Nexus Study
Discovery Bay
Area of Benefit

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Contra Costa County
Public Works Department

April 2018

Nexus Study
Discovery Bay Area of Benefit Program

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1. Introduction

1.1 Background and Purpose

The purpose of the Discovery Bay Area of Benefit (AOB) Program is to help fund improvements to the County's roadway, 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 collects funds 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 AOB 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 Discovery Bay 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 ensures that it participates fairly in the cost of improving the transportation system. This Program applies only to new development within the unincorporated portions of Discovery Bay.

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 the developers to pay a fee to fund its proportional share of the cost 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 establishes this impact and mitigation relationship to new development and the basis for the fee amount.

1.2 Discovery Bay AOB

On September 18, 1979, the Board of Supervisors passed a resolution forming the State Route 4 Area of Benefit. At the time, there were many vacant parcels in the area with potential for residential development, and the existing transportation system was inadequate to handle the additional traffic generated from the projected development. In 1987, the area of benefit was renamed as the "Discovery Bay Area of Benefit". In 1987, 1992, and 1997 the Area of Benefit program was revised to reflect the changing needs of the area. Over the past 36 years, Area of Benefit fees have helped pay for improvements to Byron Highway.

The Discovery Bay area has, in recent years, experienced changes in the area's circulation needs and development potential. These changes have prompted another revision to the Area of Benefit 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 Discovery Bay AOB Program. The focus of the updated program is to support a multi-modal transportation system in the Discovery Bay 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 report documents the analytical approach for determining the nexus between the fees, the local impact created by new development in the Discovery Bay AOB, and the transportation improvements to be funded with fee revenues to mitigate transportation impacts. A traffic and fair-share cost analysis was conducted to equitably distribute the costs of the necessary 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 standards.

The Discovery Bay AOB boundary, which was established in 1985, is shown in **Figure 1.**

2. Evaluation of Current AOB Program

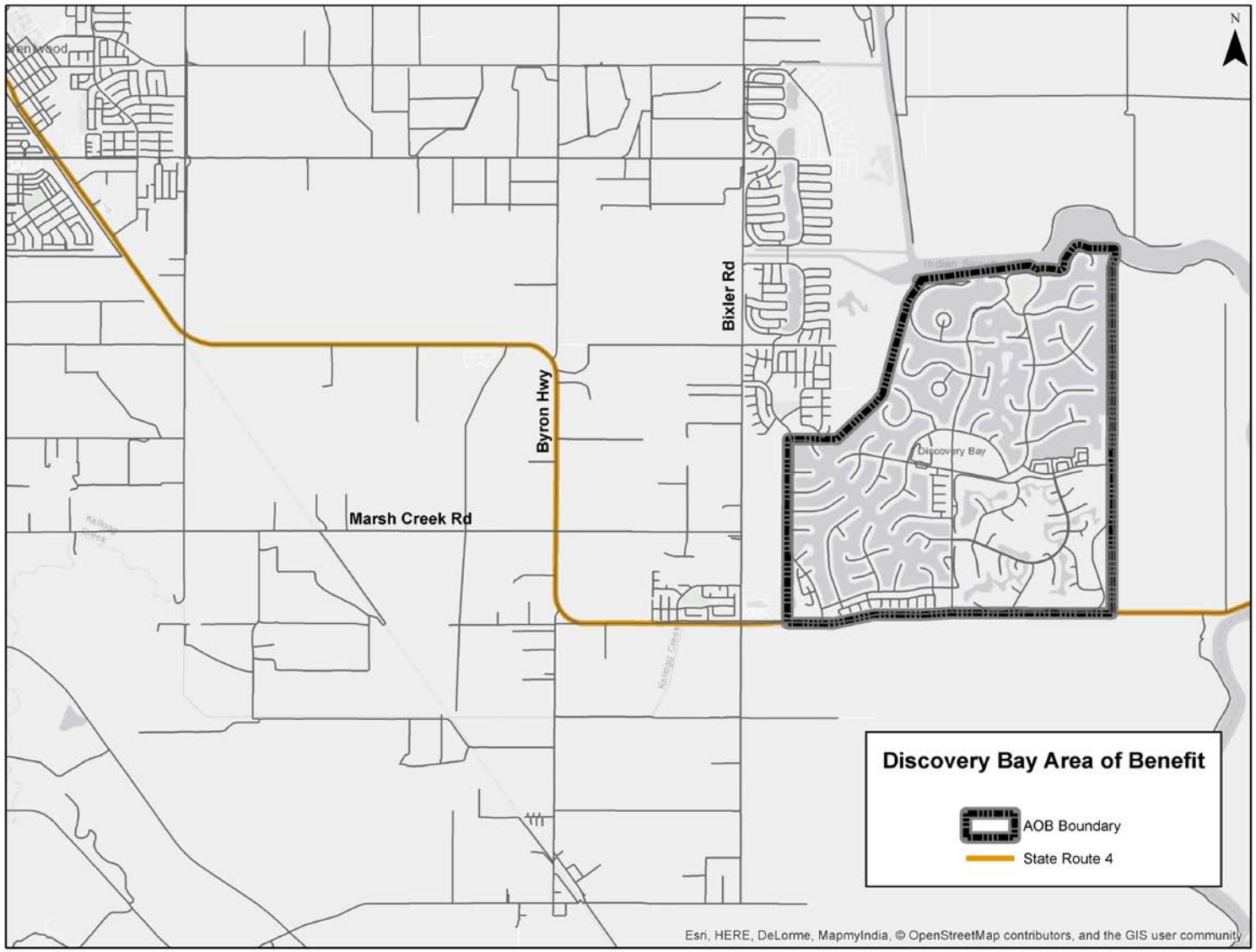
The current Discovery Bay AOB Program was last updated in 1992. The current Discovery Bay AOB Program project list, shown in **Table 1**, has three projects, which were estimated in 1992 to cost about $1.2 million, with about $427,000 to be funded by the AOB Program. The 2018 update of the Discovery Bay AOB Program 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.

Table 1: 1992 Project List for Discovery Bay AOB Program

	Project/Roadway	Project Description	Estimated Project Cost (1992 Dollars)	Project Cost to be Funded by AOB (1992 Dollars)
1	Byron Highway	Construction of improvements at Byron Elementary School	$217,000	$72,350
2	Byron Highway, at SR-4 (Stage 1)	Construct signal and interim intersection improvements	$420,000	$140,000
3	Byron Highway, at SR-4 (Stage 2)	Construction of ultimate intersection improvements	$634,000	$214,000
		Total	**$1,271,000**	**$426,790**
Source: Development Program Report for Discovery Bay AOB, 1992				

[1] California Government Code, Sections 66000 through 66026.

Figure 1: Discovery Bay AOB Boundary



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 based on the amount of traffic coming in and out of development's entrances. 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.

The use of simple trip generation rates tends to 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 for the current fees, the updated Discovery Bay AOB Program will instead use estimates of vehicle-miles of travel (VMT) added by new development. The VMT rates are calculated by multiplying 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 improvement costs for the Discovery Bay 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:

Land Use Type	Units
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 staff. Based on that review, adjustments were made and the resulting growth estimate for the AOB is summarized in **Table 2**. The table converts the estimates of jobs for nonresidential land uses used by the CCTA's model to estimates of building square feet used in the AOB fee program.

Table 2: Summary of Estimated Development 2010 to 2040 Growth

Land Use Category	Units	Due per Unit	Units			DUEs		
			2010	2040	Growth	2010	2040	Growth
Single-Family	DU	1.00	2,960	3,010	50	2,960	3010	50
Multi-family	DU	0.61	14	94	80	9	58	49
Total	**DU**		**2,974**	**3,104**	**130**	**2,969**	**3,068**	**99**
Retail	Jobs		92	162	70			
Office	Jobs		540	558	18			
Industrial	Jobs		44	45	1			
Total	**Jobs**		**676**	**765**	**89**			
Retail	1,000 sq. ft.	0.00142	46	81	35	65	115	50
Office	1,000 sq. ft.	0.00115	149	153	5	171	176	6
Industrial	1,000 sq. ft.	0.00091	26.4	27	0.6	24	25	1
Total	**1,000 sq. ft.**		**221**	**261**	**41**	**260**	**316**	**56**
					Total:	**3,229**	**3,383**	**155**
					Proportion of DUE Growth to the Total DUEs in 2040:	155/3383 = **0.0458**		

Source: DKS Associates, 2018

Notes:

Land Use	Assumed Square Feet per Job
Retail	500
Office	275
Industrial	600

4. Transportation Needs Analysis

Defining the transportation needs and project list for the Discovery Bay 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 AOB project list
7. Presenting analysis and findings at a neighborhood outreach meeting 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 AOB and select a project list are described in **Sections 4.1 through 4.6**.

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 May 2013 on major roadway segments and intersections within the AOB (see **Tables 3 and 4**).

4.2 Existing Deficiencies

The technical methods and standards used to identify the impact of new development on roadways and intersections 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/Intersection 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 study intersections under existing and future (2040) conditions. If one or more of the signal warrants are met, signalization of the intersection may be recommended.

Level of Service

The needs analysis for the Discovery Bay 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. LOS is calculated separately for intersections and roadway segments. Intersection LOS analysis is based on average vehicle delay and analysis methods recommended by the Highway Capacity Manual (Transportation Research Board, 2010). Roadway segment LOS analysis compares traffic levels with roadway segment capacities determined by the number of travel lanes and the roadway type. The Discovery Bay area is designated in the Contra Costa General Plan for low and medium density residential with supporting services. For the purpose of identifying the LOS standard, the area is considered "Suburban," and the LOS standard is Low D (less than 45 seconds delay per vehicle for a signalized intersection, less than 30 seconds delay per vehicle for an unsignalized intersection and less than 85 seconds delay per vehicle for a roadway segment). The exception is SR-4, which is designated as a Route of Regional Significance in the East County Action Plan. The LOS standard for SR-4 is High D (less than 55 seconds delay per vehicle for a signalized intersection, less than 35 seconds delay per vehicle for an unsignalized intersection and less than 90 seconds delay per vehicle). The intersection and roadway segment LOS analysis is summarized in **Tables 3 and 4** as well as **Figures 2 and 3.**

Table 3: Intersection Level of Service Analysis

	Intersection	Area Type[1]	Control Type	LOS Standard[1]	Delay Standard (seconds)	2013				2040			
						AM		PM		AM		PM	
						Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	SR 4 & Newport Dr [1,2]	Suburban	TWSC	Low D	≤ 30	13.6	B	12.2	B	**> 80**	**F**	**> 80**	**F**
2	Discovery Bay Blvd & SR 4 [2]	Suburban	Signal	High D	≤ 55	**64.4**	**E**	**66.8**	**E**	**> 80**	**F**	**> 80**	**F**
3	Discovery Bay Blvd & Clipper Dr [1]	Suburban	TWSC	Low D	≤ 30	**39.6**	**E**	21.6	C	**> 80**	**F**	**58.4**	**F**
4	Discovery Bay Blvd & Spinnaker Wy/Clubhouse Dr	Suburban	AWSC	Low D	≤ 30	15.1	C	12.9	B	**35.4**	**E**	**33.6**	**D**
5	Discovery Bay Blvd & Sand Point Rd/Willow Lake Rd	Suburban	AWSC	Low D	≤ 30	18.3	C	11.7	B	**49.2**	**E**	**33.8**	**D**

[1] Minor stop-controlled LOS based on worst approach
[2]Intersections is part of a Route of Regional Significance
LOS highlighted in gray does not meet County's standard
Source: DKS Associates, 2018

Table 4: Roadway Segment Level of Service Analysis

Roadway	Location	Area Type[2]	LOS Standard[2]	V/C Ratio Standard[2]	2013				2040			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					V/C	LOS Range	V/C	LOS Range	V/C	LOS Range	V/C	LOS Range
SR-4 [1]	Between Byron Hwy & Discovery Bay Blvd	Suburban	High D	≤ 0.90	0.79	A-C	0.88	High D	**1.49**	**F**	**1.53**	**F**
Discovery Bay Blvd	Between SR 4 & Clipper Dr	Suburban	Low D	≤ 0.85	0.29	A-C	0.30	A-C	0.45	A-C	0.46	A-C
	Between Clipper Dr & Clubhouse Dr	Suburban	Low D	≤ 0.85	0.33	A-C	0.33	A-C	0.48	A-C	0.48	A-C
	Between Sand Point Rd & Spinnaker Wy	Suburban	Low D	≤ 0.85	0.28	A-C	0.27	A-C	0.40	A-C	0.39	A-C
	North of Sand Point Rd	Suburban	Low D	≤ 0.85	0.12	A-C	0.13	A-C	0.19	A-C	0.22	A-C

[1] SR-4 is a Route of Regional Significance and has a level of service standard of High D
[2]Contra Costa County General Plan, 2005
LOS highlighted in gray does not meet County's standard
Source: DKS Associates, 2018

Figure 2: Existing Levels of Service in Discovery Bay AOB

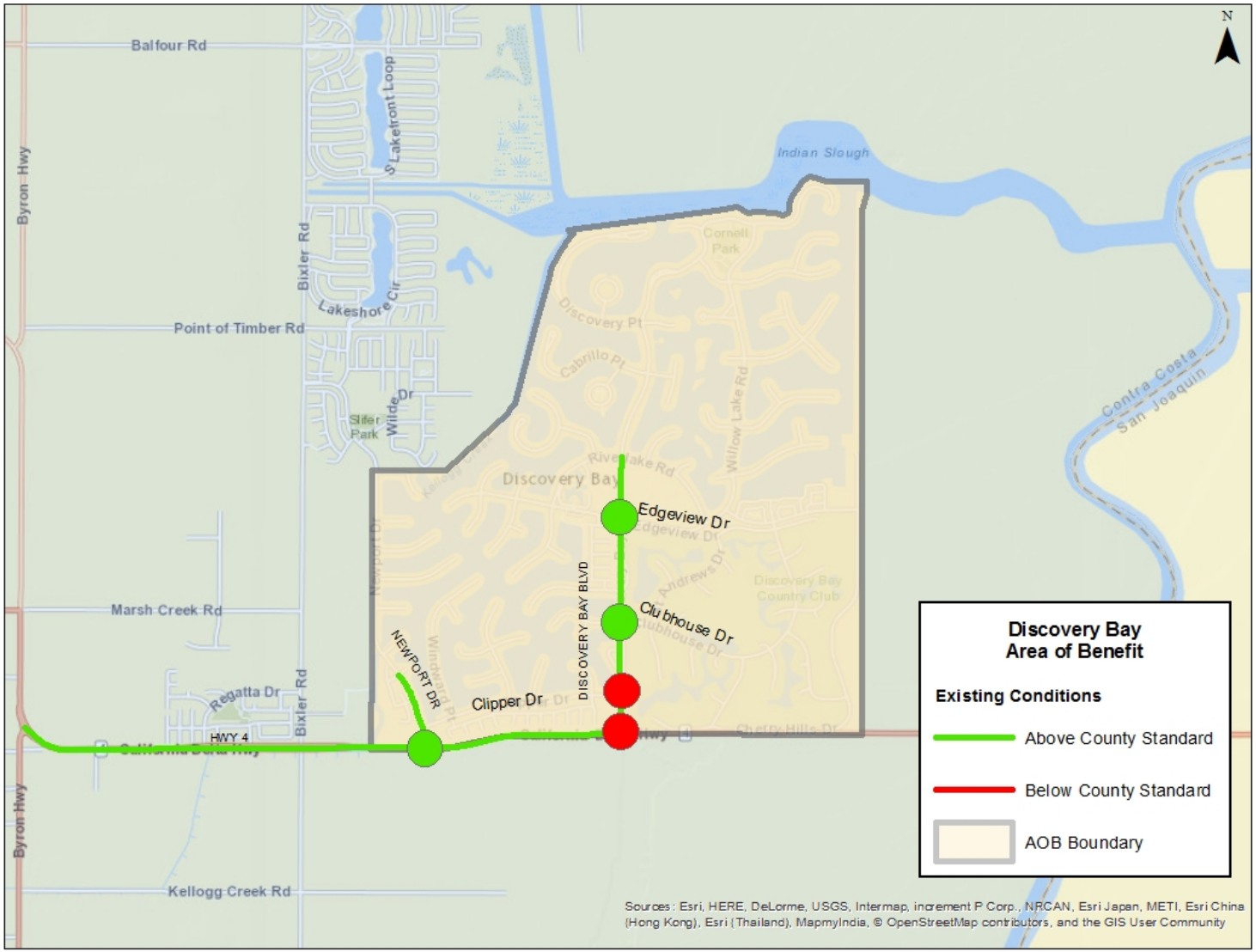
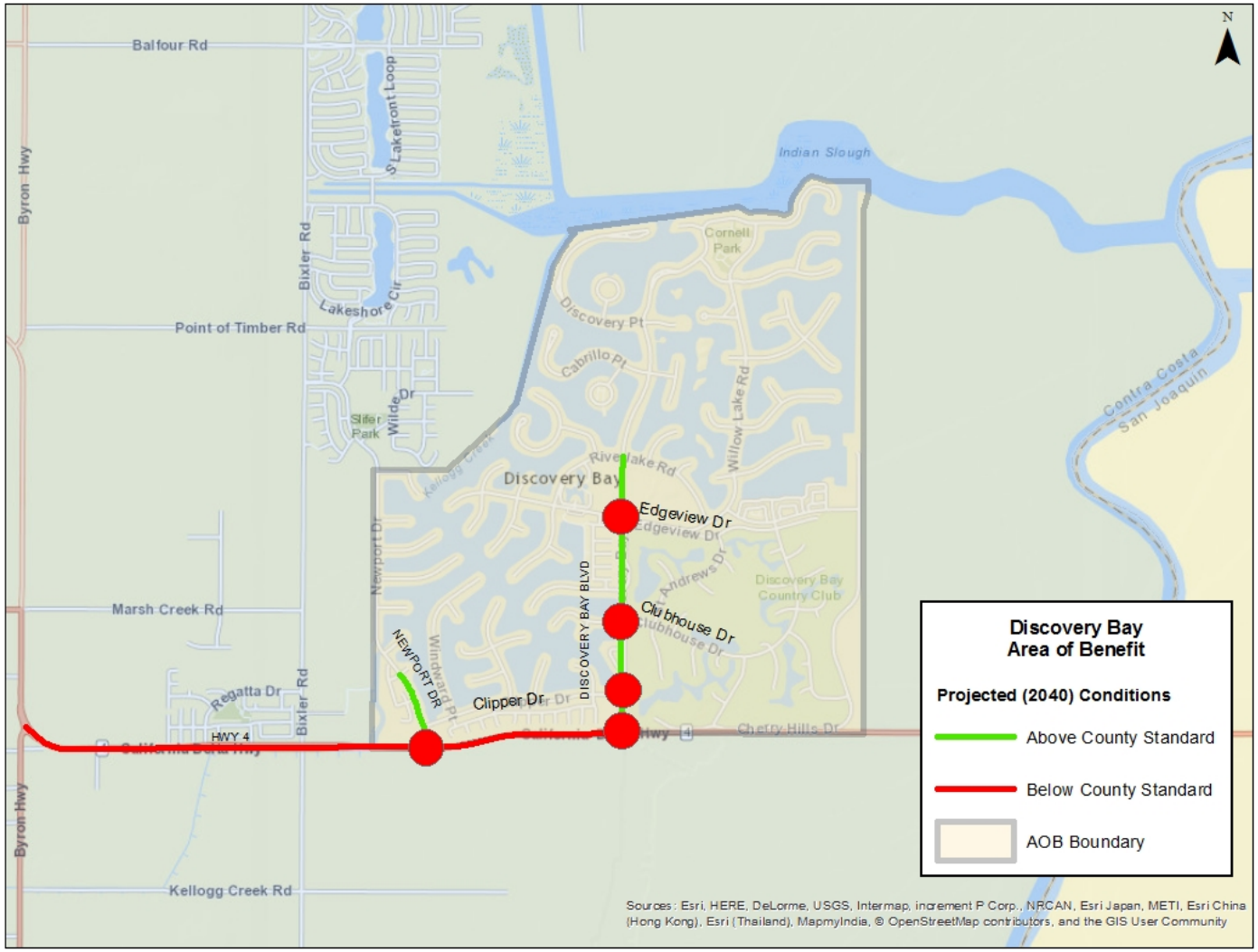


Figure 3: 2040 Levels of Service in Discovery Bay AOB



Roadway Pavement Width Standards

Many of the County's two-lane roads within the Discovery Bay 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 adding shoulders to two-lane roadways would increase safety as traffic increases and shoulders would provide a bicycle lane/walkway. FHWA recommends that rural roadways that carry more than 2,000 average daily vehicles (ADT) should have 5 to 6-foot wide shoulders. Contra Costa County's standards for two-lane roadways, shown in **Table 5**, call for shoulders on roadways with more than 1,000 ADT.

Table 5: Two Lane Rural/Lane Widths Contra Costa 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 Pedestrian and Bicycle Infrastructure Needs Analysis

New development also necessitates changes to roadway design that are not geared toward increases in vehicle capacity or improvements to vehicle safety. New development generates non-vehicular trips (pedestrian and bicycle) that will need to be 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, pedestrian and bicycle facilities would be implemented to the extent that they are represented in the County's current standard roadway designs.

Pedestrian and bicycle infrastructure improvements may also reduce vehicular congestion by shifting trips from autos to these alternative modes. The County's General Plan has goals to encourage the use of transit (Goal 5-I) and to reduce single-occupant auto commuting and encourage walking and bicycling (Goal 5-J). The General Plan also has policies to encourage all efforts to develop alternative transportation systems to reduce peak period traffic congestion (Policy 5-23) and to encourage the use of alternative forms of transportation, such as pedestrian, bicycle and transit modes in order to provide basic accessibility to those without access to a personal automobile and to help minimize automobile congestion and air pollution.

4.6 Selected Project List

A draft list of capital improvements to the transportation system in the AOB Programs was prepared. The project list is focused on the major transportation system in the County's General Plan (see Sections 5.6 and 5.8 of the General Plan, which describe the major roadway, transit, bikeway and pedestrian facilities). This list generally consists of the following types of projects:

1. Installing traffic signals at intersections that meet warrants for their installation
2. Adding turn lanes at intersections to meet LOS standards
3. Adding lanes on roadway segments to meet LOS standards
4. Upgrading roadways to be consistent with County design standards
5. Making improvements to improve safety for all modes of transportation
6. Providing appropriate pedestrian and bicyclist facility improvements

The draft project list was prepared to meet the needs defined above and then was presented to the Discovery Bay Community Service District Board of Directors who approved the list shown in **Table 6** and **Figure 4.**

5. Improvement Cost Estimates

Planning-level cost estimates were prepared based on conceptual designs for each project (**Table 6**). 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 roadway excavation quantities were used except in areas where significant excavation was identified, including cut and fill of embankments. The cost estimating does not reflect 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

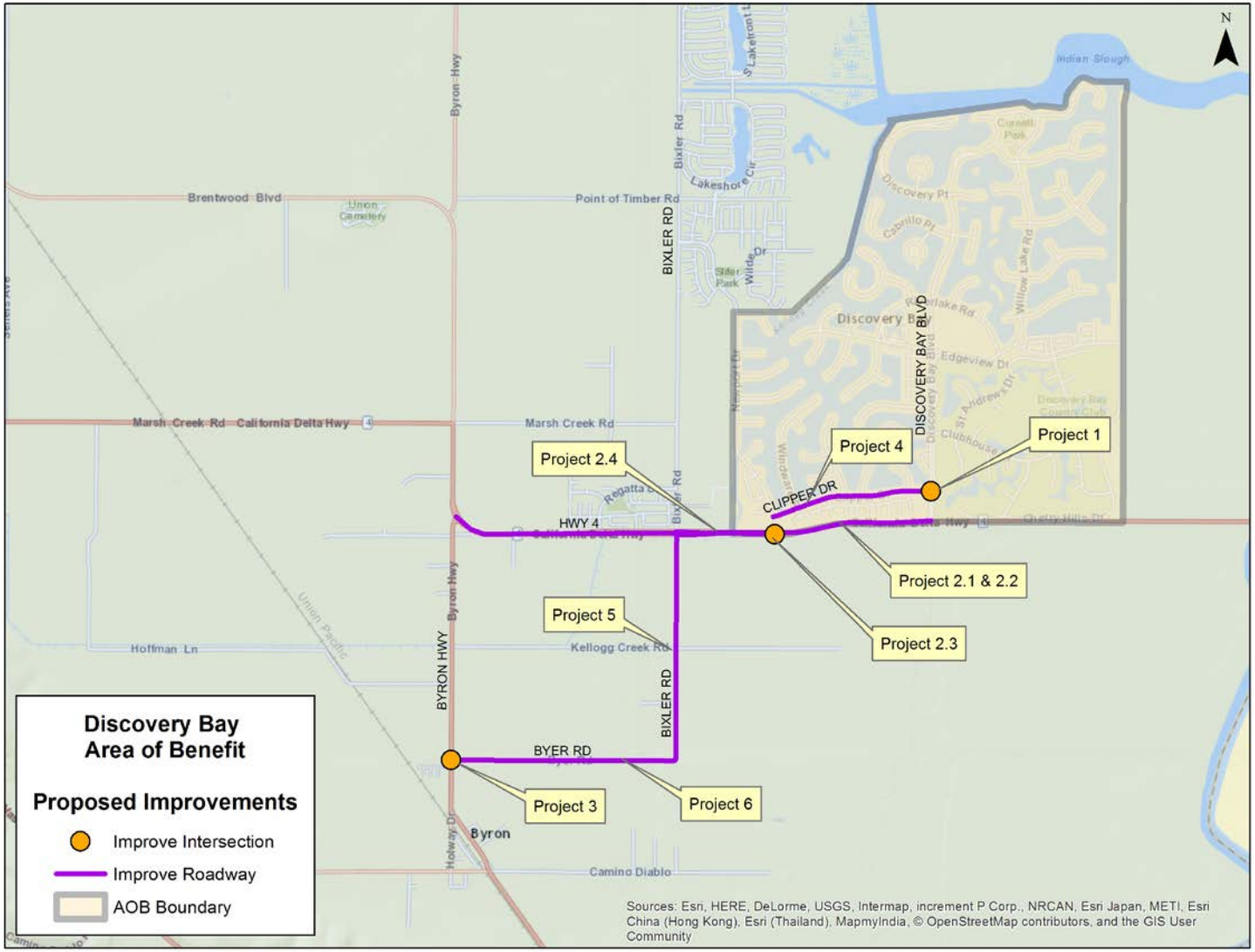
The cost estimates for each of the selected projects for funding by the Discovery Bay AOB, shown in **Table 6** are provided in **Appendix A**.

Table 6: Selected Discovery Bay AOB Project List

Roadway	Project	Location	Recommended Project	Basis for Recommendation
Discovery Bay Boulevard	1	Intersection with Clipper Drive	Intersection improvement	Contra Costa County General Plan LOS Standards
SR-4	2.1	Between Bixler Road and Discovery Bay Boulevard	Widening and provide pedestrian and bicycle improvements	Contra Costa County General Plan LOS Standards, Countywide Bicycle and Pedestrian Plan
	2.2	Between Bixler Road and Discovery Bay Boulevard	Rebuild bridge to accommodate four lanes	Contra Costa County General Plan LOS Standards
	2.3	Intersection with Newport Drive	Intersection improvement	Contra Costa County General Plan LOS Standards
	2.4	Between Byron Highway and Bixler Road	Widen roadway	Contra Costa County General Plan LOS Standards
Byron Highway	3	Intersection with Byer Road	School safety improvements	Safety Improvement
Clipper Drive	4	Between Newport Drive and Discovery Bay Boulevard	Add traffic calming measures	CSD Meeting Feedback
Bixler Road	5	Between SR-4 and Byer Road	Complete Street Improvements	CSD Meeting Feedback
Byer Road	6	Between Bixler Road and Byron Highway	Complete Street Improvements	CSD Meeting Feedback

Source: DKS Associates, 2018

Figure 4: Selected Projects for Discovery Bay AOB Program



6. Basis for Allocating Costs to New Development

This section describes the process used to allocate transportation improvement costs to new development in the AOB and the estimated transportation mitigation 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 the roadways or intersections that require improvements based on 2040 traffic forecasts. The allocation of improvement costs is based on the percentage of trips on the roadways and intersections 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 7** 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

Costs for improvements needed to address LOS impacts (either intersection or roadway LOS) are allocated to new development in the Discovery Bay AOB using one of three methods:

1. For a roadway segment or intersection that is currently operating at an acceptable LOS but would operate at an unacceptable LOS in 2040, the entire cost of improving that segment or intersection is allocated to new development if there is no increase in through traffic. This method did not apply to any improvements on the Discovery Bay project list.
2. If the current and future LOS conditions are the same as described under #1 but there is an increase in the amount of through traffic then new development within the AOB is not allocated the full cost of the improvement. Instead, new development within the AOB is allocated a percentage of costs based 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 new development. The remaining percent of costs, reflecting new trips that have neither their origin nor destination in the AOB, are not allocated to development in the AOB. This method was used to allocate costs for improvements on SR-4.
3. For a roadway segment or intersection that currently does not meet the County's LOS 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 (including through traffic). This method was used to allocate costs for improvements on Discovery Bay Boulevard and Byron Highway.

6.2 Widening to Meet Roadway Pavement Width Standards

The allocation of costs to improve roadway to County cross-section standards is similar to the allocation of cost for improvements to address LOS impacts. 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. If that roadway has an increase in the amount of through traffic then new development within the AOB is allocated a percentage of costs based on the number of trips associated with new development within the AOB. This method did not apply to any improvements on the Discovery Bay 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 did not apply to any improvements on the Discovery Bay project list.

6.3 Pedestrian and Bicycle Infrastructure Improvements

Pedestrian and bicycle improvements in the Discovery Bay AOB are localized improvements serving trips that have their origin or destination within the AOB rather than through trips. Lack of pedestrian and bicycle facilities is an existing deficiency in the AOB; hence the improvements will benefit both existing and future residents. Since the improvements will serve the existing and future pedestrian and bicycle demand, the cost of those projects allocated to new development will equal the new development's proportional share of the total future development (existing plus new development) in the Discovery Bay AOB (measured in Dwelling Unit Equivalents). This method was used to allocate costs for improvements described in **Table 8**.

Table 7: Cost Allocation Analysis for Discovery Bay AOB Project List - Level of Service Improvements

Roadway	Project	Location	Recommended Project	Existing Conditions		2040 Conditions		Percent of 2040 Volume				Percent of 2013 to 2040 Growth		Percent Allocated to AOB
				PM Peak Period Volume[3]	LOS	PM Peak Period Volume[3]	LOS[1]	Existing Local	Local Growth	Existing Through	Through Growth	Local	Through	
Discovery Bay Boulevard	1	Intersection with Clipper Drive[2]	Intersection improvement	1,229	E	1,791	F	68.62	31.38	0.00	0.00	100.00	0.00	31.38
SR-4	2.1	Between Bixler Road and Discovery Bay Boulevard	Widening and providing pedestrian and bicycle improvements	9,219	D	10,309	F	66.77	3.21	22.66	7.36	30.33	69.67	30.33
	2.2	Between Bixler Road and Discovery Bay Boulevard	Rebuild bridge to accommodate four lanes	9,219	D	10,309	F	66.77	3.21	22.66	7.36	30.33	69.67	30.33
	2.3	Intersection with Newport Drive[2]	Intersection improvement	1,686	B	3,075	F	41.00	15.00	14.00	30.00	33.33	66.67	33.33
	2.4	Between Byron Highway and Bixler Road	Widen roadway	10,177	D	11,832	F	66.77	3.21	22.66	7.36	30.33	69.67	30.33
Byron Highway	3	Intersection with Byer Road	School safety improvements with SB left-turn pocket	1,047	A-C	1,154	A-C	43.84	2.10	46.95	7.11	22.85	77.15	2.10

[1]LOS without improvement
[2]Based on AM peak hour volumes, sum of approach volumes
[3]4-hour peak period
Source: DKS Associates, 2018

Table 8: Cost Allocation Analysis for Discovery Bay AOB Project List – Pedestrian and Bicycle Infrastructure Improvements

Roadway	Project	Location	Recommended Project	Percent Allocated to AOB*
Clipper Drive	4	Between Newport Drive and Discovery Bay Boulevard	Add traffic calming measures	4.58
Bixler Road	5	Between SR-4 and Byer Road	Complete Streets Improvements	4.58
Byer Road	6	Between Bixler Road and Byron Highway	Complete Streets Improvements	4.58

*Percentage allocation to AOB is the proportion of DUE growth to the total DUEs in 2040 (see Table 2).
Source: DKS Associates, 2018

6.4 Summary of Cost Allocation

Table 9 summarizes the allocation of the cost for each of the selected projects that will have funding from the Discovery Bay AOB Program.

The County has various methods for funding transportation improvements within the Discovery Bay AOB boundary. While the Discovery Bay AOB fee program is one method, additional funding will need to be obtained from Federal, State and local grants (such as ATP, SRTS, BTA, etc.) or other sources to fund the cost of the improvements not allocated to new development in the Discovery Bay AOB. On an on-going basis, the County will assess the unconstructed projects on the AOB project list and determine project priorities. As enough funding becomes available from all sources to implement "priority" projects, the County will implement those projects.

Table 9: Allocation of Project Costs to Discovery Bay AOB Program

Roadway	Project	Location	Recommended Project	Estimated Total Cost	Percent Allocated to AOB	Cost Allocated to AOB
Discovery Bay Boulevard	1	Intersection with Clipper Drive	Intersection improvement	$1,910,000	31.38	$599,341
SR-4	2.1	Between Bixler Road and Discovery Bay Boulevard[1]	Widening and providing pedestrian and bicycle improvements	$4,976,000	30.33	$1,509,204
	2.2	Between Bixler Road and Discovery Bay Boulevard	Rebuild bridge to accommodate four lanes	$8,201,000	30.33	$2,487,336
	2.3	Intersection with Newport Drive	Intersection improvement	$731,000	33.33	$243,667
	2.4	Between Byron Highway and Regatta Drive	Widen roadway	$4,096,000	30.33	$1,242,303
Byron Highway	3	Intersection with Byer Road	School safety improvements	$1,198,000	22.85	$273,738
Clipper Drive	4	Between Newport Drive and Discovery Bay Boulevard	Add traffic calming measures	$224,000	4.58	$10,262
Bixler Road	5	Between SR-4 and Byer Road[2]	Complete Street Improvements	$5,742,000	4.58	$263,068
Byer Road	6	Between Bixler Road and Byron Highway[2]	Complete Street Improvements	$5,477,000	4.58	$250,927
			Total	**$32,555,000**	**20.37**	**$6,879,847**

Source: DKS Associates, 2018

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:

Land Use Type	Units
Single-Family	Dwelling units (DU)
Multi-Family	Dwelling units (DU)
Commercial/Retail	1,000 Sq. Ft.
Office	1,000 Sq. Ft
Industrial	1,000 Sq. Ft

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-making characteristics of a land use compare to 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 values greater than 1, while land uses with lower overall traffic impacts than a typical single-family residential unit 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 same rates for 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 peak hour. Also considered in the calculation of DUEs are "percent new" trips since some of the vehicles attracted to non-residential uses would have been on the roadway system regardless of the presence of the traffic generated by the new development. 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 that will be used to estimate the Discovery Bay AOB fees are shown in **Table 10**.

Table 10: 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, 2018

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 11**). The cost for each land use type is then based on its DUE rate. The nexus-based fee rates are shown in **Table 12**.

Table 11: Growth in DUE

Land Use Category	Unit	Growth in Units[1]	DUE per Unit	Growth in DUEs
Singe Family	Dwelling Unit	50	1.00	50
Multi-Family		80	0.61	49
Retail	Square Feet	35,000	0.00142	50
Office		4,950	0.00115	6
Industrial		600	0.00091	1
			Total	155

[1] See Table 2: "Summary of Estimated Development 2010 to 2040 Growth"

Source: DKS Associates, 2018

Table 12: Nexus Based Fee Rates

Cost of Improvements Allocated to AOB Growth	$6,879,847
AOB Account Balance (as of April 2018)	$240,760
Unfunded Allocated Costs	$6,639,087
Growth in Dwelling Unit Equivalents (DUE's)	155
Cost per DUE	$42,830.79

Land Use	Units	Fee per Unit[1]
Single Family	Dwelling Unit	$42,831
Multi-Family	Dwelling Unit	$26,292
Retail	Square Foot	$60.78
Office	Square Foot	$49.16
Industrial	Square Foot	$39.00

[1]Fee per Unit = (Cost per DUE) x (DUE per Unit)
Source: DKS Associates, 2018

8. Nexus Analysis

A nexus analysis has been prepared on the Discovery Bay AOB Program in accordance with the procedural guidelines established in AB1600 which is codified in California Government Section 66000 *et seq*. These code sections set forth the procedural requirements for establishing and collecting 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 portion of the public facility attributable to the development on which the fee is imposed.

8.1 Purpose of fee

The purpose of the Discovery Bay AOB Program is to fund improvements to the County's major roadway, bicycle and pedestrian facilities needed to accommodate travel demand generated by new land development in the unincorporated portion of Discovery Bay AOB over the next 27 years (through 2040).

The Discovery Bay 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 Discovery Bay 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 Discovery Bay AOB Program will help fund transportation facilities necessary to accommodate new residential and non-residential development in the unincorporated portions of the Discovery Bay AOB.

8.2 Use of Fees

The fees from new development in the Discovery Bay 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 Discovery Bay AOB. The Discovery Bay AOB Program will help fund improvements to roadways (include the widening or extensions of arterial and collector roadways, intersection improvements and provision of shoulders and complete streets), 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 Discovery Bay 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 costs based 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 new 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 Discovery Bay 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's are numerical measures of how the trip-making characteristics of a land use compare to a single-family residential unit. DUE's 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's reflect the relative trip generation for the peak hour. Also considered in the calculation of DUE's 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 April 2018, the Discovery Bay AOB had a fund balance of $240,760.10 (see **Table 12**). The allocation of the existing fund balance will be restricted to the Byron Highway project, a carry-over project from the previous project list.

Appendix A

Cost Estimates for Selected Projects in Discovery Bay AOB

Discovery Bay Area of Benefit
Engineer's Estimate Summary

Project	Roadway	Location	Item Description	Total Cost
1	Discovery Bay Boulevard	Discovery Bay Boulevard and Clipper Drive	Project would install a 166' diameter double-lane roundabout to address existing and future projected LOS deficiencies. This intersection control modification is expected to impact 4 properties.	$1,910,000
2.1, 2.2, 2.4	SR-4	SR-4 from Bixler Road to Discovery Bay Boulevard	Project will widen SR-4 to provide four 12' travel lanes and 8' shoulders/bike lanes. These improvements are needed to maintain an acceptable level of service and are consistent with the Countywide Bicycle and Pedestrian Plan. This cost estimate assumes roadway widening along the entire segment, excluding the two bridges (which are costed separately as Project 2.2).	$17,273,000
2.3	SR-4	SR-4 and Newport Drive	Project would signalize the intersection of SR-4 and Newport Drive to address a future LOS deficiency.	$731,000
3	Byron Highway	Byron Highway and Byer Road	Project would widen Byron Highway to provide a 200' left turn pocket at Byer Road. Currently southbound traffic uses the right shoulder to bypass stopped left-turning vehicles. This project will provide left turn storage and enhance safety near a school.	$1,198,000
4	Clipper Drive	Clipper Drive from Discovery Bay Boulevard to Newport Drive	Project will construct 15' traffic circles at the intersections of Clipper Drive and Reef Court and Clipper Drive and Balboa Way. Additionally, the project will stripe bike lanes on both sides of the roadway. Between Discovery Bay Boulevard and Windward Point, the center two-way left turn lane (TWLTL) will be removed to provide the needed width. Between Windward Point and Newport Drive, one of the two westbound left turn lanes and the eastbound left turn lane will be removed to provide the needed width.	$224,000
5	Bixler Road	Bixler Road from SR-4 to Byer Road	Project will widen Bixler Road from SR-4 to Byer Road to provide 12' travel lanes with 8' shoulders/bike lanes. These improvements are expected to enhance vehicle and bicycle safety.	$5,742,000
6	Byer Road	Byer Road from Byron Highway to Bixler Road	Project will widen Byer Road from Byron Highway to Bixler Road to provide 12' travel lanes with 8' shoulders/bike lanes. These improvements are expected to enhance vehicle and bicycle safety.	$5,477,000
			TOTAL	**$32,555,000**

Source: DKS Associates, 2016

DKS Associates

Planning Cost Estimate

1970 Broadway Ste 740, Oakland CA 94612

Project Number **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: Discovery Bay Boulevard and Clipper Drive Intersection Improvements

Project Location: Discovery Bay Boulevard and Clipper Drive

Description: Project would install a 166' diameter double-lane roundabout to address existing and future projected LOS deficiencies. This intersection control modification is expected to impact 4 properties.

Project Length (ft): N/A

Date of Estimate: Feb. 19, 2015

Prepared by: T. Krakow

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
1	Demolish existing curb	720	LF	$5.00	$ 3,600
2	Demolition of concrete sidewalk and median	2,950	SF	$5.00	$ 14,750
3	Demolition of existing asphalt	23,842	SF	$3.00	$ 71,527
4	Excavation	422	CY	$75.00	$ 31,667
5	Class 2 Aggregate Base	422	CY	$65.00	$ 27,444
6	Hot Mix Asphalt (Type A)	317	Ton	$125.00	$ 39,605
7	Curb & Gutter	1,239	LF	$35.00	$ 43,354
8	Striping	1,302	LF	$3.00	$ 3,905
9	Irrigation and Landscaping	16,742	SF	$10.00	$ 167,415
10	Pavers	2,215	SF	$25.00	$ 55,371
11	Relocate exising lighting fixtures	2	EA	$2,000.00	$ 4,000
12	Lighting fixtures	6	EA	$8,000.00	$ 48,000
13	Construction area Signs	1	LS	$1,500.00	$ 1,500
14	Removal of existing signs	1	LS	$500.00	$ 500
15	New signage	1	LS	$1,500.00	$ 1,500
16	Misc. drainage improvements	1	LS	$102,800.00	$ 102,800
17	Mobilization	1	LS	$ 61,700.00	$ 61,700

CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000)	$	617,000

Project Number **1**

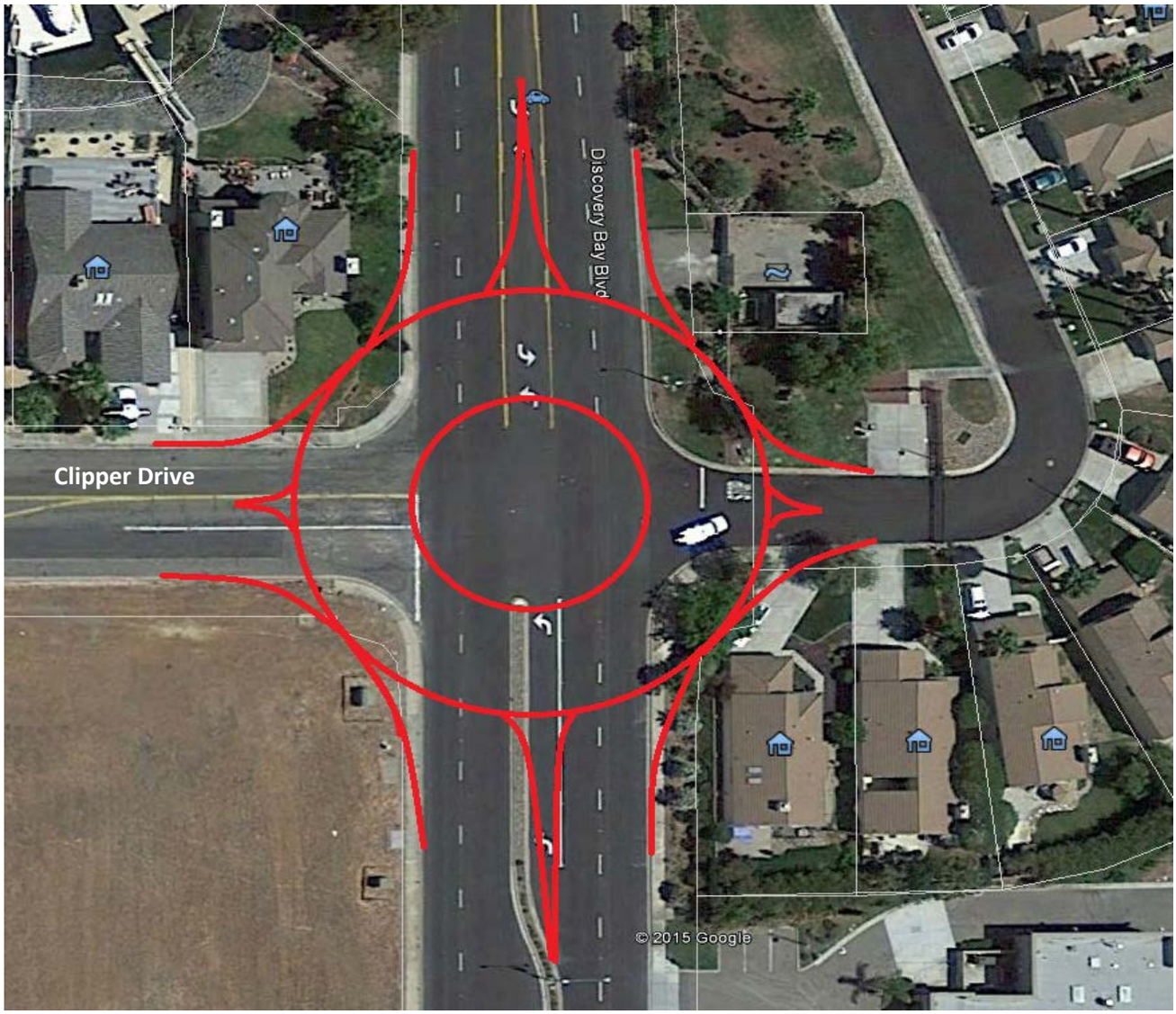
Planning Engineering (TE)	$	93,000	Contract Items	$	678,700
Preliminary Engineering (Design/Survey)*	$	272,000	Other Costs (CON)	$	102,000
Utility Coordination (Design)	$	61,694	Contingency*	$	102,000
Environmental (Environmental, Real Property)	$	74,033	Subtotal (Contract Items)	$	882,700
R/W Engineering (Survey)	$	30,000	Subtotal (Plan)	$	93,000
Real Property Labor	$	50,000	Subtotal (PE)	$	407,726
R/W Acquisition	$	447,000	Subtotal (R/W)	$	527,000
Construction Engineering *	$	102,000			
Environmental Monitoring and Mitigation Fees	$	-			
SUBTOTAL of OTHER COSTS (ALL)	$	1,129,726			
			Grand Total	$	1,910,426
			Current Year		2015
			Escalation Year		2015
			Escalation Rate		0.0%
			➢ **TOTAL (in 2015 dollars)**	**$**	**1,910,000**

* 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.)

Project 1: Discovery Bay Boulevard and Clipper Drive Intersection Improvements



DKS Associates | **Planning Cost Estimate**

1970 Broadway Ste 740, Oakland CA 94612 | **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: SR-4 Widening and Bicycle Improvements (Bixler to Discovery Bay)
Project Location: SR-4 from Bixler Road to Discovery Bay Boulevard

Description

Project will widen SR-4 to provide four 12' travel lanes and 8' shoulders/bike lanes. These improvements are needed to maintain an acceptable level of service and are consistent with the Countywide Bicycle and Pedestrian Plan. This cost estimate assumes roadway widening along the entire segment, excluding the two bridges (which are costed separately as Project 2.2).

Project Length (ft): 5420

Date of Estimate: Feb. 19, 2015

Prepared by: T. Krakow

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
Bixler Road to Newport Drive					
1	Clearing and Grubbing	23652	SF	$3.00	$ 70,956
2	Earthwork	23652	SF	$4.00	$ 94,700
3	Class 2 Aggregate Base	1752	CY	$65.00	$ 113,900
4	Hot Mix Asphalt (Type A)	781	Ton	$125.00	$ 97,600
5	Striping	7876	LF	$3.00	$ 23,700
6	Misc. Drainage Modifications	1	LS	$80,200.00	$ 80,200
				Subtotal (LS):	$ 481,056
Newport Drive to Discovery Bay Boulevard					
7	Clearing and Grubbing	90240	SF	$3.00	$ 270,720
8	Earthwork	90240	SF	$4.00	$ 361,000
9	Class 2 Aggregate Base	6684	CY	$65.00	$ 434,500
10	Hot Mix Asphalt (Type A)	2978	Ton	$125.00	$ 372,300
11	Striping	13800	LF	$3.00	$ 41,400
12	Misc. Drainage Modifications	1	LS	$296,000.00	$ 296,000
				Subtotal (LS):	$ 1,775,920
13	Construction Area Signs	1	LS	$1,000.00	$ 1,000
14	Temporary traffic control	1	LS	$112,800.00	$ 112,800
15	Prepare Water Pollution Control Plan	1	LS	$6,000.00	$ 6,000
16	Mobilization	1	LS	$ 237,700.00	$ 237,700

CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000) $ 2,377,000

Project Number **2.1**

Planning Engineering (TE)	$ 357,000	Contract Items	$ 2,615,000
Preliminary Engineering (Design/Survey)*	$ 654,000	Other Costs (CON)	$ 393,000
Utility Coordination (Design)	$ 225,698	Contingency*	$ 393,000
Environmental (Environmental, Real Property)	$ 338,546	Subtotal (Contract Items)	$ 3,401,000
R/W Engineering (Survey)	$ -	Subtotal (Plan)	$ 357,000
Real Property Labor	$ -	Subtotal (PE)	$ 1,218,244
R/W Acquisition	$ -	Subtotal (R/W)	$ -
Construction Engineering *	$ 393,000		
Environmental Monitoring and Mitigation Fees	$ -		
SUBTOTAL of OTHER COSTS (ALL)	$ 1,968,244		
		Grand Total	$ 4,976,244
		Current Year	2015
		Escalation Year	2015
		Escalation Rate	0.0%
		➢ **TOTAL (in 2015 dollars)**	**$ 4,976,000**

* 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.)

Project 2.1: SR-4 Widening and Bicycle Improvements (Bixler to Discovery Bay)

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: SR-4 Bridge Widening and Bicycle Improvements

Project Location: SR-4 from Bixler Road to Discovery Bay Boulevard

Description

Project will widen the SR-4 bridges east and west of Newport Drive to provide four 12' travel lanes and 8' shoulders/bike lanes. These improvements are needed to maintain an acceptable level of service and are consistent with the Countywide Bicycle and Pedestrian Plan.

Project Length (ft): Varies

Date of Estimate: Feb. 19, 2015

Prepared by: T. Krakow

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
Bridge West of Newport Drive					
1	Clearing and Grubbing	6960	LS	$3.00	$ 20,880
2	Earthwork	6960	SF	$6.00	$ 41,800
3	Class 2 Aggregate Base	516	CY	$65.00	$ 33,600
4	Hot Mix Asphalt (Type A)	345	Ton	$125.00	$ 43,100
5	Restripe roadway	290	LF	$8.00	$ 2,400
6	Widen bridge by 24'	6960	SF	$200.00	$ 1,392,000
7	Misc. Drainage Modifications	1	LS	$306,800.00	$ 306,800
				Subtotal (LS):	$ 1,840,580
Bridge East of Newport Drive					
8	Clearing and Grubbing	6480	SF	$3.00	$ 19,440
9	Earthwork	6480	SF	$6.00	$ 38,900
10	Class 2 Aggregate Base	480	CY	$65.00	$ 31,200
11	Hot Mix Asphalt (Type A)	321	Ton	$125.00	$ 40,100
12	Restripe roadway	270	LF	$8.00	$ 2,200
13	Widen bridge by 24'	6480	SF	$200.00	$ 1,296,000
14	Misc. Drainage Modifications	1	LS	$285,600.00	$ 285,600
				Subtotal (LS):	$ 1,713,440
15	Construction Area Signs	1	LS	$1,000.00	$ 1,000
16	Temporary traffic control	1	LS	$88,900.00	$ 88,900
17	Prepare Water Pollution Control Plan	1	LS	$6,000.00	$ 6,000
18	Mobilization	1	LS	$ 365,000.00	$ 365,000

CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000) $ 3,650,000

Project Number **2.2**

Planning Engineering (TE)	$ 548,000	Contract Items	$ 4,015,000
Preliminary Engineering (Design/Survey)*	$ 1,366,000	Other Costs (CON)	$ 603,000
Utility Coordination (Design)	$ 355,402	Contingency*	$ 603,000
Environmental (Environmental, Real Property)	$ 710,804	Subtotal (Contract Items)	$ 5,221,000
R/W Engineering (Survey)	$ -	Subtotal (Plan)	$ 548,000
Real Property Labor	$ -	Subtotal (PE)	$ 2,432,206
R/W Acquisition	$ -	Subtotal (R/W)	$ -
Construction Engineering *	$ 603,000		
Environmental Monitoring and Mitigation Fees	$ -		
SUBTOTAL of OTHER COSTS (ALL)	$ 3,583,206		
		Grand Total	$ 8,201,206
		Current Year	2015
		Escalation Year	2015
		Escalation Rate	0.0%
		➢ **TOTAL (in 2015 dollars)**	**$ 8,201,000**

* 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.)

Project 2.2: SR-4 Widening and Bicycle Improvements (Bixler to Discovery Bay)

DKS Associates

Planning Cost Estimate

1970 Broadway Ste 740, Oakland CA 94612

Project Number **2.3**

☐ 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: SR-4/Newport Drive Signalization

Project Location: SR-4 and Newport Drive

Description: Project would signalize the intersection of SR-4 and Newport Drive to address a future LOS deficiency.

Project Length (ft): N/A

Date of Estimate: Feb. 19, 2015

Prepared by: T. Krakow

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
1	Install traffic signal with safety lighting	3	EA	$ 100,000.00	$ 300,000
2	Removal of signs	1	LS	$ 500.00	$ 500
3	Removal of pavement legends	1	LS	$ 1,000.00	$ 1,000
4	Thermoplastic striping for crosswalks	1	LS	$ 2,000.00	$ 2,000
5	Install new ADA curb ramp	2	EA	$ 4,200.00	$ 8,400
6	Restripe intersection approach	3	EA	$ 2,500.00	$ 7,500
7	Temporary traffic control	1	LS	$ 5,000.00	$ 5,000
8	Prepare Water Pollution Control Plan	1	EA	$6,000.00	$ 6,000
9	Mobilization	1	LS	$ 33,000.00	$ 33,000

CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000) $ 330,000

Project Number **2.3**

Planning Engineering (TE)	$ 50,000
Preliminary Engineering (Design/Survey)*	$ 124,000
Utility Coordination (Design)	$ 33,040
Environmental (Environmental, Real Property)	$ 33,040
R/W Engineering (Survey)	
Real Property Labor	
R/W Acquisition	
Construction Engineering *	$ 73,000
Environmental Monitoring and Mitigation Fees	$ -
SUBTOTAL of OTHER COSTS (ALL)	$ 313,080

Contract Items	$ 363,000
Other Costs (CON)	$ 73,000
Contingency*	$ 55,000
Subtotal (Contract Items)	$ 491,000
Subtotal (Plan)	$ 50,000
Subtotal (PE)	$ 190,080
Subtotal (R/W)	$ -
Grand Total	$ 731,080
Current Year	2015
Escalation Year	2015
Escalation Rate	0.0%
➢ **TOTAL (in 2015 dollars)**	**$ 731,000**

* 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.)

Project 2.3: SR-4/Newport Drive Signalization

DKS Associates

Planning Cost Estimate

1970 Broadway Ste 740, Oakland CA 94612

Project Number **2.4**

☑ 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: SR-4 Widening and Bicycle Improvements (Byron to Regatta)

Project Location: SR-4 from Byron Highway to Regatta Drive

Description: Project will widen SR-4 to provide four 12' travel lanes and 8' shoulders/bike lanes. These improvements are needed to maintain an acceptable level of service and are consistent with the Countywide Bicycle and Pedestrian Plan.

Project Length (ft): 3370

Date of Estimate: Feb. 19, 2015

Prepared by: C. Shew

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
1	Clearing and Grubbing	1	SF	$100,000.00	$ 100,000
2	Earthwork	104000	SF	$4.00	$ 416,000
3	Class 2 Aggregate Base	7704	CY	$65.00	$ 500,800
4	Hot Mix Asphalt (Type A)	3432	Ton	$125.00	$ 429,000
5	Striping	10400	LF	$3.00	$ 31,200
6	Misc. Drainage Modifications	1	LS	$295,400.00	$ 295,400
7	Construction Area Signs	1	LS	$1,000.00	$ 1,000
8	Temporary traffic control	1	LS	$88,600.00	$ 88,600
9	Prepare Water Pollution Control Plan	1	LS	$6,000.00	$ 6,000
10	Mobilization	1	LS	$ 186,800.00	$ 186,800

CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000) $ 1,868,000

Project Number **2.4**

Planning Engineering (TE)	$ 281,000	Contract Items	$ 2,055,000
Preliminary Engineering (Design/Survey)*	$ 699,000	Other Costs (CON)	$ 309,000
Utility Coordination (Design)	$ 177,240	Contingency*	$ 309,000
Environmental (Environmental, Real Property)	$ 265,860	Subtotal (Contract Items)	$ 2,673,000
R/W Engineering (Survey)	$ -	Subtotal (Plan)	$ 281,000
Real Property Labor	$ -	Subtotal (PE)	$ 1,142,100
R/W Acquisition	$ -	Subtotal (R/W)	$ -
Construction Engineering *	$ 309,000		
Environmental Monitoring and Mitigation Fees	$ -		
SUBTOTAL of OTHER COSTS (ALL)	$ 1,732,100		
		Grand Total	$ 4,096,100
		Current Year	2015
		Escalation Year	2015
		Escalation Rate	0.0%
		➢ **TOTAL (in 2015 dollars)**	**$ 4,096,000**

* 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.)

Project 2.4: SR-4 Widening and Bicycle Improvements (Byron to Regatta)

Transportation Engineering — Planning Cost Estimate

Contra Costa County Public Works Department

☐ 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 Number 3

Project Name: Byron Highway-Byer Road Improvements
Alternative: TWLTL on Byron Highway near Excelsior Middle School

Project Location: Byron Highway and Byer Road
Assumptions: R=5, TI,= 7, Design Speed=35 mph

Project Length (ft): 2000

Date of Estimate: Apr. 5, 2016

Prepared by: John Honey

Revision No.
Revision Date
Revised by

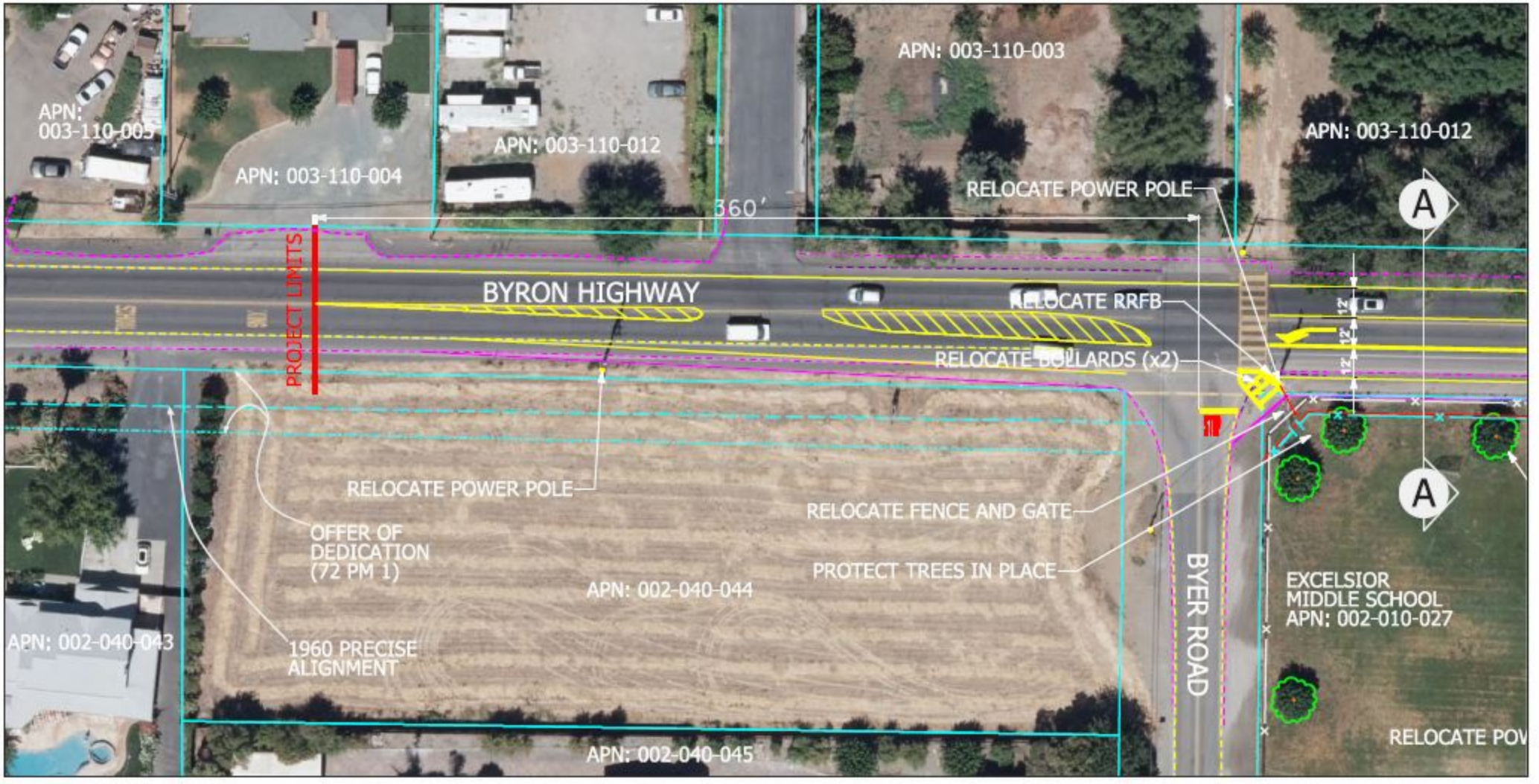
No.	Description	Quantity	Units	Unit Cost	Total
1	Construction Area Signs	6	EA	$ 350.00	$ 2,100
2	Traffic Control System	1	LS	$ 20,000.00	$ 20,000
3	Prepare Water Pollution Control Plan	1	LS	$ 6,000.00	$ 6,000
4	Remove Thermoplastic Traffic Stripe	8800	SF	$ 2.00	$ 17,600
5	Clearing and Grubbing	1	LS	$ 15,000.00	$ 15,000
6	Saw Cut Pavement Edges	2000	LF	$ 2.00	$ 4,000
7	Roadway Excavation	998	CY	$ 45.00	$ 44,910
8	Class 2 Aggregate Base (depth=1.3)	1486	TON	$ 45.00	$ 66,870
9	Hot Mix Asphalt (Type A) (depth=.35)	429	TON	$ 110.00	$ 47,190
10	Roadside Sign - One Post	2	EA	$ 350.00	$ 700
11	Relocate Fence	1170	LF	$ 160.00	$ 187,200
12	K-Rails	200	LF	$ 10.00	$ 2,000
13	Relocate pedestrian flasher	1	EA	$ 3,000.00	$ 3,000
14	Relocate sign	3	EA	$ 300.00	$ 900
15	Relocate Bollards	2	EA	$ 400.00	$ 800
16	Thermoplastic Traffic Stripe - Det. 31, Channelizing Lane	1348	LF	$ 4.00	$ 5,392
17	Thermoplastic Traffic Stripe - Det. 28, Median	285	LF	$ 4.00	$ 1,140
18	Thermoplastic Traffic Stripe - Det. 27B, Right Edge Line	1800	LF	$ 2.00	$ 3,600
19	Thermoplastic Traffic Stripe - Det. 24, Left Edge Line	165	LF	$ 2.00	$ 330
20	Thermoplastic Traffic Stripe - Det. 21, No-Passing Zone	290	LF	$ 2.00	$ 580
21	Thermoplastic Traffic Stripe - Type III, L Arrow (42 SF EA)	72	SF	$ 2.00	$ 144
22	Thermoplastic Traffic Stripe - Type IV, L Arrow (15 SF EA)	120	SF	$ 2.00	$ 240
23	Mobilization	1	LS	$ 37,000.00	$ 37,000
24	Slurry Seal	7628	SY	$ 4.00	$ 30,510
25					

OTHER COSTS BY PHASE:

PLAN	Planning Engineering (TE)	$ 50,000
PE	Preliminary Engineering (Design/Survey)*	$ 150,000
	Utility Coordination (Design)	$ 20,000
	Environmental (Environmental, Real Property, CEQA, NEPA)	$ 150,000
R/W	R/W Engineering (Survey)	$ 15,000
	Real Property Labor	$ 30,000
	R/W Acquisition	$ 86,280
CON	Construction Engineering *	$ 75,000
	Environmental Monitoring and Mitigation Fees	$ 50,000
	SUBTOTAL of OTHER COSTS (ALL)	$ 626,280

CONTRACT ITEMS	$ 497,000
OTHER COSTS (CON)	$ 125,000
CONTINGENCY*	$ 74,550
SUBTOTAL (CON)	$ 696,550
SUBTOTAL (PLAN)	$ 50,000
SUBTOTAL (PE)	$ 320,000
SUBTOTAL (R/W)	$ 131,280
GRAND TOTAL	$ 1,197,830
CURRENT YEAR	2016
ESCALATION YEAR	2016
ESCALATION RATE	0.0%
➢ **TOTAL (in 2016 dollars)**	**$ 1,198,000**

* 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.)



LEGEND

EXISTING	DESCRIPTION	PROPOSED
	Right of Way	
	Striping	
	Edge of Pavement	
	Sidewalk	
	Fence	

SCALE:
1:40 on 11x17

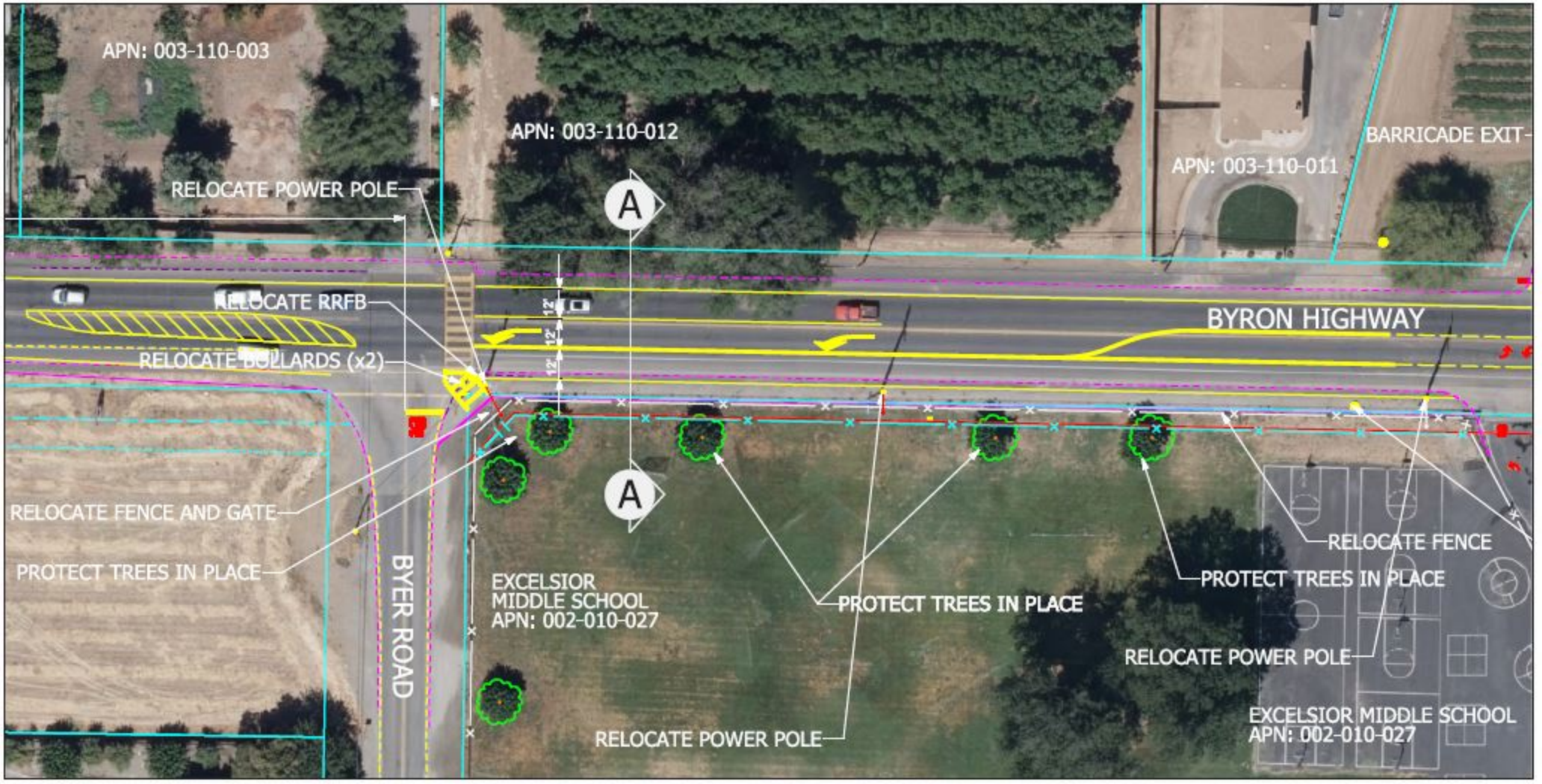
Contra Costa County
Public Works
Department

255 GLACIER DRIVE MARTINEZ, CALIFORNIA 94553 PH: (925) 313-2000 FAX: (925) 313-2333

PROPOSED PROJECT LAYOUT

BYRON HIGHWAY / BYER ROAD
SAFETY IMPROVEMENTS

FEDERAL ID NO.: DRAWN: CHECKED: DATE: JULY 2016 SHEET 1 OF 5



LEGEND

EXISTING	DESCRIPTION	PROPOSED
	Right of Way	
	Striping	
	Edge of Pavement	
	Sidewalk	
	Fence	

SCALE:
1:40 on 11x17

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PROPOSED PROJECT LAYOUT

BYRON HIGHWAY / BYER ROAD
SAFETY IMPROVEMENTS

FEDERAL ID NO.: | DRAWN: | CHECKED: | DATE: JULY 2018 | SHEET 2 OF 5

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	Right of Way	
	Striping	
	Edge of Pavement	
	Sidewalk	
	Fence	

SCALE:
1:40 on 11x17

Contra Costa County
Public Works
Department
255 GLACIER DRIVE MARTINEZ, CALIFORNIA 94553 Phone (925) 313-2000 FAX: (925) 313-2333

PROPOSED PROJECT LAYOUT

BYRON HIGHWAY / BYER ROAD
SAFETY IMPROVEMENTS

FEDERAL ID NO.: | DRAWN: | CHECKED: | DATE: JULY 2016 | SHEET 3 OF 5

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	Right of Way	
	Striping	
	Edge of Pavement	
	Sidewalk	
	Fence	

SCALE:
1:40 on 11x17

Contra Costa County
Public Works
Department

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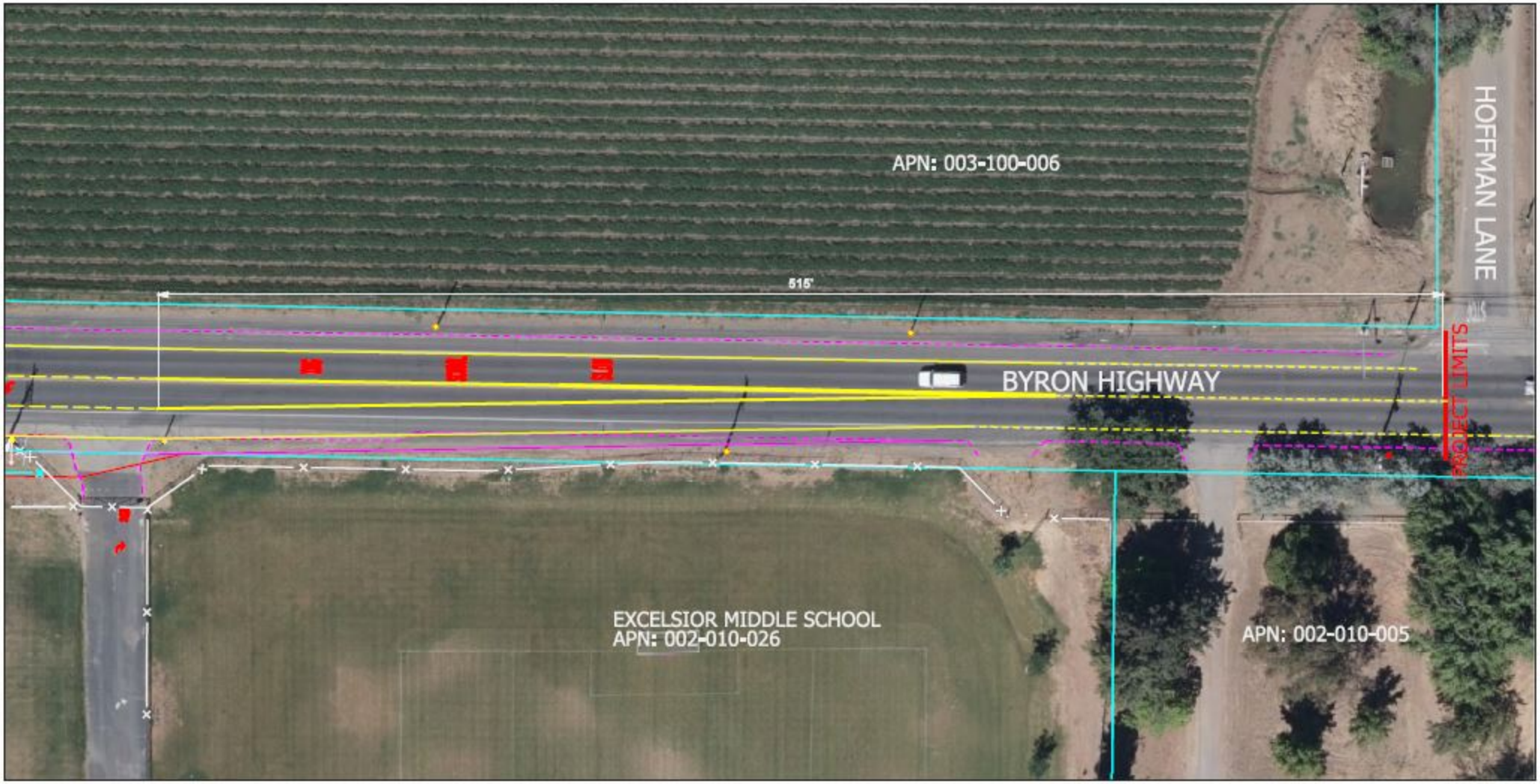
PROPOSED PROJECT LAYOUT

BYRON HIGHWAY / BYER ROAD
SAFETY IMPROVEMENTS

FEDERAL ID NO.1 | DRAWN | CHECKED | DATE: JULY 2016 | SHEET 4 OF 5



LEGEND

EXISTING	DESCRIPTION	PROPOSED
	Right of Way	
	Striping	
	Edge of Pavement	
	Sidewalk	
	Fence	

SCALE:
1:40 on 11x17

Contra Costa County
Public Works
Department

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PROPOSED PROJECT LAYOUT

BYRON HIGHWAY / BYER ROAD
SAFETY IMPROVEMENTS

FEDERAL ID NO.: | DRAWN: | CHECKED: | DATE: JULY 2016 | SHEET: 5 OF 5

DKS Associates — **Planning Cost Estimate**

1970 Broadway Ste 740, Oakland CA 94612 — **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: Clipper Drive Traffic Calming
Project Location: Clipper Drive from Discovery Bay Boulevard to Newport Drive

Description

Project will construct 15' traffic circles at the intersections of Clipper Drive and Reef Court and Clipper Drive and Balboa Way. Additionally, the project will stripe bike lanes on both sides of the roadway. Between Discovery Bay Boulevard and Windward Point, the center two-way left turn lane (TWLTL) will be removed to provide the needed width. Between Windward Point and Newport Drive, one of the two westbound left turn lanes and the eastbound left turn lane will be removed to provide the needed width.

Project Length (ft): Varies

Date of Estimate: Feb. 19, 2015

Prepared by: T. Krakow

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
Clipper Drive and Reef Court Traffic Circle					
1	Demolition of existing asphalt	177	SF	$3.00	$ 530
2	Curb & Gutter	47	LF	$35.00	$ 1,649
3	Striping	47	LF	$3.00	$ 141
4	Irrigation and Landscaping	177	SF	$15.00	$ 2,651
5	Construction area Signs	1	LS	$1,500.00	$ 1,500
6	New signage	1	LS	$2,000.00	$ 2,000
				Subtotal (LS):	$ 8,472
Clipper Drive and Balboa Way Traffic Circle					
7	Demolition of existing asphalt	177	SF	$3.00	$ 530
8	Curb & Gutter	47	LF	$35.00	$ 1,649
9	Striping	47	LF	$3.00	$ 141
10	Irrigation and Landscaping	177	SF	$15.00	$ 2,651
11	Construction area Signs	1	LS	$1,500.00	$ 1,500
12	New signage	1	LS	$2,000.00	$ 2,000
				Subtotal (LS):	$ 8,472
Bike Lanes from Discovery Bay Boulevard to Newport Drive					
13	Restripe roadway	3740	LF	$6.00	$ 22,500
				Subtotal (LS):	$ 22,500
14	Construction Area Signs	1	LS	$1,500.00	$ 1,500
15	Temporary traffic control	1	LS	$2,000.00	$ 2,000
16	Prepare Water Pollution Control Plan	1	LS	$6,000.00	$ 6,000
17	Mobilization	1	LS	$ 4,900.00	$ 4,900

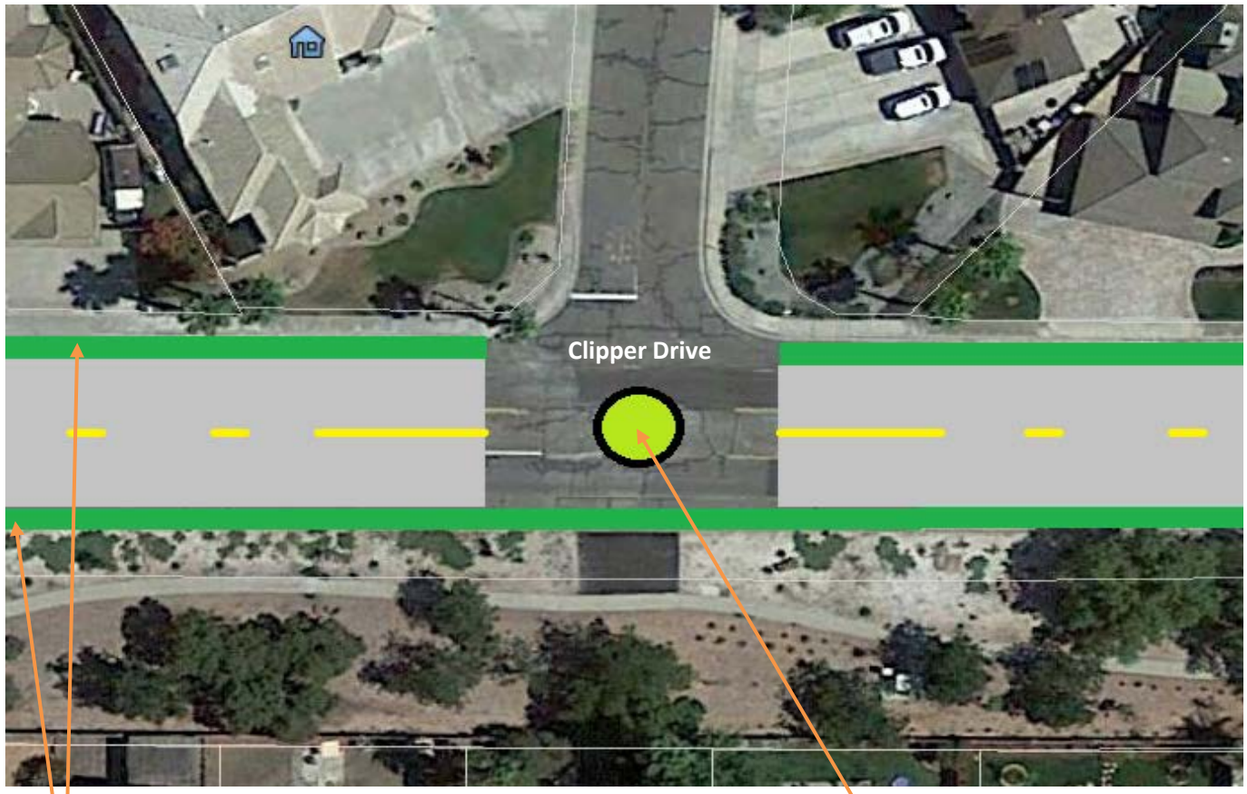
CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000) $ 49,000

Project Number **4**

Planning Engineering (TE)	$ 30,000	Contract Items	$ 54,000
Preliminary Engineering (Design/Survey)*	$ 50,000	Other Costs (CON)	$ 20,000
Utility Coordination (Design)	$ 30,000	Contingency*	$ 10,000
Environmental (Environmental, Real Property)	$ 30,000	Subtotal (Contract Items)	$ 84,000
R/W Engineering (Survey)	$ -	Subtotal (Plan)	$ 30,000
Real Property Labor	$ -	Subtotal (PE)	$ 110,000
R/W Acquisition	$ -	Subtotal (R/W)	$ -
Construction Engineering *	$ 20,000		
Environmental Monitoring and Mitigation Fees	$ -		
SUBTOTAL of OTHER COSTS (ALL)	$ 160,000		
		Grand Total	$ 224,000
		Current Year	2015
		Escalation Year	2015
		Escalation Rate	0.0%
		➢ **TOTAL (in 2015 dollars)**	**$ 224,000**

* 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.)

Project 4: Clipper Drive Traffic Calming



Stripe New Bike Lanes
in existing curb-to-curb width

DKS Associates

Planning Cost Estimate

1970 Broadway Ste 740, Oakland CA 94612

Project Number **5**

☐ 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: Bixler Road Widening and Bicycle Improvements

Project Location: Bixler Road from SR-4 to Byer Road

Description

Project will widen Bixler Road from SR-4 to Byer Road to provide 12' travel lanes with 8' shoulders/bike lanes. These improvements are expected to enhance vehicle and bicycle safety.

Project Length (ft): 5290

Date of Estimate: Feb. 19, 2015

Prepared by: T. Krakow

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
1	Clearing and grubbing	126960	SF	$3.00	$ 380,880
2	Earthwork	126960	SF	$4.00	$ 507,840
3	Class 2 Aggregate Base	9404	CY	$65.00	$ 611,289
4	Hot Mix Asphalt (Type A)	6285	Ton	$125.00	$ 785,565
5	Restriping	5290	LF	$8.00	$ 42,320
6	Misc. Drainage Modifications	1	LS	$465,600.00	$ 465,600
7	Temporary traffic control	1	LS	$69,800.00	$ 69,800
8	Mobilization	1	LS	$ 286,300.00	$ 286,300

CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000) $ 2,863,000

Project Number **5**

Planning Engineering (TE)	$ 430,000	Contract Items	$ 3,149,300
Preliminary Engineering (Design/Survey)*	$ 788,000	Other Costs (CON)	$ 473,000
Utility Coordination (Design)	$ 194,701	Contingency*	$ 473,000
Environmental (Environmental, Real Property)	$ 233,642	Subtotal (Contract Items)	$ 4,095,300
R/W Engineering (Survey)	$ -	Subtotal (Plan)	$ 430,000
Real Property Labor	$ -	Subtotal (PE)	$ 1,216,343
R/W Acquisition	$ -	Subtotal (R/W)	$ -
Construction Engineering *	$ 473,000		
Environmental Monitoring and Mitigation Fees	$ -		
SUBTOTAL of OTHER COSTS (ALL)	$ 2,119,343		
		Grand Total	$ 5,741,643
		Current Year	2015
		Escalation Year	2015
		Escalation Rate	0.0%
		➢ **TOTAL (in 2015 dollars)**	**$ 5,742,000**

* 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.)

Project 5: Bixler Road Widening and Bicycle Improvements

DKS Associates

Planning Cost Estimate

1970 Broadway Ste 740, Oakland CA 94612 **Project Number** **6**

☐ 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: Byer Road Widening and Bicycle Improvements
Project Location: Byer Road from Byron Highway to Bixler Road

Description: Project will widen Byer Road from Byron Highway to Bixler Road to provide 12' travel lanes with 8' shoulders/bike lanes. These improvements are expected to enhance vehicle and bicycle safety.

Project Length (ft): 5260

Date of Estimate: Feb. 19, 2015

Prepared by: T. Krakow

Revision No.
Revision Date
Revised by

No.	Description	Quantity	Units	Unit Cost	Total
1	Clearing and grubbing	120980	SF	$3.00	$ 362,940
2	Earthwork	120980	SF	$4.00	$ 483,920
3	Class 2 Aggregate Base	8961	CY	$65.00	$ 582,496
4	Hot Mix Asphalt (Type A)	5989	Ton	$125.00	$ 748,564
5	Restriping	5260	LF	$8.00	$ 42,080
6	Misc. Drainage Modifications	1	LS	$444,000.00	$ 444,000
7	Temporary traffic control	1	LS	$66,600.00	$ 66,600
8	Mobilization	1	LS	$ 273,100.00	$ 273,100

CONTRACT ITEMS LESS MOBILIZATION (TO NEAREST 1,000) $ 2,731,000

Project Number **6**

Planning Engineering (TE)	$ 410,000	Contract Items	$ 3,004,100
Preliminary Engineering (Design/Survey)*	$ 752,000	Other Costs (CON)	$ 451,000
Utility Coordination (Design)	$ 185,706	Contingency*	$ 451,000
Environmental (Environmental, Real Property)	$ 222,847	Subtotal (Contract Items)	$ 3,906,100
R/W Engineering (Survey)	$ -	Subtotal (Plan)	$ 410,000
Real Property Labor	$ -	Subtotal (PE)	$ 1,160,553
R/W Acquisition	$ -	Subtotal (R/W)	$ -
Construction Engineering *	$ 451,000		
Environmental Monitoring and Mitigation Fees	$ -		
SUBTOTAL of OTHER COSTS (ALL)	$ 2,021,553		
		Grand Total	$ 5,476,653
		Current Year	2015
		Escalation Year	2015
		Escalation Rate	0.0%
		➢ **TOTAL (in 2015 dollars)**	**$ 5,477,000**

* 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.)

Project 6: Byer Road Widening and Bicycle Improvements