify how the fee is to be used;
- Determine how a reasonable relationship exists between the fee’s use and the type of development project on which the fee is imposed.
- Determine how a reasonable relationship exists between the need for the public facility and the type of development project on which the fee is imposed; and,
- Demonstrate a reasonable relationship between the amount of the fee and the cost of public facility or the portion of the public facility attributable to the development on which the fee is imposed.

8.1 Purpose of fee

The purpose of the Bethel Island AOB Program is to fund improvements to the County’s major roadway, transit, bicycle and pedestrian facilities needed to accommodate travel demand generated by new land development in the unincorporated portion of Bethel Island AOB through 2040.

The Bethel Island AOB Program will help meet the County’s General Plan policies, including maintenance of adequate levels of service and safety for roadway facilities. New development in the unincorporated portions of the Bethel Island AOB will increase the demand for all modes of travel (including walking, biking, transit, automobile and truck/goods movement), and, thus, the need for improvements to transportation facilities. The Bethel Island AOB Program will help fund transportation facilities necessary to accommodate new residential and non-residential development in the unincorporated portions of the Bethel Island AOB.

8.2 Use of Fees

The fees from new development in the Bethel Island AOB Program will be used to fund additions and improvements to the transportation system needed to accommodate future travel demand resulting from residential and non-residential development within the Bethel Island AOB. The Bethel Island AOB Program will help fund improvements to roadways, including the provision of shoulders, providing bikeways and walkways plus fee program administration costs. The transportation improvements wholly or partially funded by the program are described in more detail in **Section 4**.

8.3 Relationship between use of Fees and Type of Development

Fee revenues generated by the Bethel Island AOB Program will be used to develop the transportation improvements described in **Section 4**. All of these improvements increase the capacity, improve the safety, or facilitate the use of alternative modes (transit, bicycle, pedestrian) on those segments of the transportation system affected by new development. The results of the transportation modeling analysis summarized in this report demonstrate that these improvements either mitigate impacts from, and/or provide benefits to, new development.

8.4 Relationship between Need for Facility and Type of Development

The projected residential and non-residential development described in **Section 3** will add to the incremental need for transportation facilities by increasing the amount of demand on the transportation system. The transportation analysis presented in **Section 4** demonstrates that improvements are required

to minimize the negative impact on current levels of service caused by new development and/or accommodate the increased need for alternative transportation modes (transit, bicycle, pedestrian).

8.5 Relationship between Amount of Fees and the Cost of Facility Attributed to Development upon which Fee is Imposed

The basis for allocating improvement costs to development is described in **Section 6**. Construction of necessary transportation improvements will directly serve residential and non-residential development within the unincorporated portions of the AOB and will directly benefit development in those areas.

New development within the AOB is allocated a percentage of improvement costs based on the number of new trips on a roadway segment or intersection that have either their origin or destination within the AOB divided by the total amount of trips from all development. The remaining percent of costs, reflecting new trips that have neither their origin nor destination in the AOB (through trips), are not allocated to development in the AOB. For facilities that have an “existing deficiency”, the cost of the improvement that is allocated to the Bethel Island AOB Program is modified to account for that deficiency.

The fee that a developer pays for a new residential unit or commercial building varies by the type of development based on its impact on the transportation system. Each development type is assigned a “dwelling unit equivalent” or “DUE” rate based on its estimated vehicle-miles of travel (VMT) per unit of development.

DUE are numerical measures of how the trip-generation characteristics of a land use compare to a single-family residential unit. DUE were developed by comparing both the trip generation and trip length characteristics of various land uses to those of the single-family residential units. Since roadway needs are primarily based on traffic flows and conditions during the peak hour on an average weekday, the DUE reflect the relative trip generation for the peak hour. Also considered in the calculation of DUE are “percent new” trips. The DUE rates were thus based on estimates of the average vehicle-miles of travel (VMT) generated during the peak hour for each general land use type.

8.6 Current AOB Fund Balance

As of March 2015 the Bethel Island AOB had a fund balance of about \$477,000. The fees collected were intended to fund the four projects on the list developed in 1993 (see Table 1). Two of the projects on that 1993 list are located on Cypress Road and are not included in the new 2015 project list (see Table 5) because those roadways were annexed to the City of Oakley.

The 1993 project list (see Table 1) includes the widening of a segment of Bethel Island Road and improvements at the Sandmound Road/Bethel Island intersection, which overlap two improvement projects on the new 2015 list. The costs allocated to the Bethel Island AOB for the projects on those roadway segments (see Table 7) exceed the current fund balance of the Bethel Island AOB. Thus the current fund balance will be used to fund the new 2015 project list.

Appendix A
Cost Estimates for Selected Projects in Bethel Island AOB



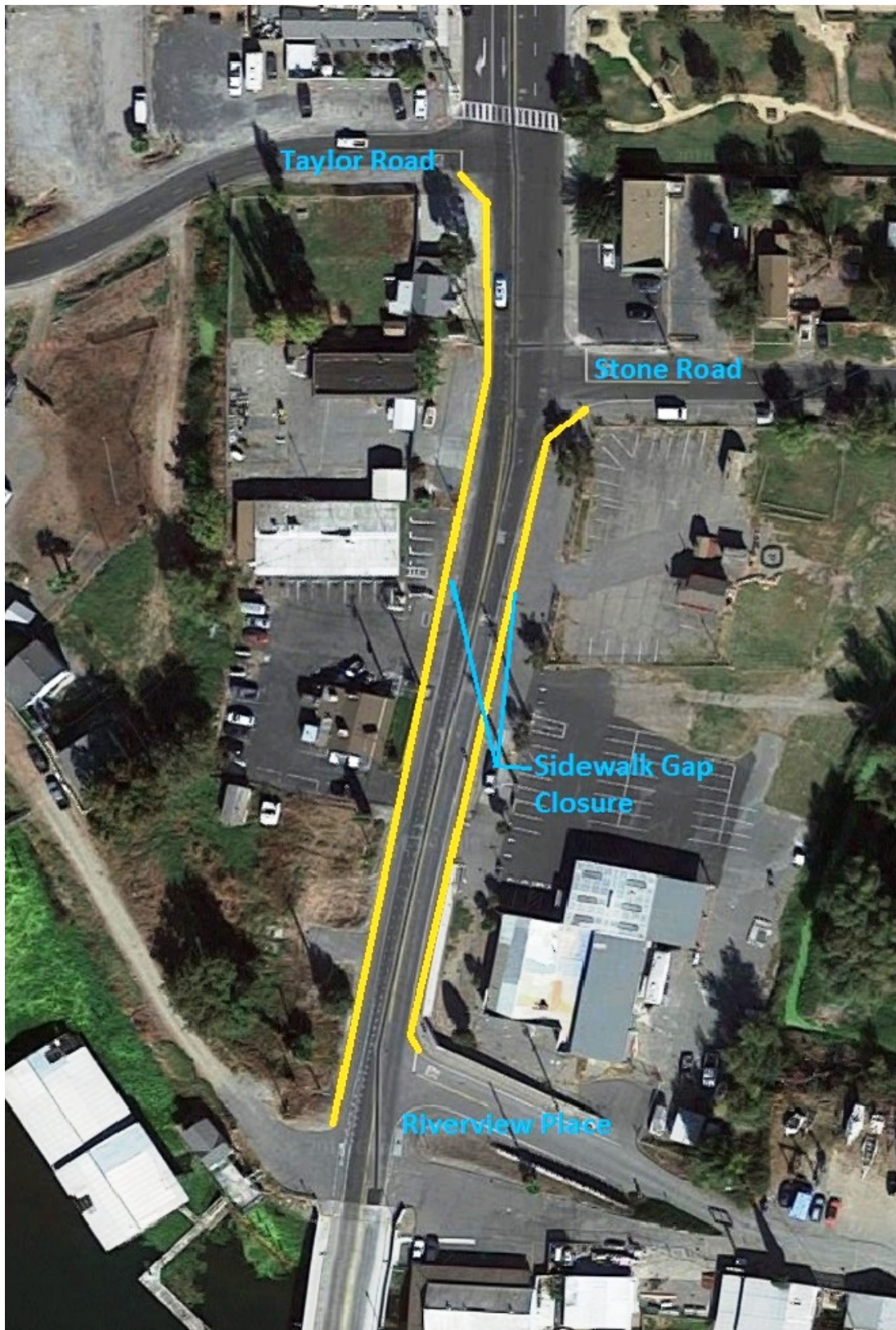
**Bethel Island Area of Benefit
Engineers Estimate Summary**

Project	Roadway	Location	Item Description	Total Cost
1	Bethel Island Road	Bethel Island Rd from Taylor Rd to Sandmound Blvd	Project will construct 8' shoulders along both sides of Bethel Island Road to bring the roadway up to County standards and provide bicycle and pedestrian improvements.	\$544,000
2.1	Sandmound Boulevard	Sandmound Blvd from Oakley City Limits to Mariner Rd	Project work includes widening Sandmound Boulevard to County standards and provide bicycle and pedestrian improvements. Travel lanes will be widened from 10' to 12', and 5' shoulders with 2' of shoulder backing will also be constructed.	\$772,000
2.2	Sandmound Boulevard	Sandmound Blvd from Mariner Rd to Cypress Rd	Project work includes widening Sandmound Boulevard to County standards and provide bicycle and pedestrian improvements. Travel lanes will be widened from 9' to 12', and 5' shoulders with 2' of shoulder backing will also be constructed.	\$2,629,000
3	Gateway Road	Gateway Rd from Bethel Island Rd to Piper Rd	Project work includes widening Gateway Road to County standards and provide bicycle and pedestrian improvements. Travel lanes will be widened from 10' to 12', and 8' shoulders will be constructed along both sides of the roadway.	\$1,690,000
4	Piper Road	Piper Rd from Gateway Rd to Willow Rd	Project work includes widening Piper Road to County standards and provide bicycle and pedestrian improvements. Travel lanes will be widened from 10' to 12', and 5' shoulders with 2' of shoulder backing will also be constructed.	\$1,293,000
Total				\$6,928,000

Project 1: Bethel Island Road Shoulders



Project 1 (2): Bethel Island Road Sidewalk Gaps



DKS Associates

1970 Broadway Ste 740, Oakland CA 94612

Planning Cost Estimate

Project Number

2.1

- ☒ Click here if the project schedule for this project is to be 50 days or more; also click here if this is a bridge project.
- ☐ Click here if this project is a surface treatment or overlay project.

Project Name: Sandmound Boulevard Shoulders - Oakley City Limits to Mariner Rd

Project Location: Sandmound Blvd from Oakley City Limits to Mariner Rd

Description	Project work includes widening Sandmound Boulevard to County standards and provide bicycle and pedestrian improvements. Travel lanes will be widened from 10' to 12', and 5' shoulders with 2' of shoulder backing will also be constructed.
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Project Length (ft): 1760

Date of Estimate: Apr. 11, 2014

Prepared by: T. Krakow

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
1	Clearing and grubbing	31680	SF	\$0.50	\$ 15,840
2	Earthwork	31680	SF	\$2.00	\$ 63,360
3	Shoulder Backing	290	Ton	\$30.00	\$ 8,712
4	Class 2 Aggregate Base	1825	CY	\$65.00	\$ 118,637
5	Hot Mix Asphalt (Type A)	1016	Ton	\$110.00	\$ 111,804
6	Striping	1760	LF	\$3.00	\$ 5,280
?	Asphaltic emulsion-slurry seal	35200	SY	\$1.00	\$ 35,200
7	Temporary traffic control	1	LS	\$35,900.00	\$ 35,900
8	Mobilization	1	LS	\$ 39,500.00	\$ 39,500
	CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000)				\$ 395,000
	Planning Engineering (TE)	\$ 40,000	Contract Items		\$ 434,000
	Preliminary Engineering (Design/Survey)*	\$ 100,000	Other Costs (CON)		\$ 87,000
	Utility Coordination (Design)	\$ 32,000	Contingency*		\$ 66,000
	Environmental (Environmental, Real Property)	\$ 13,000	Subtotal (Contract Items)		\$ 587,000
	R/W Engineering (Survey)	\$ -	Subtotal (Plan)		\$ 40,000
	Real Property Labor	\$ -	Subtotal (PE)		\$ 145,000
	R/W Acquisition	\$ -	Subtotal (R/W)		\$ -
	Construction Engineering *	\$ 87,000			
	Environmental Monitoring and Mitigation Fees	\$ -			
	SUBTOTAL of OTHER COSTS (ALL)	\$ 272,000			

* Preliminary Engineering is minimum 15% of contract items. (See Issues to Consider)

* Construction Engineering is 15% of contract items. (\$20,000 min.)

* CONTINGENCY is 15% of contract items. (\$10,000 min.)

GRAND TOTAL	\$ 772,000
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CURRENT YEAR	2014
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ESCALATION YEAR 2014

ESCALATION RATE 0.0%

➤ **TOTAL (in 2014 dollars) \$ 772,000**

Project 2.1: Sandmound Boulevard Shoulders - Oakley City Limits to Mariner Rd



DKS Associates

Planning Cost Estimate

1970 Broadway Ste 740, Oakland CA 94612

Project Number

2.2

- ☒ Click here if the project schedule for this project is to be 50 days or more; also click here if this is a bridge project.
- ☐ Click here if this project is a surface treatment or overlay project.

Project Name:	Sandmound Boulevard Shoulders - Mariner Rd to Cypress Rd
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Project Location: Sandmound Blvd from Mariner Rd to Cypress Rd

Description	Project work includes widening Sandmound Boulevard to County standards and provide bicycle and pedestrian improvements. Travel lanes will be widened from 9' to 12', and 5' shoulders with 2' of shoulder backing will also be constructed.
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Project Length (ft): 6100

Date of Estimate: Apr. 11, 2014

Prepared by: T. Krakow

Revision No.

Revision Date

Revised by

No.	Description	Quantity	Units	Unit Cost	Total
1	Clearing and grubbing	122000	SF	\$0.50	\$ 61,000
2	Earthwork	122000	SF	\$2.00	\$ 244,000
3	Shoulder Backing	1007	Ton	\$30.00	\$ 30,195
4	Class 2 Aggregate Base	7230	CY	\$65.00	\$ 469,926
5	Hot Mix Asphalt (Type A)	4026	Ton	\$110.00	\$ 442,860
6	Striping	6100	LF	\$3.00	\$ 18,300
?	Asphaltic emulsion-slurry seal	109800	SY	\$1.00	\$ 109,800
7	Temporary traffic control	1	LS	\$68,800.00	\$ 68,800
8	Mobilization	1	LS	\$ 144,500.00	\$ 144,500
	CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000)				\$ 1,445,000
	Planning Engineering (TE)	\$ 145,000	Contract Items	\$ 1,589,000	
	Preliminary Engineering (Design/Survey)*	\$ 239,000	Other Costs (CON)	\$ 239,000	
	Utility Coordination (Design)	\$ 127,000	Contingency*	\$ 239,000	
	Environmental (Environmental, Real Property)	\$ 51,000	Subtotal (Contract Items)	\$ 2,067,000	
	R/W Engineering (Survey)	\$ -	Subtotal (Plan)	\$ 145,000	
	Real Property Labor	\$ -	Subtotal (PE)	\$ 417,000	
	R/W Acquisition	\$ -	Subtotal (R/W)	\$ -	
	Construction Engineering *	\$ 239,000			
	Environmental Monitoring and Mitigation Fees	\$ -			
	SUBTOTAL of OTHER COSTS (ALL)	\$ 801,000			
			GRAND TOTAL	\$ 2,629,000	

* Preliminary Engineering is minimum 15% of contract items. (See Issues to Consider)

* Construction Engineering is 15% of contract items. (\$20,000 min.)

* CONTINGENCY is 15% of contract items. (\$10,000 min.)

CURRENT YEAR	2014
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ESCALATION YEAR 2014

ESCALATION RATE	0.0%
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➤ **TOTAL (in 2014 dollars) \$ 2,629,000**

Project 2.2: Sandmound Boulevard Shoulders - Mariner Rd to Cypress Rd



DKS Associates

1970 Broadway Ste 740, Oakland CA 94612

Planning Cost Estimate

Project Number

3

☒ Click here if the project schedule for this project is to be 50 days or more; also click here if this is a bridge project.

☐ Click here if this project is a surface treatment or overlay project.

Project Name: Gateway Road Shoulders

Project Location: Gateway Rd from Bethel Island Rd to Piper Rd

Description Project work includes widening Gateway Road to County standards and provide bicycle and pedestrian improvements. Travel lanes will be widened from 10' to 12', and 8' shoulders will be constructed along both sides of the roadway.

Project Length (ft): 5240

Date of Estimate: Apr. 11, 2014

Prepared by: T. Krakow

 Revision No.
 Revision Date
 Revised by

No.	Description	Quantity	Units	Unit Cost	Total
1	Clearing and grubbing	104800	SF	\$0.50	\$ 52,400
2	Earthwork	104800	SF	\$2.00	\$ 209,600
3	Class 2 Aggregate Base	3881	CY	\$65.00	\$ 252,296
4	Hot Mix Asphalt (Type A)	2162	Ton	\$110.00	\$ 237,765
5	Striping	5240	LF	\$3.00	\$ 15,720
?	Asphaltic emulsion-slurry seal	104800	SY	\$1.00	\$ 104,800
6	Headwalls	1	EA	\$5,000.00	\$ 5,000
7	Pipe extension	5	LF	\$250.00	\$ 1,250
8	Temporary traffic control	1	LS	\$43,900.00	\$ 43,900
9	Mobilization	1	LS	\$ 92,300.00	\$ 92,300
	CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000)				\$ 923,000
	Planning Engineering (TE)	\$ 93,000		Contract Items	\$ 1,015,000
	Preliminary Engineering (Design/Survey)*	\$ 153,000		Other Costs (CON)	\$ 153,000
	Utility Coordination (Design)	\$ 88,000		Contingency*	\$ 153,000
	Environmental (Environmental, Real Property)	\$ 35,000		Subtotal (Contract Items)	\$ 1,321,000
	R/W Engineering (Survey)	\$ -		Subtotal (Plan)	\$ 93,000
	Real Property Labor	\$ -		Subtotal (PE)	\$ 276,000
	R/W Acquisition	\$ -		Subtotal (R/W)	\$ -
	Construction Engineering *	\$ 153,000			
	Environmental Monitoring and Mitigation Fees	\$ -			
	SUBTOTAL of OTHER COSTS (ALL)	\$ 522,000			
				GRAND TOTAL	\$ 1,690,000

* Preliminary Engineering is minimum 15% of contract items. (See Issues to Consider)

* Construction Engineering is 15% of contract items. (\$20,000 min.)

* CONTINGENCY is 15% of contract items. (\$10,000 min.)

 CURRENT YEAR 2014
 ESCALATION YEAR 2014
 ESCALATION RATE 0.0%
➤ **TOTAL (in 2014 dollars) \$ 1,690,000**

Project 3: Gateway Road Shoulders



DKS Associates

1970 Broadway Ste 740, Oakland CA 94612

Planning Cost Estimate

Project Number

4

- ☒ Click here if the project schedule for this project is to be 50 days or more; also click here if this is a bridge project.
☐ Click here if this project is a surface treatment or overlay project.

Project Name: Piper Road Shoulders
Project Location: Piper Rd from Gateway Rd to Willow Rd

Description Project work includes widening Piper Road to County standards and provide bicycle and pedestrian improvements. Travel lanes will be widened from 10' to 12', and 5' shoulders with 2' of shoulder backing will also be constructed.

Project Length (ft): 5005**Date of Estimate:** Apr. 11, 2014**Prepared by:** T. Krakow

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
1	Clearing and grubbing	90090	SF	\$0.50	\$ 45,045
2	Earthwork	90090	SF	\$2.00	\$ 180,180
3	Shoulder Backing	413	Ton	\$30.00	\$ 12,387
4	Class 2 Aggregate Base	2595	CY	\$65.00	\$ 168,687
5	Hot Mix Asphalt (Type A)	1445	Ton	\$110.00	\$ 158,971
6	Striping	5005	LF	\$3.00	\$ 15,015
?	Asphaltic emulsion-slurry seal	100100	SY	\$1.00	\$ 100,100
7	Temporary traffic control	1	LS	\$34,000.00	\$ 34,000
8	Mobilization	1	LS	\$ 71,400.00	\$ 71,400
	CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000)				\$ 714,000
	Planning Engineering (TE)	\$ 72,000		Contract Items	\$ 786,000
	Preliminary Engineering (Design/Survey)*	\$ 118,000		Other Costs (CON)	\$ 118,000
	Utility Coordination (Design)	\$ 58,000		Contingency*	\$ 118,000
	Environmental (Environmental, Real Property)	\$ 23,000		Subtotal (Contract Items)	\$ 1,022,000
	R/W Engineering (Survey)	\$ -		Subtotal (Plan)	\$ 72,000
	Real Property Labor	\$ -		Subtotal (PE)	\$ 199,000
	R/W Acquisition	\$ -		Subtotal (R/W)	\$ -
	Construction Engineering *	\$ 118,000			
	Environmental Monitoring and Mitigation Fees	\$ -			
	SUBTOTAL of OTHER COSTS (ALL)	\$ 389,000			
				GRAND TOTAL	\$ 1,293,000

* Preliminary Engineering is minimum 15% of contract items. (See Issues to Consider)

* Construction Engineering is 15% of contract items. (\$20,000 min.)

* CONTINGENCY is 15% of contract items. (\$10,000 min.)

CURRENT YEAR 2014
ESCALATION YEAR 2014
ESCALATION RATE 0.0%

➤ **TOTAL (in 2014 dollars) \$ 1,293,000**

Project 4: Piper Road Shoulders

