

**CASTLE HOMES CSA, ZONE 3 ENGINEER'S REPORT
CSA R-1982-1**

ENGINEER'S REPORT

Prepared by



Alameda County
Public Works Agency
399 Elmhurst Street
Hayward, CA 94544

February 2023
Proposed Service Charge Increase FYs 23/24, 24/25, 25/26, and 26/27

Castle Homes CSA Zone 3

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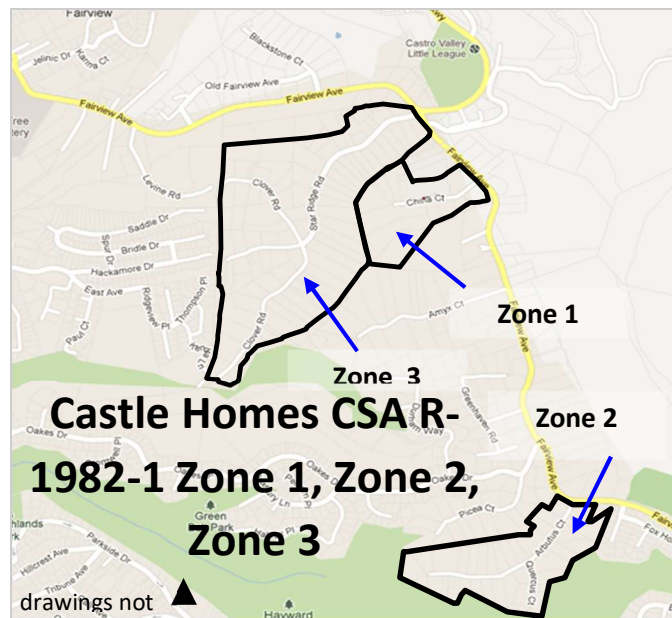
Castle Homes CSA Zone 3

INCREASE OF ROAD MAINTENANCE SERVICE CHARGE FISCAL YEARS 2023/24, 2024/25, 2025/26, AND 2026/27

Background

The Castle Homes CSA was established in January 1983 to provide road maintenance services for three private roads: Clover Road, Star Ridge Road (formerly East Avenue) and China Court. In November 1996, the Board approved the annexation of properties adjacent to Quercus and Arbutus Courts, both private roads, to the CSA for road maintenance services. In September 2010, the property owners on Star Ridge Road and Clover Road petitioned the County to separate from Zone 1 to form their own zone of service. Following numerous public meetings and hearings, the Board of Supervisors approved the formation of a Zone 3 service zone for Clover Road and Star Ridge Road in February 2012. This report pertains to a proposed service charge increase for only those parcels in the Zone 3 service area, which is depicted on the map below. All references to “Zone 3” herein are to Castle Homes Zone 3. The other two zones within the Castle Homes CSA are not affected or discussed by this report or the service charge recommendation in this report.

VICINITY MAP



Clover Road and Star Ridge Road are the only access points that the properties within the County Service Area have to Fairview Avenue, a county owned and maintained roadway. The existing service charge, \$300, is levied equally against each developed parcel within Zone 3. The service charge is \$150 for undeveloped parcels. These amounts are established yearly by the annual report prepared for the CSA and as approved by the property owners when the Zone 3 was established. The roadways within Zone 3 are in need of repair and resurfacing and based on our field review these improvements would require milling of the existing asphalt surface and a new asphalt surface. Based on the findings within this report, it would take 12 years to accumulate enough funds to fund this project. Property owners within Zone 3 have expressed a need to increase this service charge to accumulate enough money to pay for these improvements and incidental costs to fund this project earlier.

Descriptions & Costs of Improvements

The improvements in Zone 3 that the Agency has provided have generally been limited to roadway resurfacing and base repair of the existing surface of Clover Road and Star Ridge Road. Property owners within Zone 3 have made a request to the County to provide base repairs and a complete roadway resurfacing of both roadways within Zone 3. This report is prepared to determine what the costs associated with this request would be, to analyze the timelines to accumulate the required funds, and to describe a proposed service charge increase to allow this maintenance project to be completed on a timely basis.

Detailed plans and specifications are included for reference, subject to any changes based on field conditions. The work to be done consists, in general, of: providing traffic control; providing construction area signs; water pollution control; crack sealing; pavement patching; furnishing and applying water; dust control; hauling excavated or removed materials; disposal of materials; milling of the existing asphalt surface and replacement with a new asphalt surface; notifying neighborhood residents about the work; videotaping the project area prior to construction; cleaning the site and miscellaneous things; and furnishing all labor, materials, tools, equipment, mechanical workmanship, transportation and services necessary to be done in order to perform a complete job in all respects.

In general, the complete pavement rehabilitation project would entail removal of the existing asphalt surface and placement of a new surface. This would entail milling 2 inches of the existing surface and paving a new 2-inch layer of asphalt pavement. The total surface area of pavement replacement is 122,000 square feet of surface. Based on these dimensions the project estimate would be:

Bid Item	Unit Amount	Cost per Unit	Total Cost
Milling	13,600 square yard (SY)	\$5/SY	\$68,000
Digout Repair	4,880 square foot (SF)	\$10/SF	\$48,800
Asphalt pavement	1,530 Ton	\$135/Ton	\$206,550
Total Cost			\$323,350

This estimated cost is for construction only. Adding in 10% for Engineering and construction management, the total cost of the project is estimated to be \$355,685.

Recommended Service Charge Increase

Zone 3 has both a capital replacement fund and a yearly maintenance fund. Any unspent moneys in the yearly maintenance fund transfer to the capital maintenance fund to ensure that both minor annual maintenance and major maintenance services can be funded. The capital replacement fund is used to provide the required major maintenance services on the roadways including base repair and roadway resurfacing. The time to accumulate funds in the capital replacement fund at the current rate will extend far beyond the useful life of the original pavement, which already has deteriorated to a point that major maintenance is necessary. Based on the \$355,685 estimate for construction costs, engineering, and construction management, the properties would need to accumulate an additional \$283,685 to fund the complete repair and resurfacing of the roadways. The options available to accumulate these funds are:

Current Service Charge per Developed/Undeveloped Parcel	Additional Service Charge per Developed/Undeveloped Parcel	Total Service Charge (Developed/Undeveloped)	Years to Accumulate \$355,685
\$300/\$150	\$0/\$0	\$300/\$150	12 years
\$300/\$150	\$300/\$150	\$600/\$300	6 years
\$300/\$150	\$700/\$350	\$1,000/\$500	4 years
\$300/\$150	\$2,450/\$1,225	\$2,750/\$1,375	2 years

The County recommendation based on discussions with the property owners is to increase the total Service Charge for developed parcels by \$700.00, raising the total Service Charge per developed parcel to \$1,000. The Service charge for undeveloped parcels would increase by \$350, raising the service charge for undeveloped parcels to \$500. The increased service charge will need to be charged to the property owners for four years (i.e. for FY 2023/24, FY 2024/25, FY 2025/26, and FY 2026/27) to accumulate the \$283,685 needed to complete the repairs and resurfacing. After FY 2026/27, the annual service charge would return to \$300 for developed parcels and \$150 for undeveloped parcels.

Identification of Parcels Subject to Service Charge

The chart below provides a list of the existing and proposed service charge for each parcel within Zone 3 of the CSA:

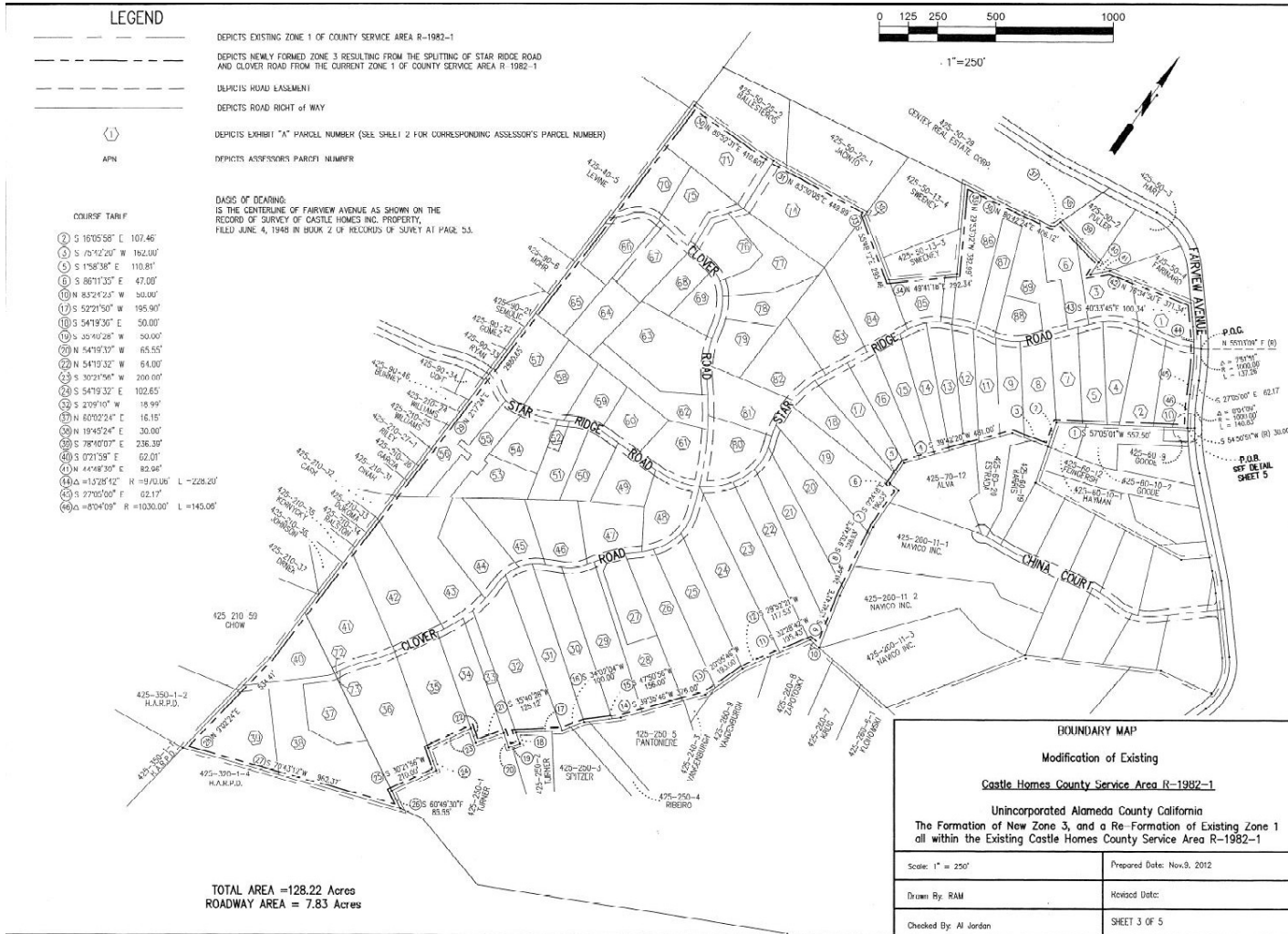
Parcel_APN	Street Address	Developed Parcel	Existing Service Charge	Proposed Service Charge FY 23/24 to 26/27	Proposed FY 27/28 Service Charge
425-220-1	3553 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-220-12	26145 CLOVER RD	1	\$300	\$1,000	\$300
425-220-13	26157 CLOVER RD	1	\$300	\$1,000	\$300
425-220-14	26165 CLOVER RD	1	\$300	\$1,000	\$300
425-220-15	26137 CLOVER RD	1	\$300	\$1,000	\$300
425-220-16	3571 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-220-17	3565 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-220-2-2	3559 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-220-4	3581 STAR RIDGE RD	0	\$150	\$500	\$150

425-220-5	3581 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-220-6	3611 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-220-7	3649 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-220-8	3661 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-220-9	26027 CLOVER RD	1	\$300	\$1,000	\$300
425-230-1	CLOVER RD	0	\$150	500	\$150
425-230-2	26205 CLOVER RD	1	\$300	\$1,000	\$300
425-230-3	26233 CLOVER RD	1	\$300	\$1,000	\$300
425-230-4	26264 CLOVER RD	1	\$300	\$1,000	\$300
425-230-5-1	CLOVER RD	0	\$0*	\$0*	\$0*
425-230-5-2	26252 CLOVER RD	1	\$300	\$1,000	\$300
425-230-6-1	CLOVER RD	0	\$0*	\$0*	\$0*
425-230-6-2	CLOVER RD	0	\$150	\$500	\$150
425-230-7	26204 CLOVER RD	1	\$300	\$1,000	\$300
425-230-8	26204 CLOVER RD	0	\$150	\$500	\$150
425-230-9	26176 CLOVER RD	1	\$300	\$1,000	\$300
425-240-1	25950 CLOVER RD	1	\$300	\$1,000	\$300
425-240-10	26162 CLOVER RD	1	\$300	\$1,000	\$300
425-240-11	26164 CLOVER RD	0	\$150	\$500	\$150
425-240-2	26008 CLOVER RD	1	\$300	\$1,000	\$300
425-240-4	26022 CLOVER RD	1	\$300	\$1,000	\$300
425-240-5	26036 CLOVER RD	1	\$300	\$1,000	\$300
425-240-6	26090 CLOVER RD	1	\$300	\$1,000	\$300
425-240-7	26144 CLOVER RD	1	\$300	\$1,000	\$300
425-240-8	26128 CLOVER RD	1	\$300	\$1,000	\$300
425-240-9	26158 CLOVER RD	1	\$300	\$1,000	\$300
425-50-10	STAR RIDGE RD	0	\$150	\$500	\$150
425-50-11	4020 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-12	4010 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-13-1	3990 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-14	3978 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-15	3934 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-16	3888 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-17	3774 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-18	3766 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-19	25774 CLOVER RD	1	\$300	\$1,000	\$300
425-50-20-2	25700 CLOVER RD	1	\$300	\$1,000	\$300
425-50-20-3	25678 CLOVER RD	1	\$300	\$1,000	\$300
425-50-21-2	25634 CLOVER RD	1	\$300	\$1,000	\$300
425-50-22-1	CLOVER RD	0	\$150	\$500	\$150
425-50-25-2	CLOVER RD	0	\$150	\$500	\$150
425-50-26	25602 CLOVER RD	1	\$300	\$1,000	\$300
425-50-27	25584 CLOVER RD	1	\$300	\$1,000	\$300
425-50-5	25785 FAIRVIEW AVE	1	\$300	\$1,000	\$300
425-50-6	4204 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-7	4192 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-50-8	4192 STAR RIDGE RD	0	\$150	\$500	\$150
425-50-9	4180 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-60-1	4007 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-60-2	4023 STAR RIDGE RD	1	\$300	\$1,000	\$300

425-60-21	4119 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-60-22	4143 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-60-3	4043 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-60-4	4061 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-60-5	4085 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-60-7	4205 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-60-8	25833 FAIRVIEW AVE	1	\$300	\$1,000	\$300
425-70-1	3999 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-10	3735 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-11	3713 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-2	3993 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-3	3977 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-4	3949 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-5	3921 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-6	3891 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-7	3833 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-8	3771 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-70-9	3759 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-80-10	3566 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-80-11	25585 CLOVER RD	0	\$150	\$500	\$150
425-80-12	CLOVER RD	0	\$150	\$500	\$150
425-80-13	25601 CLOVER RD	1	\$300	\$1,000	\$300
425-80-14	25601 CLOVER RD	1	\$300	\$1000	\$300
425-80-3	25633 CLOVER RD	1	\$300	\$1,000	\$300
425-80-4	25633 CLOVER RD	0	\$150	\$500	\$150
425-80-5	25767 CLOVER RD	1	\$300	\$1,000	\$300
425-80-6	25795 CLOVER RD	1	\$300	\$1,000	\$300
425-80-7-1	3600 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-80-7-2	3590 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-80-8	3580 STAR RIDGE RD	1	\$300	\$1,000	\$300
425-80-9	3572 STAR RIDGE RD	1	\$300	\$1,000	\$300
Collected per FY			\$24,600	\$82,000	\$24,600

* Small parcels under 100 square feet not subject to service charge

Below is the recorded map prepared by the County Surveyor for Zone 3:



Method of Collecting Service Charge

The Service Charge, if approved, would be collected under the tax rolls collected annually for each property within the boundary of Zone 3.

Revenues derived from the service charge shall be used to fund the major maintenance project described above, and any amount exceeding the maintenance project costs shall be used to replenish the capital replacement fund. Revenues from the service charge will not be used for any other purpose than funding maintenance services. Following Fiscal Year 2026/27 the service charge will return to \$300 per developed parcel and \$150 per undeveloped parcel. The revenues collected will not exceed the costs of the maintenance services provided to Zone 3.

Basis of Calculation of Service Charge

The additional amount of service charge needed was determined based on the following quantities:

Bid Item	Unit Amount	Cost per unit	Total Cost
Milling	13,600 square yard (SY)	\$5/SY	\$68,000
Digout Repair	4,880 square foot (SF)	\$10/SF	\$48,800
Asphalt pavement	1,530 Ton	\$135/Ton	\$206,550
Total Cost			\$323,350

The table above reflects the estimate for quantity costs only. The breakdown in estimated costs required to complete the project include:

Construction Costs	\$323,350
Engineering/Construction Management	\$32,335
Total Costs	\$355,685
Less Accumulated Funds in Zone 3	\$72,000
Amount required to complete Project	\$283,685

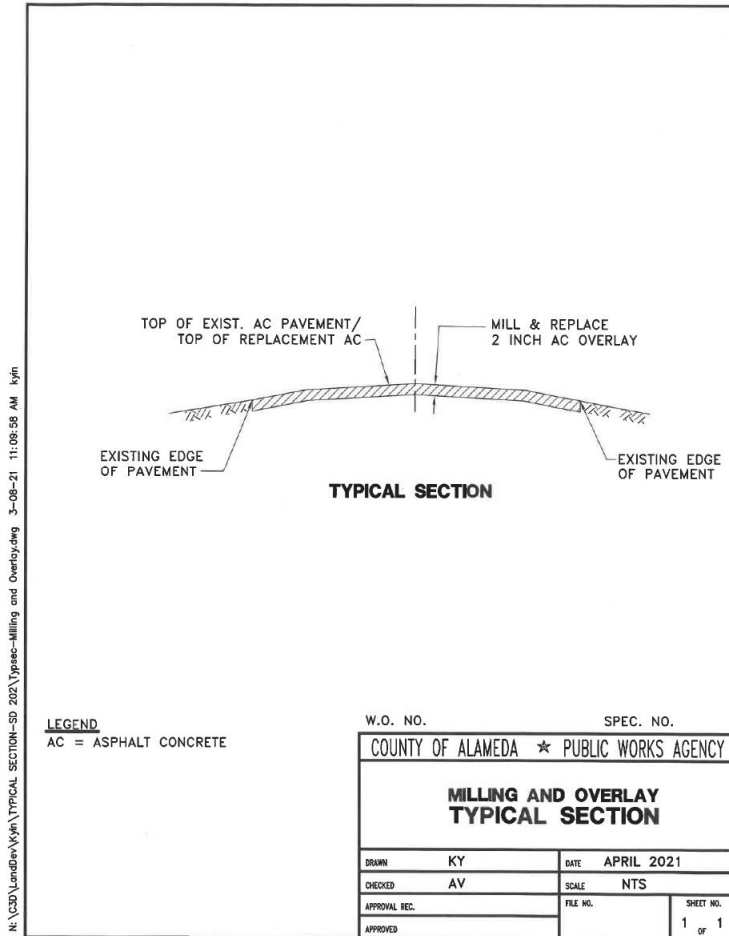
Proportional Cost of the Services Attributed to Each Parcel

Castle Homes CSA was established by the County of Alameda under Resolution No. 195140, adopted December 7, 1982, where the Board of Supervisors declared its intention to establish a county service area for road maintenance services on East Avenue (now known as Star Ridge Road), Clover Road, China Court, Arbutus Court, and Quercus Court. The discussion in this report only refers to Zone 3, which includes Clover Road and Star Ridge Road.

The maintenance services funded by the Zone 3 service charge benefit only the parcels that access onto the private roadways in Zone 3. There is no through access for the general public through Zone 3. The cost of the maintenance services has been historically shared equally among all developed parcels, which benefit and use the services equally, while undeveloped parcels in all Zones of the Castle Homes CSA have historically paid half of the standard rate for developed parcels. The parcels are single family residences and there is no through access for the general public through Zone 3. Per the Trip Generation Manual, 10th Edition, prepared by the Institute of Traffic Engineers, each single-family residence contributes equally to the amount of vehicular traffic that would be generated by the parcels within the Zone 3 boundaries. The service is equally utilized by the developed parcels, with costs and benefits proportionally shared by equal division. Undeveloped parcels generally contribute less vehicular traffic than developed parcels, at a rate that has been historically established within the Castle Homes CSA to be half of the rate of developed parcels. This service directly benefits both developed and undeveloped parcels on the streets, which are otherwise responsible for maintaining these streets.

The proposed service charge reflects the estimated cost of the improvements, divided proportionally and equally by the number of parcels, with undeveloped parcels being charged half of the rate of developed parcels. Should the actual bids for the maintenance project come in lower than estimated, then any remainder will be used to replenish the capital replacement fund. The service charge will return to \$300/\$150 following funding and completion of this maintenance project.

Project Plan and Specifications



JOB TITLE

ROADWAY REPAIRS ON STAR RIDGE AND CLOVER ROAD IN EDEN DISTRICT
ALAMEDA COUNTY, CALIFORNIA

a. SUMMARY OF BID ITEMS

Item	Description	Quantity	Unit
1. *	Milling	13,600	SY
2.	Digout Repair	4,880	SF
3. *	Asphalt Pavement	1,530	TON

The price bid includes all items of work to complete the project as described in the project specifications and shown on the project plan sheet including mobilization, demobilization, and all State, Federal, and other taxes applicable to the project.

MILLING

Existing asphalt concrete adjacent to the edge of pavement shall be ground and removed to the depths and widths indicated on the plans and/or as directed by the Engineer without ripping or tearing of the underlying or adjacent asphalt concrete. Existing asphalt concrete adjacent to existing asphalt concrete curb or dikes shall be removed as directed by the Engineer.

The grinding machine shall be designed and built specifically for grinding of bituminous pavement and shall be capable of cutting to the desired depth and slope and shall have the capability of spraying water at the cutting drum to minimize the dust.

The grinding machine shall be demonstrated to the Engineer before production work begins.

The Contractor shall remove from the roadbed all residues from the milling operations by sweeping.

Resurfacing operation shall commence within three (3) calendar days after the initial milling operation is started on any roadway.

At milling locations where asphalt concrete exists on top of existing P.C.C. gutter, the Contractor shall remove such existing asphalt concrete.

The Contractor shall “sweep” the entire street with metal detectors before milling to locate buried structures. The cost for sweeping the entire street with metal detectors shall be included in the prices paid for various items of work.

The depth of milling, as specified on the plans and these special provisions, at portland cement concrete gutter shall be measured from the lip of gutter. The depth of milling will not be measured from the surface of the existing asphalt concrete. Additional depth of milling due to extra asphalt concrete over the lip of gutter will not be measured or paid for.

Milling widths wider than shown on plans will not be measured or paid for.

The quantity of milling to be paid for will be determined by field measurement to the nearest 0.1 square yard.

Payment of milling will be made as bid per square yard for Milling.

The price bid for Milling shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved in milling the existing asphalt concrete, including lowering existing utilities, sweeping the roadbed and disposing of the removed asphalt concrete and residues, as specified herein, and as directed by the Engineer.

ASPHALT CONCRETE

Asphalt concrete shall conform to Section 39, “Asphalt Concrete,” of the Standard Specifications and these special provisions. Amendments to Section 39 do not apply.

RAP aggregate may be substituted for a part of the virgin aggregate in a quantity not to exceed fifteen percent (15%) by weight of the aggregate blend.

Asphalt binder shall comply with Section 92, "Asphalts," of the Standard Specifications. Asphalt binder shall be PG 64-10 unless otherwise noted.

Asphalt concrete for surfacing shall be Type A. The aggregate for asphalt concrete shall conform to the grading specified for 1/2" Maximum size aggregate, Medium grading.

The Contractor shall submit a current (less than one year old) asphalt concrete mix design from two separate sources (primary source and backup source) for asphalt concrete proposed to be used. The asphalt concrete mix design shall have an air void ratio between 3% and 5%. Contractor shall allow ten (10) calendar days for County's review of mix design.

Asphalt concrete for dikes shall be Type A, 3/8" Maximum size aggregate.

The amount of asphalt binder used in asphalt concrete placed in dikes, gutters, gutter flares, overside drains and aprons at the ends of drainage structures shall be increased one percent by weight of the aggregate over the amount of asphalt binder determined for use in asphalt concrete placed on the traveled way.

The use of any equipment for placing dikes that leaves ridges, indentations, or other objectionable marks in the surface or fails to provide a finished workmanlike uniform job shall be discontinued and other acceptable equipment furnished by the Contractor.

Spreading by blading equipment consisting of motor graders will not be permitted.

Liquid asphalt for use as a prime coat shall be Grade SC-70 unless otherwise directed by the Engineer.

Liquid asphalt prime coat shall be applied to granular bases. In exceptional cases, during wet weather construction, asphaltic paint binder of mixing-type emulsion may be used in lieu of prime coat on granular bases, but only if approved or directed by the Engineer. If asphaltic paint binder of mixing-type emulsion is used, water shall be added to the material and mixed therewith in such proportion that the resulting mixture will contain not more than 50 percent of added water. The exact quantity of added water will be determined by the Engineer. The application of the resulting mixture shall be such that the original emulsion will be spread at the specified rate.

Seal coats shall conform to Section 39-7.02, "Seal Coat," of the Standard Specifications except that when directed by the Engineer, the Contractor shall apply a fog seal coat to the entire pavement area.

Asphalt concrete pavers for the project shall have an un-extended screed width of eight feet.

The Contractor will be required to furnish a minimum of two 8 ton rollers for each asphalt paver.

Resurfacing operation shall commence within three (3) calendar days after the initial key cut or milling operation is started on any road.

The Contractor will be required to place a "Tack Coat" of liquid asphalt on the existing pavement immediately prior to resurfacing.

The asphalt concrete resurfacing area to receive fabric shall be sprayed with steam-refined pavement asphalt Type PG 70-10.

The traveled way shall be paved first on those streets as shown on the plans, as specified in these special provisions, or as directed by the Engineer. The final lift of asphalt concrete shall be placed in the direction of traffic travel.

Asphalt concrete placed in layers of 0.15-foot or less in compacted thickness or widths of less than 5 feet shall be spread and compacted with the equipment and by the methods conforming to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications. Other asphalt concrete shall be compacted and finished in conformance with the provisions in Section 39 and the following:

- A. The provisions in Section 39-5.02, "Compacting Equipment," of the Standard Specifications shall not apply.
- B. The Contractor shall furnish a sufficient number of rollers to obtain the compaction specified in these special provisions and the surface finish required by the Standard Specifications and these special provisions.
- C. Rollers shall be equipped with pads and water systems that prevent sticking of asphalt mixtures to the pneumatic-tired or steel-tired wheels. A parting agent that will not damage the asphalt mixture may be used.
- D. The second paragraph in Section 39-6.01, "General Requirements," of the Standard Specifications shall not apply.
- E. Asphalt concrete and asphalt concrete base shall be compacted by any means to obtain the specified relative compaction before the temperature of the mixture drops below 150° F. Additional rolling to achieve the specified relative compaction will not be permitted after the temperature of the mixture drops below 150° F or once the pavement is opened to public traffic. When vibratory rollers are used as finish rollers the vibratory unit shall be turned off.
- F. The fifth and seventh through tenth paragraphs of Section 39-6.03, "Compacting," of the Standard Specifications shall not apply.
- G. Asphalt concrete and asphalt concrete base shall be compacted to a relative compaction of not less than 95.0 percent or more than 97.0 percent and shall be finished to the lines, grades, and cross section shown on the plans. In-place density of asphalt concrete and asphalt concrete base will be determined prior to opening the pavement to public traffic.
- H. Relative compaction will be determined by California Test 375.
- I. If the test results for a quantity of asphalt concrete or asphalt concrete base indicate that the relative compaction is below 95.0 percent or above 97.0 percent, the Contractor will be notified. Asphalt concrete or asphalt concrete base spreading operations shall not continue until the Contractor has notified the Engineer of the adjustment that will be made in order to meet the specified relative compaction.
- J. If the test results for a quantity of asphalt concrete or asphalt concrete base indicate that the relative compaction is less than 95.0 percent or above 97.0 percent, the asphalt concrete or asphalt concrete base represented by that quantity shall be removed, except as otherwise provided in these special provisions. If requested by the Contractor and approved by the Engineer, asphalt concrete or asphalt concrete base with a relative compaction between 93.0 percent and 95.0 percent, or between 97.0 percent and 99.0 percent may remain in place and the County will deduct the amount of reduced compensation from moneys due, or that may become due, the Contractor under the contract for the quantity with relative compaction between 93.0 percent and 95.0 percent, or between 97.0 percent and 99.0 percent. The amount of reduced compensation will be calculated using the total tons in the quantity with relative compaction between 93.0 percent and 95.0 percent, or between 97.0 percent and 99.0 percent multiplied by the contract price per ton for asphalt concrete or asphalt concrete base involved multiplied by the following compensation factors:

Relative compaction (%)	Reduced payment factor	Relative compaction (%)	Reduced payment factor
95.0	0.0000	97.0	0.0000
94.9	0.0125	97.1	0.0125
94.8	0.0250	97.2	0.0250
94.7	0.0375	97.3	0.0375
94.6	0.0500	97.4	0.0500
94.5	0.0625	97.5	0.0625
94.4	0.0750	97.6	0.0750
94.3	0.0875	97.7	0.0875
94.2	0.1000	97.8	0.1000
94.1	0.1125	97.9	0.1125
94.0	0.1250	98.0	0.1250
93.9	0.1375	98.1	0.1375
93.8	0.1500	98.2	0.1500
93.7	0.1625	98.3	0.1625
93.6	0.1750	98.4	0.1750
93.5	0.1875	98.5	0.1875
93.4	0.2000	98.6	0.2000
93.3	0.2125	98.7	0.2125
93.2	0.2250	98.8	0.2250
93.1	0.2375	98.9	0.2375
93.0	0.2500	99.0	0.2500
<93.0	Remove and replace	> 99.0	Remove and replace

No single compaction test shall represent more than 275 tons or one day's production, whichever is smaller.

When approved by the Engineer, shoulder and variable transition areas may be paved using a self-propelled spreader equipped with an approved extension wing or approved non-self-propelled spreader (Layton box or equal).

The area to which paint binder and asphalt resurfacing fabric has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

The Contractor shall schedule his paving operations such that each layer of asphalt concrete is placed on all contiguous lanes of a traveled way each work shift. Additional asphalt concrete shall be placed along the traverse edge at the end of each lane and along the exposed longitudinal edges between adjacent lanes, hand raked and compacted to form temporary conforms. Kraft paper, or other approved bond breaker, may be placed under the conform tapers to facilitate the removal of the taper when paving operations resume.

Additional asphalt concrete surfacing material shall be placed along the edge of the surfacing at road connections and private drives, hand raked, if necessary, and compacted to form smooth tapered conforms. Full compensation for furnishing all labor and tools and doing all the work necessary to hand

rake said conforms shall be considered as included in the contract prices paid per ton for Asphalt Concrete and no additional compensation will be allowed therefor.

The quantity of asphalt concrete to be paid for will be measured by the ton. The weight shall be the combined weight of the aggregate and asphalt binder.

The quantity of liquid asphalt and asphalt emulsion will not be measured or paid for. Full compensation for liquid asphalt and asphalt emulsion will be considered included in the prices paid for the various other items of work and no additional compensation will be allowed.

Payment for asphalt concrete will be made as bid per ton for Asphalt Concrete, Type A.

The price per ton for Asphalt Concrete shall include full compensation for furnishing all labor, materials, including tack coat, tools, equipment and incidentals and for doing all the work involved in furnishing and placing asphalt concrete, complete in place, as specified herein, and as directed by the Engineer.

Water furnished and applied to tacky asphaltic emulsion and for mixing-type asphaltic emulsion will not be paid for and full compensation therefor will be considered as included in the contract price paid for asphalt concrete.

ASPHALTS

Section 92, "Asphalts," of the Standard Specifications, shall not apply.

DESCRIPTION

Asphalt shall consist of refined petroleum or a mixture of refined liquid asphalt and refined solid asphalt, prepared from crude petroleum. Asphalt shall be:

- A. Free from residues caused by the artificial distillation of coal, coal tar, or paraffin.
- B. Free from water.
- C. Homogeneous.

MATERIALS

General

The Contractor shall furnish asphalt under the Department's "Certification Program for Suppliers of Asphalt." The Department maintains the program requirements, procedures, and a list of approved suppliers at:

<http://www.dot.ca.gov/hq/esc/Translab/fpmcoc.htm>

The Contractor shall ensure the safe transportation, storage, use, and disposal of asphalt.

The Contractor shall prevent the formation of carbonized particles caused by overheating asphalt during manufacturing or construction.

Grades

Performance graded (PG) asphalt binder shall conform to the following:

Performance Graded Asphalt Binder

Property	AASHTO Test Method	Specification				
		Grade				
		PG 58-22 ^a	PG 64-10	PG 64-16	PG 64-28	PG 70-10
Original Binder						
Flash Point, Minimum °C	T48	230	230	230	230	230
Solubility, Minimum % ^b	T44	99	99	99	99	99
Viscosity at 135°C, ^c Maximum, Pa·s	T316	3.0	3.0	3.0	3.0	3.0
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T315	58 1.00	64 1.00	64 1.00	64 1.00	70 1.00
RTFO Test, ^e Mass Loss, Maximum, %	T240	1.00	1.00	1.00	1.00	1.00
RTFO Test Aged Binder						
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T315	58 2.20	64 2.20	64 2.20	64 2.20	70 2.20
Ductility at 25°C Minimum, cm	T51	75	75	75	75	75
PAV ^f Aging, Temperature, °C	R28	100	100	100	100	110
RTFO Test and PAV Aged Binder						
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum G*/sin(delta), kPa	T315	22 ^d 5000	31 ^d 5000	28 ^d 5000	22 ^d 5000	34 ^d 5000
Creep Stiffness, Test Temperature, °C Maximum S-value, Mpa Minimum M-value	T313	-12 300 0.300	0 300 0.300	-6 300 0.300	-18 300 0.300	0 300 0.300

Notes:

- a. For use as asphalt rubber base stock for high mountain and high desert area.
- b. The Engineer will waive this specification if the supplier is a Quality Supplier as defined by the Department's "Certification Program for Suppliers of Asphalt."
- c. The Engineer will waive this specification if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards.
- d. Test the sample at 3°C higher if it fails at the specified test temperature. G*/sin(delta) shall remain 5000 kPa maximum.
- e. "RTFO Test" means the asphaltic residue obtained using the Rolling Thin Film Oven Test, AASHTO Test Method T240 or ASTM Designation: D 2872. Residue from mass change determination may be used for other tests.
- f. "PAV" means Pressurized Aging Vessel.

Performance Based Asphalt Binder

Property	AASHTO Test Method	Specification			
		Grade			
		PBA 6a	PBA 6a(mod)	PBA 6b	PBA 7
Absolute Viscosity (60°C), Pa·s(x10 ⁻¹) ^a Original Binder, Minimum RTFO Aged Residue ^b , Minimum	T202	2000 5000	2000 5000	2000 5000	1100 3000
Kinematic Viscosity (135°C), m ² /s(x10 ⁻⁶) Original Binder, Maximum RTFO Aged Residue, Minimum	T201	2000 275	2000 275	2000 275	2000 275
Absolute Viscosity Ratio (60°C), Maximum RTFO Test Visc./Orig. Visc.	—	4.0	4.0	4.0	4.0
Flash Point, Cleveland Open Cup, °C, ^d Original Binder, Minimum	T48	232	232	232	232
Mass Loss After RTFO Test, %	T240	0.60	0.60	0.60	0.60
Solubility in Trichloroethylene, % ^c Original Binder, Minimum	T44	Report	Report	Report	Report
Ductility (25°C, 5 cm/min), cm RTFO Test Aged Residue ^b , Minimum	T51	60	60	60	75
On RTFO Test Aged Residue, °C: 1 to 10 rad/sec: SSD ≥ 0 and Phase Angle (at 1 rad/sec) < 72°	^f	—	35	—	—
On Residue from PAV ^g at temp., °C Or Residue from Tilt Oven ^f (@113°C), hours	R28	100 36	100 36	100 36	110 72
°SSD ≥ -115(SSV)-50.6, °C	^f	—	—	—	25
Stiffness, Test Temperature, °C Maximum S-value, MPa Minimum M-value	T313	-24 300 0.300	-24 300 0.300	-30 300 0.300	-6 300 0.300

Notes:

- a. Absolute viscosity (60°C) will be determined at one sec⁻¹ using ASTM Designation: D 4957 with Asphalt Institute vacuum capillary viscometers.
- b. "RTFO Aged Residue" means the asphaltic residue obtained using the Rolling Thin Film Oven Test (RTFO Test), AASHTO Test Method T240 or ASTM Designation: D 2872.
- c. There is no requirement; however results of the test shall be part of the certified copy of test results furnished with the Certificate of Compliance.
- d. "Residue from Tilt Oven" means the asphalt obtained using California Test 374, Method B, "Method for Determining Asphalt Durability Using the California Tilt-Oven Durability Test."
- e. "SSD" means Shear Susceptibility of Delta; "SSV" means Shear Susceptibility of Viscosity.
- f. California Test 381.
- g. "PAV" means Pressurized Aging Vessel.

Sampling

The Contractor shall provide a sampling device in the asphalt feed line connecting the plant storage tanks to the asphalt weighing system or spray bar. The sampling device shall be accessible between 600 mm and 750 mm above the platform. The Contractor shall provide a receptacle for flushing the sampling device.

The sampling device shall include a valve:

- A. With a diameter between 10 mm and 20 mm.
- B. Manufactured in a manner that a one-liter sample may be taken slowly at any time during plant operations.
- C. Maintained in good condition.

The Contractor shall replace failed valves.

In the presence of the Engineer, the Contractor will take 2 one-liter samples per operating day. The Contractor shall provide round, friction top, one-liter containers for storing samples.

APPLYING ASPHALT

Unless otherwise specified, the Contractor shall heat and apply asphalt in conformance with the provisions in Section 93, "Liquid Asphalts."

The Contractor shall apply paving asphalt at a temperature between 120°C and 190°C. The Engineer will determine the exact temperature of paving asphalt.

MEASUREMENT

If asphalt is paid as a contract work item on a mass basis, the Department will measure asphalt by the ton under the provisions for determining the mass for payment of liquid asphalt in Section 93, "Liquid Asphalt."

The Engineer will determine the mass of asphalt from volumetric measurements if the Contractor:

- A. Uses partial loads of asphalt.
- B. Uses asphalt at locations other than a mixing plant and no suitable scales are available within 35 km.
- C. Delivers asphalt meeting either of the following:
 - 1. In calibrated trucks and each tank is accompanied by its measuring stick and calibration card.
 - 2. In trucks equipped with a calibrated thermometer that determines the asphalt temperature at the time of delivery and equipped with a vehicle tank meter meeting Section 9-1.01, "Measurement of Quantities," for weighing, measuring, and metering devices.

If the Contractor furnishes asphalt concrete from a mixing plant producing material for only one project, the Department will determine the amount of asphalt from volumetric measurements by measuring the amount in the tank at the start and the end of the project provided the tank is calibrated and equipped with its measuring stick and calibration card. The Engineer will determine pay quantities in conformance with the following:

- A. Before converting the volume to mass, the Engineer will reduce the volume measured to that which the asphalt would occupy at 15°C.

- B. The Engineer will use 981 L and 1020 g/L for the average weight and volume for both PG and PBA grades of asphalt at 15°C.
- C. The Engineer will use the Conversion Table in Section 93, "Liquid Asphalts," and the following table

Average Mass and Volumes of Paving Asphalt

Grade	Liters per Tonne at 15° C	Grams per Liter at 15°C
PG 58-22	981	1020
PG 64-10	981	1020
PG 64-16	981	1020
PG 64-28	981	1020
PG 70-10	981	1020
PBA 6a	981	1020
PBA 6a (mod)	981	1020
PBA 6b	981	1020
PBA 7	981	1020

Full compensation for applying asphalt emulsion shall be considered as included in the prices paid for the various items of work and no additional compensation will be allowed therefor.