



City Council Staff Report

Agenda Item: I.3
 Date: December 17, 2019
 Department: Public Works and
Engineering Services

AGENDA TITLE: Approve Updated Road and Drainage Repairs Plan

RECOMMENDATION: The Citizens Infrastructure Oversight Commission (CIOC) recommends the City Council review and approve the updated Road and Drainage Repairs Plan dated December 17, 2019 and adopt Resolution 65-19.

BACKGROUND:

On July 17, 2012 the City Council adopted the original Orinda Road and Drainage Repairs Plan, originally known as the “10-Year Plan”. This Plan delineated a program for a multi-phased funding plan for fixing Orinda’s infrastructure challenges. The Plan identified the infrastructure needs which included repairs to publicly maintained roads and storm drains. The Plan further identified future phases and potential funding sources to make such improvements to the public infrastructure. This original Plan was the basis for the 0.5% Sales Tax that was assigned on the ballot as Measure L and approved by the voters in 2012.

The Plan was subsequently updated and approved by the City Council on April 22, 2014 and March 15, 2016 prior to successful voter approved general obligation bonds (\$20 million in June 2014 and \$25 million in June 2016 – Phase 2 & 3 respectively). With each update and completion of more road repairs, the Plan has added more detail and clarified the goals of the original plan and set forth the goals for each next Phase.

DISCUSSION:

On June 18, 2019, Commissioner Terry Murphy presented to the City Council the CIOC Annual Report for 2018. On August 20, 2019, Chair Jud Hammon made a presentation to the City Council of the status of Road and Drainage Repairs Plan to the City Council.

On November 13, 2019 the CIOC met and reviewed the 2019 update to the Plan and voted to recommend that the City Council approve the Updated Road and Drainage Repairs Plan (As Updated in 2019).

The updated Plan (Attachment B) describes the remarkable progress that has been accomplished with the voter-approved funds to date. A majority of our publicly maintained roads are now in very good condition, with less than 10% of our publicly maintained roads (mostly arterials & collectors) still needing repairs. As described in the Plan, the City needs to complete the repairs on the remaining public roads, and then needs to shift its focus to (1) rehabilitating public storm drain pipes, and (2) maintaining our public roads in their present, very good condition using less costly surface treatments. This approach will minimize the long-term costs to Orinda's citizens.

The cost for needed pavement surface maintenance of our publicly maintained roads is estimated to be on **average of \$3.6 Million per year over the next twenty years.**

As detailed in the attached Plan, the estimated cost to repair or replace deteriorated public storm drain pipes over the next 10 years or so is approximately \$30 Million. Approximately \$9.6 Million of that will be needed over the next 3 to 5 years, to do needed to repair or replace the storm drain pipes found to have the highest risk of failure, and to complete CCTV inspections to identify conditions.

FISCAL IMPACT:

There is no direct fiscal impact from adopting this Resolution. The City is currently exploring additional future funding sources through the Revenue and Tax Measure Subcommittee (Mayor Gee, Vice Mayor Worth); starting with extending the City current 0.5% Add-On Sales Tax approved by Measure L in 2012 and expires in March 2023. There is also discussion regarding the potential for seeking voter approval of an increase to a full one cent. The plan identifies that the City still requires additional funding for long term maintenance of the publicly maintained roadway system; as well as funding to make major drainage related improvements.

ATTACHMENTS:

- A. Resolution 65-19 Approved Updated Road and Drainage Repairs Plan 12-17-19
- B. Road and Drainage Repairs Plan - Updated Dec 17, 2019

Respectfully Submitted by:
 Larry Theis
 Assistant City Manager/PW
 Director

Prepared By: Farah Khorashadi, Paving Program Project Manager

Approved by:

Steve Salomon
 Steve Salomon, City Manager 12/10/2019

BEFORE THE CITY COUNCIL OF THE CITY OF ORINDA

IN THE MATTER OF:

Adoption of the City of Orinda)	Resolution No. 65-19
Updated Road and Drainage)	
Plan dated December 17, 2019)	

WHEREAS, on February 16, 2016, the City Council of the City of Orinda adopted a Resolution of Public Convenience and Necessity and (2) introduced an Ordinance Calling for the Holding of a Special Election in the City of Orinda to be held on June 7, 2016, for the purpose of submitting to the electorate the approval of bonds to finance roadway and storm drain improvements; and

WHEREAS, an Orinda Road and Drainage Repairs Plan ("Plan") was developed and adopted by the City Council on July 17, 2012, and has subsequently been updated to reflect the inclusion of the half-cent sales tax revenues (Measure L) as approved by the Orinda electorate in November 2012 and Measure J, a \$20 million dollar bond approved by the voters in 2014 and Measure L \$25 million dollar bond approved by voters in 2016; and

WHEREAS, the City plans to use the voter approved revenue to supplement other available City funds for the public infrastructure improvements;

WHEREAS, the "Plan" identifies and delineates the infrastructure needs including repairs to publicly maintained roads and storm drains; and

WHEREAS, the "Plan" further identifies the funding sources to make such improvements to the public infrastructure; and

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Orinda hereby approves the updated Road and Drainage Repairs Plan dated December 17, 2019.

PASSED AND ADOPTED.

- COUNCILMEMBERS: AYES:
- COUNCILMEMBERS: NOES:
- COUNCILMEMBERS: ABSENT:
- COUNCILMEMBERS: ABSTAIN:

Darlene Gee, Mayor

ATTEST:

Sheri M. Smith, City Clerk

Attachment: Resolution 65-19 Approved Updated Road and Drainage Repairs Plan 12-17-19 (1980 : CIOC Road and Drainage Plan)

CITY OF ORINDA

Road and Drainage Repairs Plan

(As Updated in 2019)



December 17, 2019



*(ORIGINALLY ADOPTED BY THE CITY COUNCIL JULY 17, 2012
UPDATED APRIL 22, 2014 AND MARCH 15, 2016)*

CITY OF ORINDA

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Acknowledgements

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and

CITIZENS' INFRASTRUCTURE OVERSIGHT COMMISSION

Jud Hammon, Chair

Bill Hurrell, Vice-Chair

Walter Bell

Jerry Condon

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Terry Murphy

Richard Nelson

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CITY OF ORINDA ROAD AND DRAINAGE REPAIRS PLAN

(As Updated in 2019)

Submitted December 17, 2019 to the Orinda City Council

Section 1: Executive Summary

The City of Orinda incorporated in 1985, and took over approximately 93 miles of paved publicly-maintained roads and roughly 17 miles of publicly- maintained storm drain pipes and culverts from Contra Costa County at that time.

With available funds, primarily Gas Tax, Contra Costa County Sales Tax Return-to-Source and grant funds, the City was able to repair and maintain the most heavily-travelled roads (Arterials, Collectors, and School Routes) in a generally good condition. However, by 2004, most of the city's Residential roads had deteriorated badly, and it was clear that available funding was insufficient. The City established the Citizen's Infrastructure Committee, to study the problem and recommend solutions.

In November, 2006, and again in March, 2007, bond measures for \$60 Million were placed on the ballot. Each measure got over 60% approval; but neither measure met the 66.7% approval required to pass.

In July, 2012, a ten-year, multi-phase funding plan was approved by the City Council. The total cost for repairs was estimated to be \$58.4 Million, but the new plan called for a series of smaller, incremental ballot measures, rather than a single ballot measure.

Real progress on improving the Residential roads began in 2013, with voters approving a half-cent sales tax in November, 2012. The first revenues from this funding source, targeted for repair of Residential streets and drains, were available in April, 2013.

In 2014, voters approved a \$20 Million general-obligation bond (Measure J), to provide additional funds for repairs of Residential roads and drains. Another funding increment, also targeted for repairs of Residential roads and drains, was provided by the subsequent passage of the 2016 Bond Measure L (\$25 Million).

The availability of this level of funding has allowed the City to significantly accelerate repair of our Residential roads and associated drains. This acceleration has shortened the duration of the disruptive road-repair projects and has reduced costs, through the use of larger-scale contracts, and the ability to take advantage of low oil prices, a main factor in the cost of the asphalt required to pave the roads.

The results of this effort are clear: In 2006, the overall average Pavement Condition Index (PCI) of Orinda's public roads was 46 ("Poor" category). By the end of 2019, the system-wide average PCI is expected to be about 85 ("Very Good" category), and only a few roads (less than 6% of the system) will have a PCI less than 50. This is a tremendous accomplishment!

By the end of 2021, all of our public Residential roads will have been repaired. By the end of 2024, all of our Arterial and Collector roads should have been repaired, as well.

Funding Requirements Going Forward - -Roads

As discussed above, the repairs of our public roads are nearly complete. However, our roads will not stay in good condition without routine maintenance. As is described below, avoiding that routine maintenance can increase our long-term costs by tens of millions of dollars.

The cost for needed maintenance of our roads is estimated to be approximately \$2.6 Million per year in the near term, increasing to about \$3.6 Million per year by 2032.

After the Bond funds have been expended (about the end of 2021), we estimate that approximately \$2.8 Million will available per year for road repairs and maintenance; \$1.6 Million from a combination of Gas Tax, County Sales Tax Return to Source funds, and Road Maintenance Funds collected from the garbage-collection company; plus \$1.2 Million from the add-on ½-cent sales tax.

However, the ½-cent sales tax expires in 2023. It is clear that the City must find a replacement source of at least \$1 Million per year for road maintenance.

By 2032, road maintenance costs are likely to increase by roughly an additional \$1 Million per year, so an additional funding source is likely to be required by that time.

Monitoring both expenses and revenues on a year-by-year basis will allow the City to

refine its plans for future revenue sources effectively.

Funding Requirements Going Forward - -Storm Drains

The sinkhole created on Miner Road in January 2017, caused by the failure of the culvert under the road, clearly shows the necessity to address storm-drain assessment and associated rehabilitation work as quickly as possible.

Using information from two recent studies of our storm-drain system plus additional assessments by City staff, up-to-date information about our storm drain system, including estimated repair costs, has been entered into a Geographic Information System (GIS), which integrates the information about each individual pipe with a map showing the location of the pipe.

These estimates show that roughly \$30 Million will likely be needed, to repair or replace public storm drain pipes that are likely to fail over the next 10 years or so.

Approximately \$9.6 Million of that will be needed over the next 3 to 5 years, to do needed CCTV inspections and to repair or replace the storm drain pipes found to have the highest risk of failure.

NOTE

This release of the Road and Drainage Repairs Plan addresses only the City's publicly-maintained roads and storm drain pipes.

There are also approximately 30 miles of privately-maintained roads and approximately 28 miles of privately-maintained storm-drain pipes within the City.

As this update to the Road and Drainage Repairs Plan is being prepared, the City Council is reviewing the status of the privately-maintained roads and storm drains, as well as the related city policies.

Impacts of any future changes in city policies regarding the private roads and/or storm drains and any projected costs associated with those changes would be addressed in a future revision of this plan.

Section 2: Orinda's Public Roads

This section addresses only the maintenance and repair of our public road system and the associated costs. The maintenance and repair of our public storm drain system is discussed in Section 3.

It is clear that dramatic progress has been made in repairing the city's public roads and storm drains. At the time this report is being written, the 2019 paving program is nearing completion. **Figure 2-1** shows the historical PCI data, from 2011 through the end of 2018, along with the projected improvement through 2019.

As can be seen in the chart, the average PCI of our public roads in 2011 was less than 50 (the upper end of the "Poor" category). By the end of the 2018 paving project, our average PCI had improved to 75 (in the "Good" category). Based on current projections, we anticipate rehabilitating nearly all of our public Residential roads by the end of 2019, after which the system-wide average PCI will be about 85 (in the "Very Good" category). This will be among the best overall PCI ratings in the entire Bay Area.

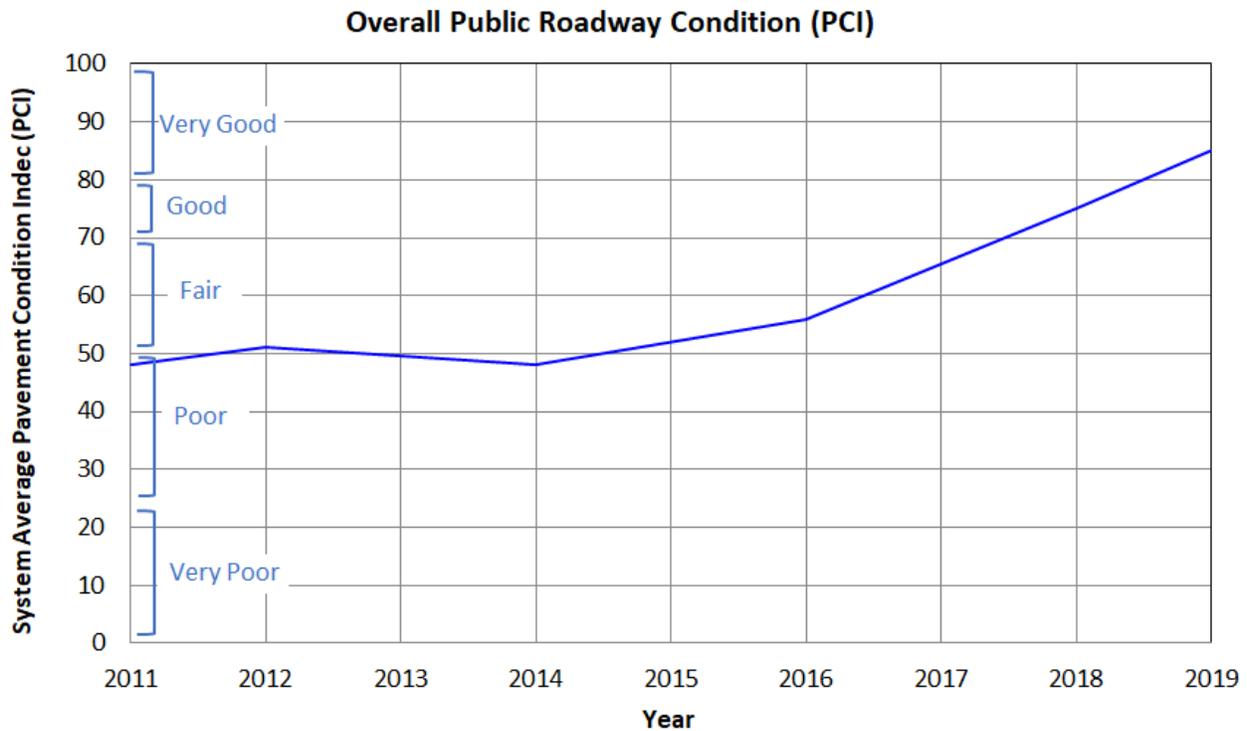


Figure 2-1: System-Wide Average Pavement Condition Index; 2011 through 2019

When our repair program started to really ramp up, in 2014, about 35% of our public road system was in Good to Very Good condition, with another 10% in Fair condition. At that time, however, more than 30% of the system was in Very Poor condition. As is shown in **Figure 2-2**, the condition of the vast majority of our public roads will have improved to Good or Very Good by the completion of the 2019 paving project, and the number of roads in Very Poor condition will have fallen to zero, with only about 6% of the roads still in Poor condition. This is excellent progress, and ahead of the original 2021 planned completion date.

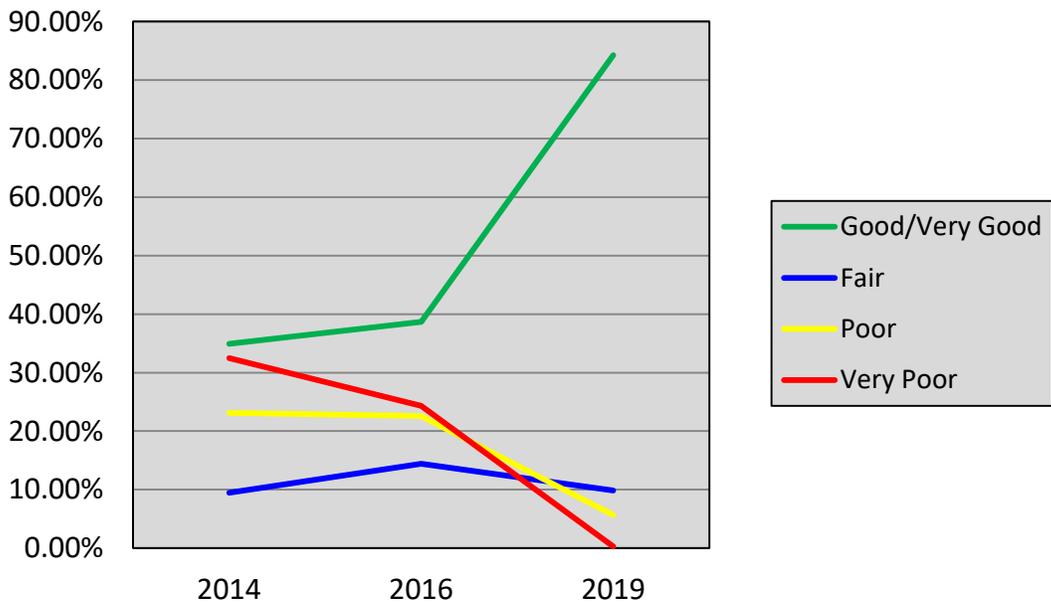


Figure 2-2: Orinda Public Roads. 2014 - 2019, by Pavement Condition

Table 2-1 shows the lengths of Orinda's public roads that have been repaired from 2012 through 2018, as well as the repairs scheduled for the 2019 repair project. In 2012, most of Orinda's public Residential roads were in poor condition. After the 2019 paving project is complete, nearly all of these roads will have been refurbished. Approximately 0.6 miles of Residential roads have been delayed until the 2020 and 2021 paving projects, due to conflicting construction work scheduled on those road segments during the 2019 paving project. Approximately half of our Arterials and Collectors will have been repaired, as well.

Year	Residential Streets Miles of Rehabilitation	Arterials and Collectors Miles of rehabilitation
2012	0.66	1.77
2013		
2014	0.94	3.86
2015	6.85	2.24
2016	8.50	0.73
2017	10.46	0.36
2018	13.74	1.34
2019	24.35	0.86

Miles repaired:		
Sub-Totals	65.5	11.2

Total Miles Orinda Roads Repaired	76.7
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Table 2-1. Lengths of Orinda's Public roads repaired from 2012, by year, including projected repairs for 2019

The map of **Figure 2-3** also shows the progression - and acceleration - of the repair project, with yellow highlights showing those public roads repaired from 2012 through 2016, brown highlights showing those being repaired during the 2017 project, and blue highlights showing those scheduled to be repaired in 2018 and 2019.

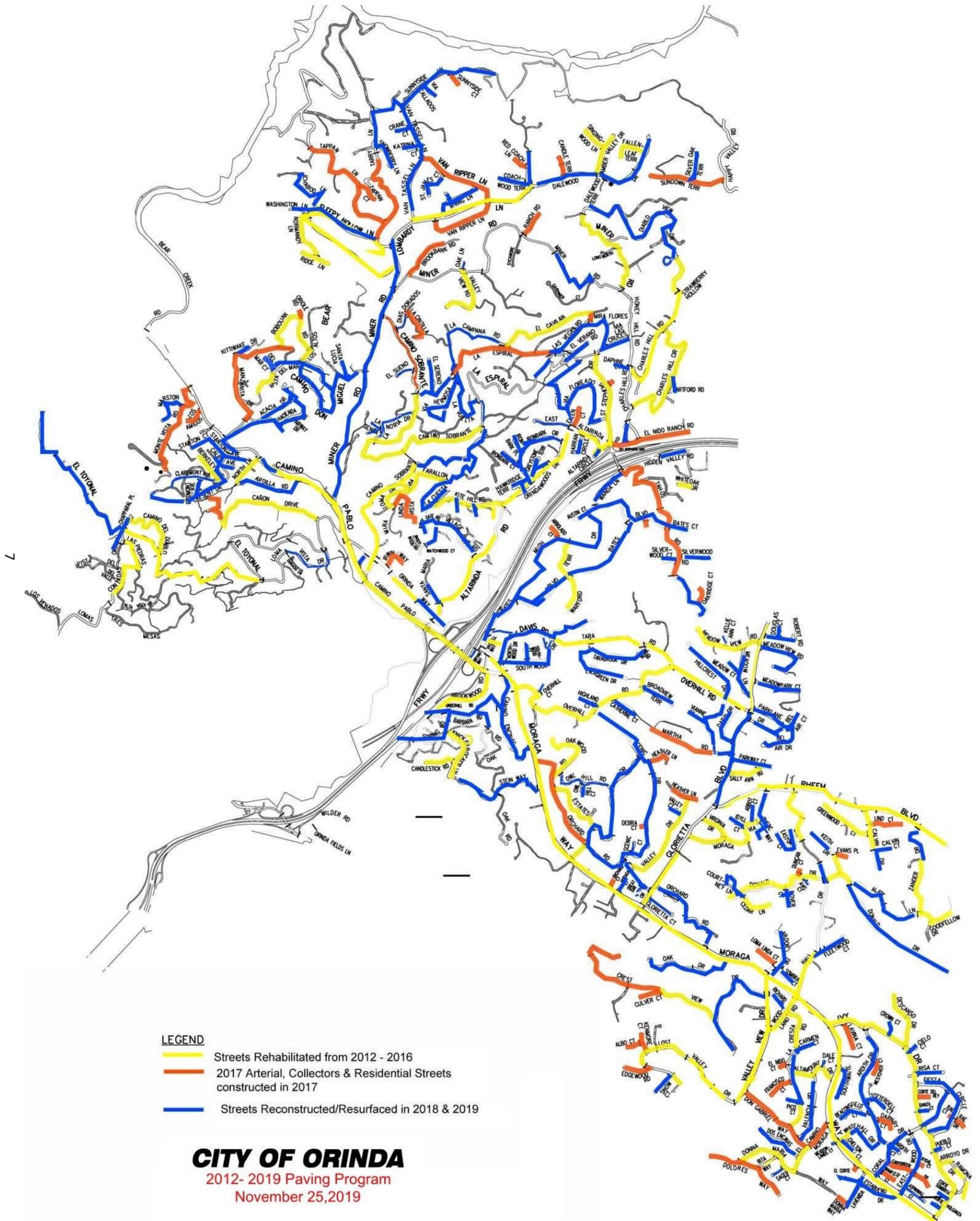


Figure 2-3 City of Orinda - - Public Roads Repaired 2012 - 2019

Table 2-2 lists the remaining repairs needed on our public roads. Approximately \$12 Million in funding (plus possible grants) are expected to be available to repair these roads within the 2020 - 2024 time frame. As can be seen from the table, the great majority of the remaining repairs are for our Arterial and Collector streets. It follows that most of the road repair and maintenance funds for the next several years will be spent on these streets. Repairs to the Residential roads will generally be funded through the residual 2016 Bond measure funds.

Remaining Repairs	
Residential Roads	\$1,305,939
Arterials/Collectors	\$10,440,061
Full System	\$11,746,000

Table 2-2. Funds required to complete repairs of Orinda's public roads

While repairs of Orinda's public roads will be complete by 2024, we must not conclude that we can soon stop worrying about our roads. Our roads will not stay in good condition without routine maintenance, and many studies have shown that delaying needed maintenance will significantly increase our costs in the long-term. As shown in **Figure 2-4**, it costs approximately 5 times as much to repair a badly deteriorated roadway, as it does to maintain a roadway while it still has a PCI over 60. The increase in pavement repair costs caused by delaying needed maintenance is discussed further in Attachment 11.

To understand how postponing maintenance would likely impact Orinda's budget, the Citizens Infrastructure Oversight Commission (CIOC) performed a Deferred Maintenance analysis. Deferred Maintenance refers to maintenance or repairs that are needed, but have been deferred to sometime in the future. The data used in the analysis was supplied by Pavement Engineering Inc. (PEI), using the StreetSaver program.

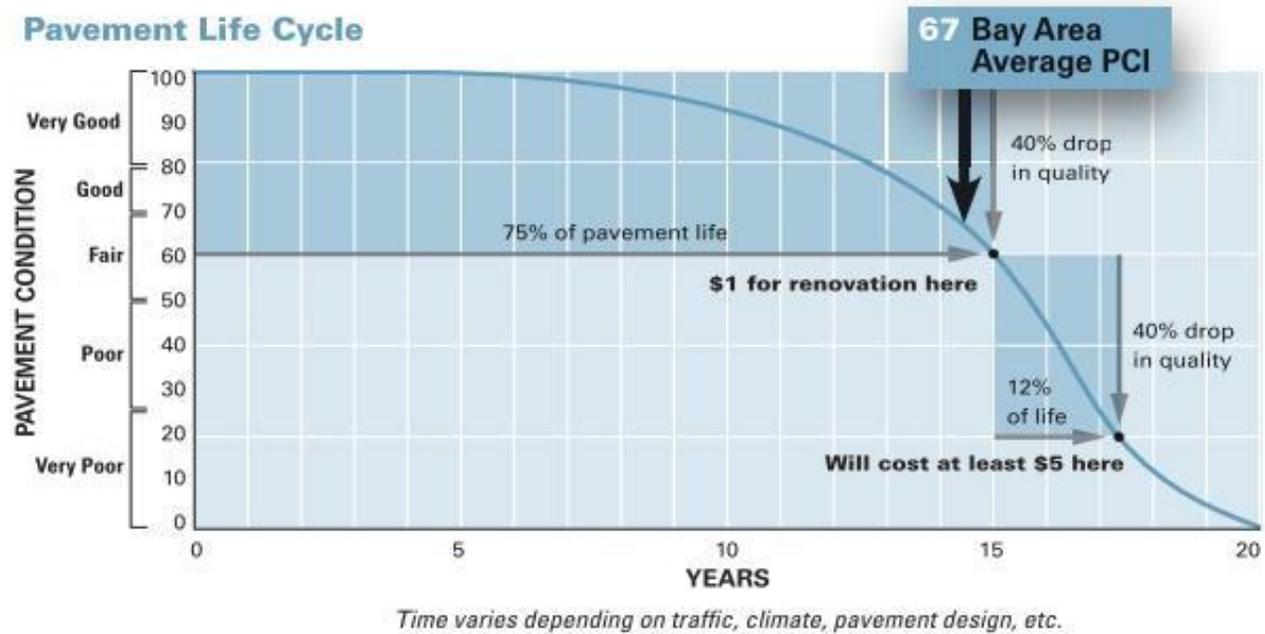


Figure 2-4: Pavement Life Cycle (Source: Metropolitan Transportation Commission)

StreetSaver is a software package that evolved from software developed in 1983 for the Metropolitan Transportation Commission, to assist in determining the pavement management needs for Bay Area cities. Starting with recent data on the conditions of Orinda's public streets, and based on over 30 years of data, StreetSaver can generate projections of how our roads are likely to degrade over time. In this case, the software was used to generate projections of the condition of our public roads for a set of four different potential road-maintenance budgets. (See Attachment 10 for further information about the StreetSaver program.)

The graph of **Figure 2-5** shows the results of the study, showing the projected deferred maintenance costs for the Orinda public road system for the next 20 years - that is, starting in 2020, and continuing through 2039. Four funding profiles were considered:

- \$2.6 Million per year through 2022, then decreasing the funding to \$1.6 Million per year
- \$2.6 Million per year through 2039
- \$2.6 Million per year until 2032, then increasing the funding to \$3.6 Million per year
- \$2.6 Million per year through 2022, then increasing the funding to \$3.6 Million per year

\$2.6 Million is the actual funding that was available for paving projects in 2018, including \$1 Million from the ½ cent add-on sales tax and \$1.6 Million from the combination of (1) Orinda share of the Gasoline Tax, (2) the CCTA Return-to-Source (3) Garbage company impact fees, and (4) potential federal and state grants, dedicated to road paving projects.

Profile a) thus is the amount that would be available from the existing funding sources, assuming that the sales tax is not renewed when it expires in 2023 and that there is no growth in the listed revenue sources over the next 20 years. All profiles other than option (a) would require some source of funds that would replace or supplement the present ½-cent sales tax, after it expires early in 2023.

In each case, it was assumed that unit costs of construction increase at a rate of 3% per year. The result is a projected total increase in unit costs of 80 percent over the 20-year period.

NOTE: In each case, the indicated spending profile is assumed to be in constant, 2019 dollars. It is likely that at least some of the tax sources listed would provide intrinsic increases in revenue. Any such increases would reduce the needed tax rate to generate the funding increases in cases described cases (b), (c), and (d).

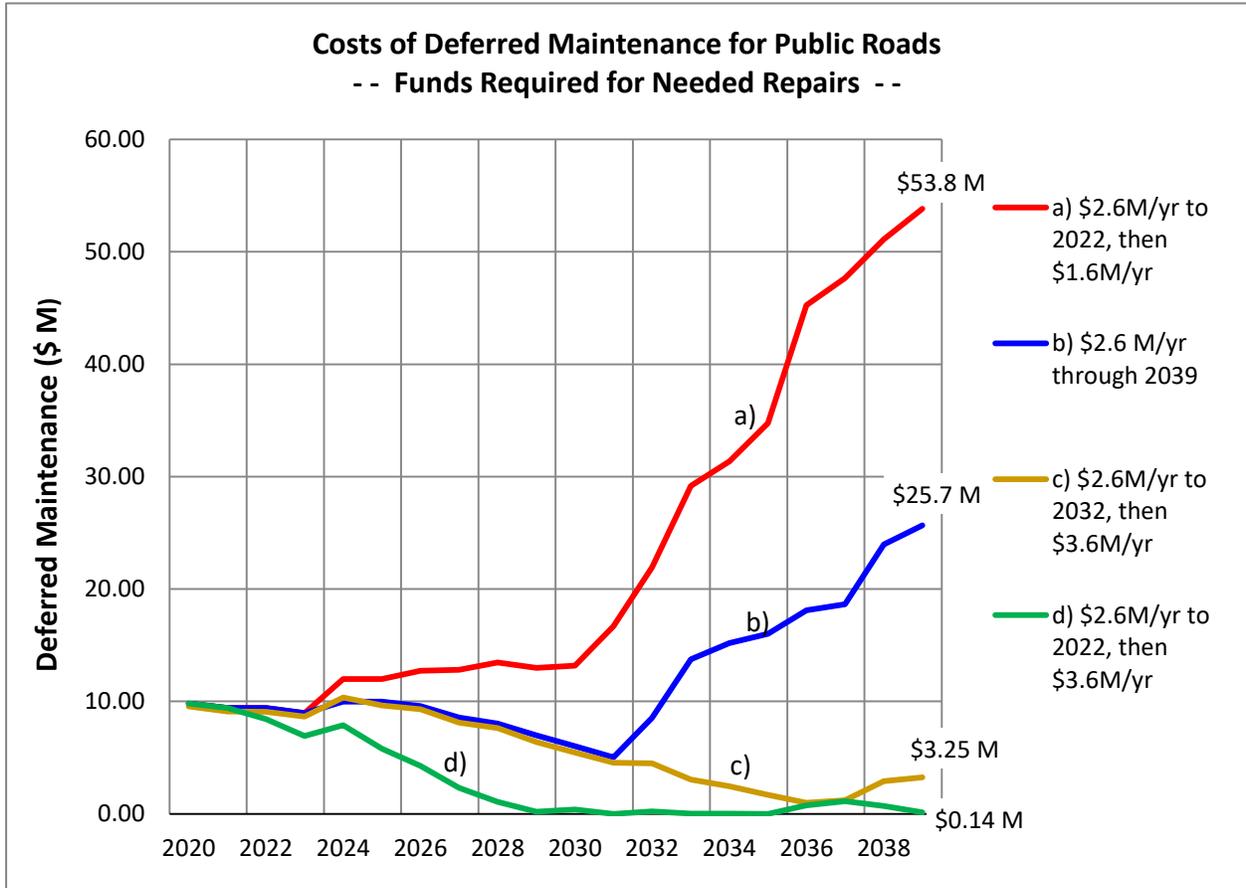


Figure 2-5: Projections of Deferred Maintenance for Four Funding Scenarios

NOTE: These projections assumed that all indicated funds would be used for road repair and maintenance. Additional funds will be required to address repairs to the city's storm drain system. Funding required to address the storm drain system is discussed in Section 3.

The rapid rise rate of the Deferred Maintenance lines shown in Figure 2.5 after 2030 for case (a) and after 2031 for case (b) indicates that many streets would be falling into disrepair at those times. This is because a budget of \$2.6 Million per year is not sufficient to fund maintenance of roads which had been refurbished before 2016, but begin to deteriorate after about 2030 without routine maintenance.

To be more specific, if we were to limit road-maintenance budget to \$1.6M/year after 2022 (case a), it is likely that our public road system would need repairs costing approximately \$53.8 Million dollars by 2039 (twenty years from now). Orinda's

citizens would, once again, be forced to resort to bond measures or similar tools to repair our roads.

Even with a road-maintenance budget of \$2.6 Million through 2039 (case b), our funding short-fall for needed repairs would be approximately \$25.7 Million. Major repairs could possibly be avoided for another few years, but a large new road-repairs bond measure would soon be required.

We clearly need to plan for a road maintenance budget of significantly more than \$2.6 Million per year at some time in the future. However, the trend-line of profile (b), which continues to fall until about 2031, suggests that we may be able to postpone an increase until about 2031, without severe negative consequences.

Consider funding profile (c), with a \$2.6 Million/year budget starting in 2022, then increasing to a \$3.6 Million/year budget starting in 2032. The graph shows that the Deferred Maintenance will continue to fall until it reaches a very low value in about 2036, and then begin to slowly increase. This implies that a further budget increase will likely be needed in the 2040 time frame, but the funding short-fall in this case is still small.

The Deferred Maintenance line for funding profile d), with a \$3.6 Million/year budget starting in 2022, shows that the Deferred Maintenance falls to near zero by 2029, and remains near zero through the rest of the analysis.

A reasonable question at this point is "What would the TOTAL COST for Orinda citizens, to maintain our public roads, in the long term? That is, what is the likely year-by-year maintenance costs plus the cost to repair any roads that fall into disrepair in the meantime?"

Figure 2-6 addresses this question for the same four funding profiles. For each of the four profiles, the chart shows the projected annual expenses for road maintenance (in blue) and the estimated cost for the repairs that are needed, but have been deferred (in red), through 2039.

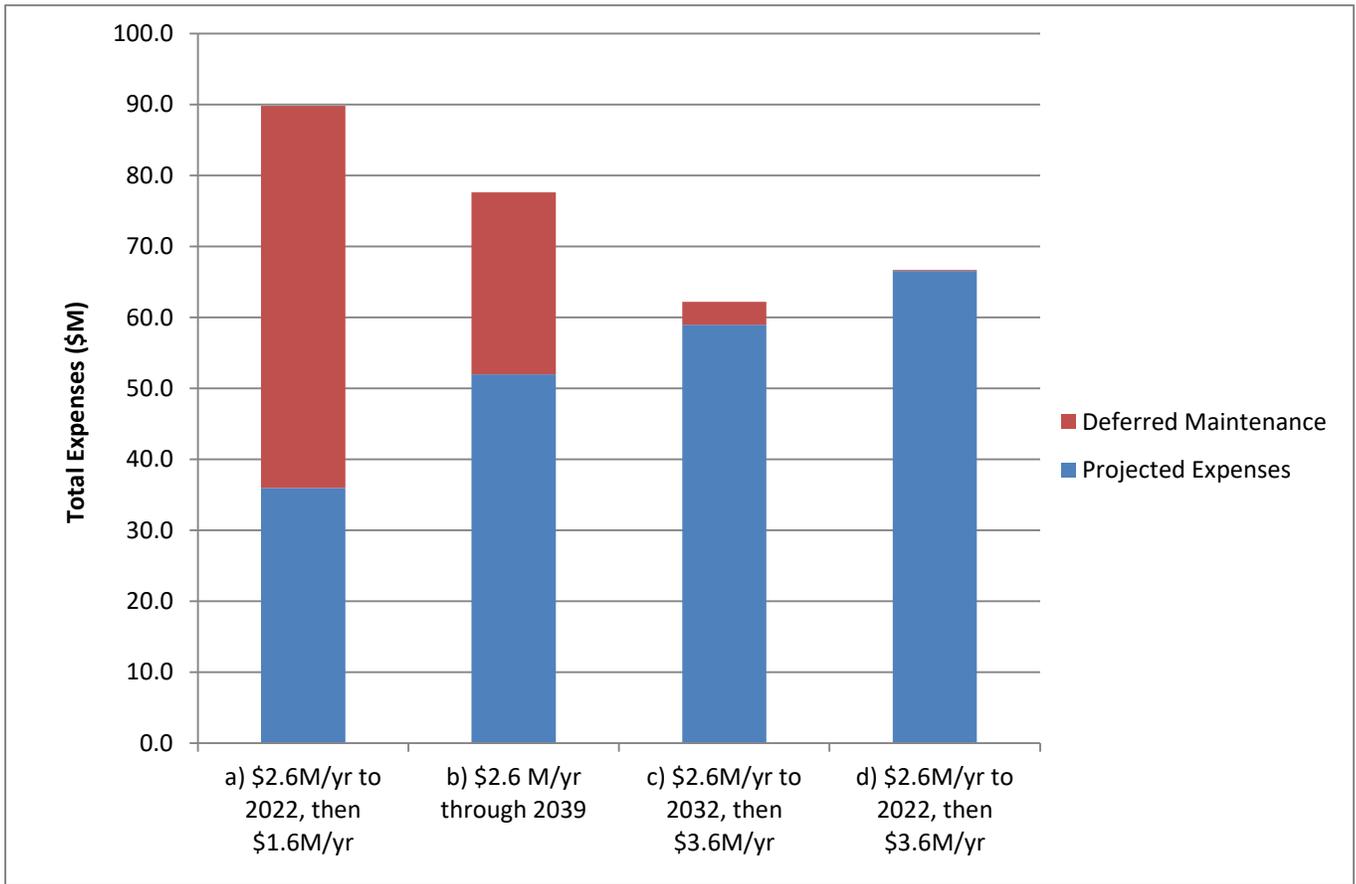


Figure 2-6. Projected total road repair and maintenance costs for four funding scenarios, including estimated costs for repairs still needed after 2039

The chart clearly shows the very high long-term costs Orinda citizens would incur if we fail to adequately maintain our public roads on a continuous basis. Note that the Deferred Maintenance expenses represent only what would be generated by tax or bond revenue. Any interest associated with bond measures would result in additional costs.

Funding profile (a), reducing our annual road-maintenance budget from about \$2.6 Million/year to \$1.6 Million/year, would result in the lowest total direct cost Orinda citizens over the 20-year time frame -- about \$36 Million. However at the end of that period, in 2039, the Orinda public road system would require well over \$50 Million of repairs that had been deferred. That is, many of our roads would then be in poor condition. To fund the needed repairs, Orinda citizens would once again need to pass a set of bond measures - this time for over \$50 Million dollars, to repair the city's public roads. The total cost to the citizens would be about \$90 Million, plus any required interest payments.

With funding profile (b), maintaining a steady budget of \$2.6 Million/year, the sum of the year-by-year expenses increases to about \$52 Million, but the deferred maintenance is significantly reduced, to about \$26 Million. This presents a better situation than profile (a), with the total long-term cost reduced by more than \$12 Million. However, Orinda citizens would likely still need to approve a new bond measure in the next few years, to repair badly-deteriorated roads. The total cost to the citizens, not including any required interest payments, would be about \$78 Million -- \$12 Million less than profile (a).

Funding profile (c) offers the lowest overall, long-term cost approaches for Orinda's citizens, saving \$30 Million relative to profile (a). Profile d) spends more overall than profile c), and would consequently be undesirable.

Our conclusion, therefore, is that funding will need to increase over the next 20 years, to allow us to maintain our roads in the condition we have achieved. Funding profile c) achieves the required increase by increasing revenues by \$1 Million per year, starting in 2033 and continuing through 2039, a total of \$7 Million over those 7 years.

It is possible that internal growth of the various funding sources, particularly of the ½ cent sales tax if renewed, will generate the required additional revenues without a new funding source. For example, growth of 3.5% per year in the ½ cent sales tax would double the revenues from that source by 2039 and generate an additional \$9 Million between now and 2039. Sales tax revenues have increased in recent years, but future growth is uncertain, as are possible changes in other current funding sources and growth in unit construction costs.

Monitoring both expenses and revenues on a year-by-year basis will allow the City to refine its plans for future revenue sources effectively.

Road Maintenance Objectives

Based on the results of the study above, the CIOC recommends the Council consider implementing a new road-maintenance objective and associated policy to replace the road-maintenance objective established by the City Council in 2015. The 2015 objective was:

Bring the average Pavement Condition Index of our public roads to at least PCI = 70, and work to assure that no public road has a PCI less than 50.

This was a sensible approach when our focus was to repair a road system that was in poor condition. However, the average PCI of our public road system is now over 75, and is expected to be 85 by the end of the present paving project, and very few road segments will have a PCI less than 50.

We now need to turn our focus to maintaining our public road system in its present very good condition. Providing adequate funds to properly maintain our roads is the best way to assure that we better control total long-term costs for our citizens.

The CIOC recommends the Council consider implementing a new road-maintenance objective:

Complete the repair of the public roads, then maintain these recently- repaired roads at the level we have achieved, using recommendations from the StreetSaver program as a guide, to minimize the long-term cost of maintenance.

The CIOC recommends that this objective would be realized by:

1. Using existing funding to complete the repair of the public Residential roads by the end of calendar year 2021.
2. Using existing funding to complete the repair of the public Arterials and Collectors by the end of calendar year 2023.
3. By 2023, extending the current ½ cent add-on sales tax or developing an alternative source of funding yielding the same continuing revenue.
4. Every four years, evaluating whether growth in existing revenue sources is adequate to achieve our objective, and if not, developing additional funding sources to fill the gap.
5. Since funding needs are unlikely to be constant from year to year, the City should set aside in reserves any funding available in any given year but not required to meet current requirements.
6. Continuing the Pavement Management approach described in Attachment 8, including regular pavement condition assessments, the use of the StreetSaver program to guide City Staff in the selection of treatment schedules for all of the city's public streets, considering such factors as how groupings of segments can minimize overall cost and minimize impacts to the citizens using the roads.

Note that the discussions up to this point have centered on repair and maintenance of the pavement to respond normal aging and wear. When considering budgets going forward, it is important to also consider the risks added by the city's hilly terrain - - settling, erosion, landslides, etc. We do not presently have quantitative assessments for addressing this risk, but it would clearly be prudent to set aside some reserves to prepare for these potential problems.

Section 3: Orinda's Public Storm Drains

In this section of the document, we address only the maintenance and repair of our public storm drain system and the associated costs.

Orinda's storm drains, many of which are located under our roads, are largely out of sight, and most of us are not aware of how extensive Orinda's storm drain system actually is. For the most part, our storm drains are only noticed when problems arise. The sinkhole created in January 2017 on Miner Road, caused by the failure of the culvert under the road, clearly shows the necessity to address storm-drain rehabilitation work as quickly as possible.

To develop a better understanding of the status of the storm drain system, the City has funded two recent surveys of the system. The first survey, summarized in a March, 2016 report by Schaaf and Wheeler, focused on a hydraulic assessment of the larger, higher-risk drains. The second survey, summarized in an August, 2019 report by Drake Haglan and Associates, focused on inspections of poor-condition, large diameter pipes, providing updated cost estimates for recommended repairs of those pipes and a prioritized list of repairs and potential improvements.

In addition, City staff has recently compiled cost estimates for the smaller-diameter metal pipes. They have also entered the most up-to-date information about our storm drains in a Geographic Information System (GIS), which integrates the information about each individual pipe with a searchable map showing the location of each pipe.

Based on the latest GIS data, Orinda's storm drain system includes about 17 miles of public storm drain pipes and about 28 miles of private storm drain pipes. These pipes, made from various materials, include Corrugated Metal Pipes (CMP), Reinforced Concrete Pipes (RCP), and various plastic pipes (HDPE, PVC etc.).

From the available data, the primary concern is the metal pipes, as most of these pipes have been in place well beyond their design life, and therefore many may need to be replaced. The other pipe materials have much longer lifetimes, and are thus less likely to be at risk.

City staff has proposed an extensive project to perform CCTV inspections of many pipes in the public storm drain system, which would provide a more accurate assessment of the status of these pipes, the risk of failures, and the cost of any needed

repairs.

The majority of the public storm-drain pipes are located under public roads, and many of these pipes are being replaced as a part of our ongoing paving projects. **Table 3-1** below summarizes repairs of storm drain pipes that were performed as part of our paving projects since 2012.

Year	Linear Feet replaced or lined	Total cost
2012	300	\$91,464
2013		
2014		
2015	384	\$133,644
2016	397	\$200,096
2017	2,226	\$672,364
2018	4,462	\$1,768,008
2019	2,406	\$1,065,400
	10,175	\$3,930,976

Table 3-1 Drains that were repaired or replaced as part of the Paving Projects from 2012 through 2019

Table 3-2 summarizes two recent large-scale storm-drain projects. The total cost of the recently-completed repairs listed in **Tables 3-1** and **3-2** is approximately \$10.4 Million.

North Lane project (#4070)	All new trench and 60" Reinforced Concrete Pipe	Approx. \$3.2 Million	Primarily funded through federal grants plus funds from EBMUD and Orinda drainage impact fees
Miner Rd. sinkhole project (#4121)	Replaced a failed 72" Corrugated Metal Pipe with a 7.5 ft high x 16 ft. Wide Reinforced Concrete Box culvert	Approx. \$3.3 Million	Federal emergency repair funding supplemented with funds from the Orinda General Fund

Table 3-2 Recent large-scale Storm Drain projects, funded outside of the Paving Projects

It is important to note that regulatory permits may be required for some storm drain or natural creek repair work. Applications for these permits can be very complex, can require extensive, costly engineering work, and can require coordination between multiple state and federal agencies. It is not uncommon for the cost of the

engineering and permit effort to be greater than the cost of the construction.

Table 3-3 summarizes repairs on storm drain pipes planned in the near future. Several of these projects will be funded through the city's Annual Drainage Facilities Improvement Program, which allocates \$150,000 each year primarily for repairs that are found to be needed during operations and maintenance work, including failures that occur during the year

Brookwood culvert repair CIP 4151)	Line the invert (bottom) of a 144" Corrugated Metal Pipe with concrete	Approx. \$ 50,000	Capital Improvement Project in process
Lavenida culvert repair (CIP 4148)	Line the invert (bottom) of a 120" Corrugated Metal Pipe with concrete	Approx. \$ 215,000	Capital Improvement Project planned to start in 2020
548 Miner	28" x 36" -- CIPP or Slip Line	\$90,000	Planned to fund through the Drainage Impact Fees
548 Miner	28" x 42" -- CIPP or Slip Line	\$210,000	Planned to fund through the Drainage Impact Fees
Camino Pablo at Manzanita	32" x 52" -- Slip Line	\$120,000	Planned to fund through the Drainage Impact Fees
216 Camino Sobrante	24" DIA -- Slip Line	\$55,000	Planned to fund through the Drainage Impact Fees
118 Lombardy Lane - 12' segment	24" DIA -- Replace with HDPE	\$25,000	Planned to fund through the Drainage Impact Fees

Table 3-3 Near-Term planned Storm Drain projects, to be funded outside of the Paving Projects

Table 3-4 summarizes storm drain pipes that will likely need repair or replacement in the next 3 to 10 years. The estimated funding requirements and time frames listed in **Table 3-3** and **Table 3-4** are only preliminary. The listed funding requirements should probably be considered to be a "lower bound" for the funds that will be required. These estimates will be refined through detailed engineering analyses, including CCTV inspections where appropriate, prior to beginning any work.

	Major dimension (Inches)	# of Pipe Segments	Length (Feet)	Cost
Repair/replace Existing Smaller Pipes	8, 10, 12	112	3,865	\$2,645,399
	15	26	1,191	\$827,257
	18	176	7,177	\$5,057,847
	21	7	369	\$276,883
	24	75	2,857	\$2,274,143
	30	10	515	\$466,725
	36	27	945	\$960,626
Increase Capacity	Less than 42	25	1,000	\$1,102,021
Smaller-Pipe Construction Subtotals			17,919	\$13,610,901
Smaller-Pipe Construction contingency				\$3,402,725
Smaller-pipe regulatory permits				\$1,370,000
Repair/Replace Larger pipes	42 to 120	31	2,323	\$10,604,100
Cost for Larger Pipes includes Contingency, Permits, Engineering				
CCTV- pre con for all metal pipes				\$212,000
CCTV non-metal pipes (contingency)				\$535,000
TOTALS		489	20,242	\$29,734,726

Table 3-4 Storm drain pipes that will likely need repair or replacement in the coming years.

Note: All listed funding requirements are in 2019 dollars, with no escalation factor included.

Table 3.5 gives very preliminary estimates for the prioritization of repairs to our public storm drain system over the next 10 years, along with preliminary funding estimates. Low score numbers in the table represent lower-priorities. Scores of 4 and above are considered high risk, and should be repaired as soon as the availability of funds and the permitting process allow. The listed estimates will be refined through planned engineering assessments, including CCTV inspections, but it is clear that significant funding is required in the near term - probably roughly \$9.6 Million within the next few years.

	Engineering Estimates	Recommended Funding	Overall Priority Category
Score 4 and above	\$778,500	\$9,600,000	A: In the next 3 to 5 years
Score 3 to less than 4	\$7,191,232		
PM/CM on DHA	\$897,100		
CCTV	\$748,000		
Score 2 to less than 3	\$7,582,596	\$20,100,000	B: Within the next 5 to 10 years
Score less than 2	\$10,102,961		
non-CMP capacity plus contingency.	\$1,377,526		
50 unknown pipes (see note 1)	\$1,057,095		
	\$29,735,010	\$29,700,000	

Note 1: Approximately 50 pipe segments are of unknown material and size. For estimating purposes, it was assumed that 30 are CMP at an average size of 18" diameter and 40 ft. long.

Table 3-5 Preliminary prioritization of storm-drain-pipe repairs

The scores listed in Table 3-5 indicate an estimated relative overall failure risk for each pipe segment. The scores are calculated based on the type of road over the pipe, pipe size, pipe material, and pipe condition.

For example, the failure of a storm drain pipe under an arterial could cause major disruptions of traffic, and thus contributes to a higher score. Failure of a pipe under a residential road without alternative egress could prevent people from getting to and from their homes, but if the pipe is small enough, the failure could be addressed with a temporary steel plate until repairs are made. At the lower end of the scale, failure of a pipe under a residential road with alternative egress would inconvenience residents, but in many cases would not prevent people from getting to their homes.

It is important to recognize that failures of storm drain pipes are often sudden events, with little warning, unlike the predictable, gradual failure of roads due to normal wear and tear. As a result, it would be desirable for the City to build a reserve for storm drain repairs. This is discussed further in Section 4 below.

Section 4: Overall Funding Requirements

Funding and Expenditures from 2012 through 2019

Since 2012, two separate approaches have been followed in addressing (1) the Arterials and Collectors, and (2) the Residential roads.

Repair and maintenance of the public Arterials and Collectors have been funded through the Annual Pavement Maintenance Program, using funds from Gas Tax, County Sales Tax Return-to-Source funds, Road Maintenance Funds collected from the garbage-collection company, and grants, where grants could be obtained.

Repairs of the public Residential roads have been funded through the add-on ½-cent sales tax approved in 2012, and the two dedicated bond measures approved in 2014 and 2016.

Until recently, the focus for Residential roads was on repairing the worst roads. Many of those roads required complete pavement reconstruction. Full Depth Reclamation was generally used for these roads, as it reduces cost significantly, and also has considerable environmental benefits. With the 2019 paving project, the Residential roads program has moved on to roads that are less distressed, and the repairs are shifting to quicker, simpler, less costly processes, such as milling with a thin overlay and slurry seals (with or without minor patching). As a result, many more roads are being repaired in this year's project than in prior years

Funding for repairs of the public Residential roads and the storm drains that are below or adjacent to those roads was provided in three phases.

- Phase 1 is funded through the 1/2-cent Orinda sales tax (Measure L), which was approved 2012, and continues to early 2023. This tax has been contributing and average of about \$1Million per year to the repair of the public Residential roads. Revenue from this sales tax has been increasing, and is expected to provide approximately \$1.2 Million for the 2019-2020 fiscal year.
- Phase 2 was funded through the \$20 Million general-obligation bond approved in 2014 (Measure J).

- Phase 3 was funded through the \$25 Million general-obligation bond (Measure L) approved in 2016.

Phases 1, 2, and 3 are all fully funded, and have been used in parallel, to repair the city's public Residential roads.

As was discussed in Section 3 above, repairs of the public Residential roads are nearly complete. Repairs for three Residential roads were deferred from the 2019 paving project, and are now planned for a 2020 project. With the completion of those roads, funds from the 2014 and 2016 General Obligation Bonds are expected to have been expended.

Funding for the repair and maintenance of the public Arterials and Collectors, an average of approximately \$1.6 Million per year over the 2012 - 2019 time frame, has been provided through funds from a combination of Gas Tax, County Sales Tax Return to Source funds, Road Maintenance Funds collected from the garbage-collection company, plus several grants, the largest of which (a total of about \$6.7 Million for road repairs, and about \$2.6 Million spent on the North Lane drainage project) are listed in Attachment 6.

Funding for the recent major storm drain repairs came from a combination of grants, the Orinda general fund and other sources, as listed in **Table 3-2**, in Section 3 above.

Table 4-1 below summarizes the expenditures and funding sources for the repair projects for the city's public roads and storm drains from 2012 through 2019. The table shows the total expenditures for the public storm drains on the left side of the table, and for the public roads on the right side of the table. Approximately \$53.7 Million was spent on the Residential roads, approximately \$10.5 Million on the Arterials and Collectors, and approximately \$5.5 Million on two major storm-drain sites. The repair/replacement of many smaller storm-drains, mostly under Residential roads and close to the surface, was performed as a part of the pavement repair projects, within the \$53.7 Million listed above.

Funding Requirements Going Forward

The funding approach for repairs and maintenance of our public roads and storm drains going forward is summarized in **Table 4.2**, below. Again, the table shows

projected funding requirements for repairs of the public storm drains on the left side of the table, and for the public roads on the right side of the table.

Note that future funding requirements described in this document are in 2019 dollars, with no escalation factor included.

Road Maintenance and Repairs, Going Forward:

A future revenue source, not presently specified, will be required, to provide the needed ongoing maintenance of our public roads. As discussed in Section 3 above, the cost to provide routine maintenance for the roads is estimated to be approximately \$2.6 Million per year in the near term, increasing to about \$3.6 Million per year by 2032. This increase is due to (1) the expected year-by-year increase in the cost of maintenance materials and labor, and (2) the fact that wear and tear on a road after 15 to 20 years leads to the need for more expensive repair processes than are needed in the first 10 years.

It seems likely that an average of approximately \$1.6 Million per year will continue to be available for road repairs and maintenance from a combination of Gas Tax, County Sales Tax Return to Source funds, and Road Maintenance Funds collected from the garbage-collection company. Grants for road repairs or maintenance will be pursued where possible, and may add to this total.

The City should proceed as soon as possible with extension of the ½-cent sales tax or an alternative revenue measure expected to generate a similar amount for maintenance of the public roads, so as to ensure that our roads can be maintained at the level that we have achieved.

In the 2019-2020 Fiscal year, the add-on sales tax is projected to provide approximately \$1.2 Million. As a result, we expect that this total combination should be able to provide approximately \$2.8 Million per year in the near term, somewhat more than the \$2.6 Million per year our estimates show would be needed for road maintenance.

However, the present ½-cent sales tax expires in 2023. It is clear that a replacement source of at least \$1 Million per year for road maintenance will therefore be needed

by 2023, when the present ½-cent sales tax expires.

Furthermore, additional funds will likely be needed by 2032, to increase the total to approximately \$3.6 Million per year by that time. It is likely that a ½-cent sales tax would generate significantly more than the present \$1.2 Million per year by 2032 if it was renewed in 2023, but a higher sales tax rate or other types of revenue sources should also be considered.

The City should review projected costs and revenues at least once every four years, beginning in 2020, to evaluate the adequacy of existing funding to meet needs.

When evaluating alternative funding sources, it will also be important to consider that it is likely that the funding requirements would vary significantly from year to year. This is particularly true for the many Orinda roads that are located on slide-prone slopes, but also for our storm drains, where a large-scale failure can result in closure of a road for a significant period of time.

Whatever funding approaches are selected, provisions should be made to develop a Reserve Fund when possible, to prepare for years that may have urgent need for repairs that are more expensive than the planned average expenditure rate. Any revenues from funding sources dedicated to roads beyond current needs should be added to this reserve fund.

Table 4-1: Expenditures and Approved Funding, 2012 through 2020, for Repairs and Maintenance of Orinda's Public Roads and Storm Drains

	Major Public Storm Drains	Smaller Storm Drains Below Roads	Public Residential Roads	Public Arterials and Collectors
2012 through 2020	<p>Approx. \$5.5 Million Funded through a mixture of Grants, city General Fund, and other sources.</p> <p>North Lane and Miner Rd. Projects</p>	<p>Approx. \$3.9 Million total, included as a part of the Residential Paving Projects</p> <p>Repair or Replace smaller pipes close to the surface, as a part of the paving of the respective street.</p>	<p>Phase 1: Approximately \$1 Million per year. Half-Cent Sales Tax -- 2012 Measure L Extends to early 2023, with annual increments Appropriated Annually by the City Council.</p>	<p>Approximately \$1.6 Million per year, through 2020.</p> <p>From a combination of Gas Tax, CCTA Return-to-Source, Garbage truck impact fees, and Misc. grants.</p>
			<p>Phase 2: \$20 Million General Obligation Bond 2014 Measure J -- Fully Funded</p>	
			<p>Phase 3: \$25 Million General Obligation Bond 2016 Measure L -- Fully Funded</p>	

Table 4.2: Funding Requirements, Starting in 2021, for Repair and Maintenance of Orinda's Public Roads and Storm Drains

	Public Storm Drains	All Public Roads
2021 to 2024	<p>Approximately \$9.6 Million Needed by 2021</p> <p>Repairs of Public Storm Drains</p> <p>These funds could be raised by a Bond, Parcel Tax, or other new funding source.</p>	<p>Approximately \$2.6 Million per year in the near term, increasing to about \$3.6 Million per year by 2032.</p> <p>Public Roads - Ongoing Maintenance</p> <p>These funds could, for example, be raised through a continuation of the approximately \$1.6 Million per year from the combination of the Gas Tax, Return-to-Source, Garbage Truck Impact Fees, and Misc. grants, plus an additional source of at least \$1M/year starting 2023 (when the 1/2-cent add-on sales tax expires), increasing to at least \$2M/year by 2032.</p>
Starting 2025	<p>Approx. \$20 Million additional Needed between 2025 and 2030</p> <p>Long-Term ongoing repairs of Storm Drains</p> <p>These funds could be raised through a combination of a bond measure, plus a sales tax, parcel tax, etc.</p>	

Note: The indicated spending profiles are assumed to be in constant, 2019 dollars. It is likely that at least some potential funding sources would provide intrinsic increases in revenue from year to year. Any such increases would reduce the needed tax rate for any subsequent funding increases.

Storm Drain Repairs Going Forward:

As is described in Section 3 above, our system of public storm drains includes many pipes which are ageing, and many have been in place well beyond their expected service life. We need to develop a funding base to allow repair or replacement of pipes that are at risk of failing - or that fail.

As was shown in **Tables 3.4 and 3.5**, in Section 3 above, roughly \$30 Million will likely be needed, to better assess the condition of our public storm drain system, and to repair or replace the pipes that are likely to fail over the next 10 years or so. Our best estimate to date is that \$9.6 Million of that will be needed over the next 3 to 5 years, to do the detailed CCTV inspections and to repair or replace the storm drain pipes found to have the highest risk of failure.

The City needs to proceed to identify new funding sources to address the approximately \$30 Million of anticipated costs for public storm drain repairs over the next ten years, with about \$10 Million of those funds needed in roughly the next 3 to 5 years.

These estimates for the funding requirements are preliminary, and should probably be considered to be a "lower bound" for the funds that will be required. These estimates will be refined through planned engineering assessments, including CCTV inspections, over the next few years.

It is important to understand that the funds needed for storm drain repairs are likely to vary significantly from year to year, as the cost to replace a single large storm drain pipe can easily be more than \$1M. Whatever funding approaches are selected, provisions should be made to develop a Reserve Fund when possible, to prepare for years that may have urgent need for repairs that are more expensive than the planned average expenditure rate.

Section 5: 2019 Paving Program

The City Council awarded a \$12,148,651 contract for the overall 2019 Paving Program to DeSilva Gates Construction LP on June 18, 2019. This project, which consists of the following four major elements, is in process, and is planned to be complete by the end of November, 2019.

1. The Annual Pavement Maintenance Program (CIP # 4119). This part of the project addresses Arterials and Collectors, and is funded through a combination of Gas Tax, Contra Costa County Sales Tax (CCTA) Return to Source funds, and Road Maintenance Funds collected from the garbage collection company.

The Construction Cost Based On Recommended Bid Plus Contingency = \$ 1,557,129 funded as follows:

Funding Sources	Construction Costs
105 Add-On Sales Tax	\$ 64,050
200 Gas Tax	415,000
330 CCTA Return To Source	440,000
335 Road Maintenance (Garbage Co)	638,079
Total Funding for Construction	\$ 1,557,129

2. The Pavement Rehabilitation Project - Measures J and L (CIP # 4120). This part of the project addresses residential streets and some drainage facilities under or adjacent to the streets. This part is funded from proceeds of the 2016 Measure J General Obligation Bond, and the 2012 Measure L Local Add-On Sales Tax.

Construction Cost Based On Recommended Bid Plus Contingency = \$ 12,076,582 funded as follows:

Funding Sources	Construction Costs
105 Add-On Sales Tax	402,540
741 GO Bond 2016	11,674,001
Total Funding for Construction	12,076,582

3. The Glorietta Safe Route to School Project (CIP# 4131). This part of the

project will convert the road shoulder on the west side of Glorietta Blvd near Glorietta Elementary School to a shared-use path for pedestrians and bicycles. It is funded through a CCTA Project-Specific grant and Gas Tax funds.

Construction Cost Based On Recommended Bid Plus Contingency = \$332,130 funded entirely from a CCTA Project Specific Grant.

4. The ADA Transition Plan Project (CIP # 4074). This is an ongoing project which removes barriers to accessibility, by replacing curbs with curb ramps and upgrades existing curb ramps to current standards. This phase of the ADA project includes two new curb-ramp installations at Altarinda/Santa Maria and detectable warning surfaces/truncated domes in the Glorietta Safe Route to School project. It is funded by Gas Tax funds.

Construction Cost Based On Recommended Bid Plus Contingency = \$39,100 and is funded entirely from Gas Tax funds.

Table 5-1 – 2019 Paving Program

Street Name	Begin Location	End Location	Length (FT)	Width (FT)	Area (SF)
ACACIA DRIVE	MANZANITA DR.	CUL-DE-SAC	1,935	22	39,490
ALICE LANE	1000'W/ZANDER DRIVE	DONALD DRIVE	1,100	26	34,430
ALTARINDA CIRCLE	E. ALTARINDA DR.	CUL-DE-SAC	245	25	8,320
ARDITH DRIVE	CORAL DRIVE	TOTTERDELL COURT	1,242	33	41,900
ARDITH DRIVE	TOTTERDELL COURT	WESTOVER COURT	1,145	33	37,630
ARDITH DRIVE	WESTOVER COURT	IVY DRIVE	846	33	29,220
ARDOR DRIVE	LOMA LINDA COURT	CUL-DE-SAC	971	22	27,700
ASPINWALL COURT	EASTWOOD DRIVE	CUL-DE-SAC	610	25	18,170
AVIS COURT	DONALD DRIVE	CUL-DE-SAC	166	26	6,990
BATES BLVD	WARFORD TERR	MUTH DR (N)	2,179	32	73,950
BEL AIR COURT	BEL AIR DR.	CUL-DE-SAC	120	22	5,560
BEL AIR DRIVE	PARKLANE DR.	CUL-DE-SAC	1,380	22	35,590
BRYANT WAY	CUL-DE-SAC	MORAGA WAY	276	29	9,600
CALIFORNIA AVE	PROPERTY LINE AT #65/61	END AT #39 CALIFORNIA AVE.	466	15	11,040
CALVIN COURT	CALVIN DRIVE	CUL-DE-SAC	396	30	11,690
CALVIN DRIVE	CALVIN COURT	END	360	30	9,660
CAMINO DON MIGUEL	MINER ROAD	CAMINO DON MIGUEL	4,485	20	99,990
CAMINO ENCINAS	MORAGA WAY (N)	MORAGA WAY (S)	2,100	30	71,420
CAMINO SOBRANTE	EL RIBERO (SOUTH)	LA ESPIRAL	2,460	21	51,960
CANDLE TERRACE	NEW STREET SECTION	CUL-DE-SAC	295	29	6,470
CARMEN COURT	LA CRESTA ROAD	CUL-DE-SAC	340	20	9,860
CHAPPARAL PLACE	ELTOYONALRD	CUL-DE-SAC	350	20	6,920
CHARLES HILL PLACE	END	CHARLES HILL RD.	487	21	10,520
CHELTON COURT	WHITEHALL DRIVE	CUL-DE-SAC	420	25	11,600
CIELO COURT	IVY DRIVE	CUL-DE-SAC	214	25	7,440
CLAREMONT AVE	CAMINO PABLO	HOLLY LANE	1,930	18	31,840
COACHWOOD TERRACE	DALEWOOD DR.	CUL-DE-SAC	670	32	22,020
CORAL DRIVE	IVY DRIVE	FIESTA CIRCLE	1,115	26	28,100
CORTE HOLGANZA	IVY DRIVE	CUL-DE-SAC	203	27	7,150
CORTE SOMBRITA	IVY DRIVE	CUL-DE-SAC	270	27	9,290
CRANE COURT	VAN TASSEL LANE	CUL-DE-SAC	315	16	7,170
CRESCENT DRIVE	CLAREMONT AVE.	PIEDMONT AVE.	896	19	11,330
CREST VIEW DRIVE	SOUTHERLY PROP LINE 199 VALLEY	CUL DE SAC	914	22	20,510
CREST VIEW DRIVE	VALLEY VIEW DRIVE	CRESTVIEW COURT	1,901	22	44,210
CROSS RIDGE COURT	KITE HILL RD.	CUL-DE-SAC	160	23	4,120
CROSS RIDGE PLACE	KITE HILL RD.	CUL-DE-SAC	147	23	3,100
CROSS RIDGE TERRACE	KITE HILL RD.	END	240	25	5,400
CROWN COURT	IVY DRIVE	CUL-DE-SAC	285	25	10,180

Street Name	Begin Location	End Location	Length (FT)	Width (FT)	Area (SF)
DALE COURT	ALTAMOUNT DRIVE	CUL-DE-SAC	190	20	5,760
DALEWOOD DRIVE	PRIVATE ROAD	LOMBARDY LN	843	36	30,160
DALEWOOD DRIVE	AMBER VALLEY DR	SUNDOWN TERR.	1,047	36	37,910
DALEWOOD DRIVE	SUNDOWN TERR.	CUL-DE-SAC (EAST)	950	36	31,860
DANZA COURT	IVY DRIVE	CUL-DE-SAC	208	27	7,260
DAPHNE COURT	CHARLES HILL ROAD	END	267	15	5,390
DARYL DRIVE	GLORIETTA BLVD	OVERHILL RD	1080	24	30,200
DAVIS ROAD	BRYANT WAY	SOUTHWOOD DR	2,167	22	41,760
DIABLO VIEW DRIVE	MINER RD.	CHARLES HILL RD.	5,110	18	81,230
DIAS DORADOS	CAMINO SOBRANTE	LA CINTILLA	917	17	13,910
E. ALTARINDA DR	ORINDAWOODS DR.	CUL-DE-SAC	1,090	29	36,920
EASTON COURT	HALL DRIVE	CUL-DE-SAC	1,010	25	26,480
EASTWOOD DRIVE	MORAGA WAY	CARISBROOK DRIVE	565	33	19,070
EASTWOOD DRIVE	CARISBROOK DRIVE	CORAL DRIVE	1,031	33	35,250
EL SERENO ROAD	LA ESPIRAL	CUL-DE-SAC	900	14	15,200
EL SUENO	CAMINO SOBRANTE	CUL-DE-SAC	525	15	10,470
EL VERANO	LAS VEGAS	CUL-DE-SAC	620	18	11,970
ESTABUENO	MORAGA WAY	CUL-DE-SAC	1416	24	35,280
FIESTA CIRCLE	IVY DRIVE	IVY DRIVE	2,434	33	81,540
FLEETWOOD COURT	HALL DRIVE	CUL-DE-SAC	723	25	20,110
GLORIETTA COURT	GLORIETTA BLVD	CUL-DE-SAC	742	22	17,720
GREAT OAK CIRCLE	ORCHARD RD.	CUL-DE-SAC	120	22	3,300
GREYSTONE TERRACE	ORINDAWOODS DR.	BULB BOTH ENDS	745	30	25,910
HACIENDA CIRCLE	HACIENDA CIRCLE	ACACIA DR (N)	1,200	19	28,030
HACIENDA CIRCLE	ACACIA DR (S)	END	425	18	11,950
HALL DRIVE	DONALD DR.	END	164	24	4,420
HARRAN CIRCLE	E. ALTARINDA DR.	CUL-DE-SAC	267	26	9,020
HARTFORD ROAD	CHARLES HILL CIRCLE	END	400	15	8,708
HAWKRIDGE TERRACE	ORINDAWOODS DR.	BULB BOTH ENDS	510	29	18,560
HILLCREST DRIVE	MARTHA RD.	OVERHILL ROAD	1,610	23	41,910
IDYLL COURT	MORAGA VIA	CUL-DE-SAC	230	31	7,400
IRONBARK CIRCLE	ORINDAWOODS DR. (W)	ORINDAWOODS DR. (E)	1,988	25	53,940
IRONBARK COURT	IRONBARK CR.	CUL-DE-SAC	466	29	15,990
IRONBARK PLACE	IRONBARK CR.	CUL-DE-SAC	365	29	12,350
IRVING COURT	IRVING LANE	CUL-DE-SAC	208	21	6,500
IRVING LANE	LOMBARDY LANE	VAN RIPPER LANE	1,296	19	26,790
KATRINA COURT	VAN TASSEL LANE	CUL-DE-SAC	275	23	6,580
KELLIE ANN COURT	MEADOW VIEW RD.	CUL-DE-SAC	280	29	11,760
KITTIWAKE ROAD	MANZANITA DR.	CUL-DE-SAC	335	21	7,500
LA CAMPANA	LA ESPIRAL (E)	LA ESPIRAL (W)	2,600	16	55,280
LA CRESTA	PICO COURT	CARMEN COURT	1,450	22	30,360

Street Name	Begin Location	End Location	Length (FT)	Width (FT)	Area (SF)
LA CUESTA	CAMINO SOBRANTE	END	3,080	15	55,030
LA ESPIRAL	VIA HERMOSA	CAMINO SOBRANTE NORTH	1,094	20	21,680
LA ESPIRAL	CAMINO SOBRANTE SOUTH	LAS VEGAS ROAD	4,500	20	97,740
LA NORIA	CAMINO SOBRANTE (S)	CAMINO SOBRANTE (N)	1,530	15	28,280
LA SENDA	LA NORIA	CUL-DE-SAC	330	16	6,860
LA SOMBRA COURT	ARDOR DRIVE	CUL-DE-SAC	505	25	13,920
LAS VEGAS ROAD	MIRA FLORES	VIA LAS CRUCES	1,000	19	17,710
LAS VEGAS ROAD	LA ESPIRAL	MIRA FLORES	1,189	19	22,920
LAS VEGAS ROAD	ST. STEPHENS DRIVE	LA ESPIRAL ROAD	1,050	19	24,790
LAS VEGAS ROAD	VIA LAS CRUCES	ST. STEPHENS DRIVE	320	19	9,620
LAVENIDA DRIVE	MORAGA WAY	B.C. @ 90 DEGREE	932	24	23,930
LOMA VISTA DRIVE	EL DORADO LN	EL TOYONAL (EAST)	1,586	18	32,030
LOMBARDY LANE	MINER ROAD	TARRY LANE	1,136	23	26,820
LONGVIEW TERRACE	ORCHARD ROAD FRONTAGE	BULB BOTH ENDS	331	20	8,870
MANZANITA DRIVE	CAMINO PABLO	CREEK BRIDGE	580	25	9,020
MARSTON ROAD	MONTE VISTA RD.	CUL-DE-SAC	1,025	15	19,260
MARTHA ROAD	GLORIETTA BLVD.	HILLCREST RD.	500	33	16,280
MEADOW PARK COURT	GLORIETTA BLVD.	END	1,200	25	28,890
MEADOW VIEW ROAD	1300' E/ MEADOWVIEW ROAD	CUL-DE-SAC (ON HILARY LN)	150	25	3496
MEADOWLANDS COURT	MORAGA WAY	CUL-DE-SAC	128	24	4,020
MINER ROAD	CAMINO PABLO	CAMINO DON MIGUEL	3375	25	84,375
MORAGA VIA	RUSTIC WAY	RHEEM BLVD	834	19	17,920
NONIE ROAD	TARA RD	END	185	15	3,400
NORTHWOOD COURT	NORTHWOOD DR.	CUL-DE-SAC	300	22	6,460
OAK DRIVE	1000' W/MORAGA WAY	CUL-DE-SAC	1,421	18	26,070
OAK DRIVE	MORAGA WAY	1000' W/MORAGA WAY	1,000	20	21,100
OAK LANE	MINER RD.	END	230	13	3,930
OLD CAMINO PABLO	END - WEST OF CLAREMONT	EAST - EAST OF CLAREMONT	394	18	7,040
OLD CAMINO PABLO	NORTH LANE	ARDILLA ROAD	1,139	20	28,470
ORCHARD ROAD	CORTE BOMBERO	MORAGA WAY	382	21	8,370
PARKLANE DRIVE	GLORIETTA BLVD. (W)	GLORIETTA BLVD. (E)	1,800	22	47,290
PICO COURT	LA CRESTA ROAD	CUL-DE-SAC	285	20	8,210
PIEDMONT AVENUE	CRESCENT DR.	CLAREMONT AVE.	365	18	6,800
PUEBLO COURT	IVY DRIVE	CUL-DE-SAC	247	24	7,390
RICHARD COURT	VALLEY VIEW DRIVE	CUL-DE-SAC	278	15	8,180
RIDGE GATE RD	VILLAGE GATE RD	CUL-DE-SAC	550	25	15,170
RISA COURT	IVY DRIVE	CUL-DE-SAC	670	25	19,700
RUSTIC WAY	MORAGA VIA	CUL-DE-SAC (ALSO END)	563	16	9,570

Street Name	Begin Location	End Location	Length (FT)	Width (FT)	Area (SF)
SAGER COURT	DONNA MARIA WAY	CUL-DE-SAC	357	25	11,300
SANTA LUCIA	CAMINO DON MIGUEL	CUL-DE-SAC	435	20	9,440
SANTA MARIA WAY	ALTARINDA RD	SANTA MARIA WAY (PRIVATE)	300	37	10,730
SCENIC COURT	SCENIC DR.	CUL-DE-SAC	240	17	4,440
SILVEROAK TR	SUNDOWN TR.	CUL-DE-SAC	657	29	21,180
SILVERWOOD DRIVE	TAHOS RD	CITY LIMIT	208	29	5,950
SLEEPY HOLLOW LANE	SOUTHERLY EDGE NORMANDY LANE	TARRY LANE	1,693	22	43,230
SNOWBERRY LANE	TARRY LN	CUL-DE-SAC	670	20	17,160
SOUTHWAITE COURT	MORAGA WAY	CUL-DE-SAC	822	33	28,760
SOUTHWOOD DRIVE	MORAGA WAY	TARA RD	1,600	20	36,110
ST. JAMES COURT	VAN RIPPER LANE	CUL-DE-SAC	790	19	18,620
STANTON AVE	STANTON CT.	CUL-DE-SAC	980	30	24,730
STANTON COURT	STANTON AVE.	CUL-DE-SAC	535	25	11,480
STEIN WAY	OAK RD	MORAGA WAY	1,040	30	31,200
STEIN WAY	KNICKERBOCKER LN.	OAK RD	1,390	30	35,760
SUNNYSIDE LANE	VAN TASSEL LANE	END	1,780	23	42,400
TOTTERDELL COURT	ARDITH DRIVE	CUL-DE-SAC	538	25	16,700
VAN TASSEL LANE	LOMBARDY LANE	CENTERLINE VAN RIPPER	1,635	20	36,220
VAN TASSEL LANE	CENTERLINE VAN RIPPER	CENTERLINE SUNNYSIDE	1,271	20	30,000
VAN TASSEL LANE	CENTERLINE SUNNYSIDE	TARRY LANE	874	20	19,000
VIA CALLADOS	SUNNYSIDE LANE	CUL-DE-SAC	340	24	10,420
VIA FLOREADO	ST. STEVENS DR.	VIA FLOREADO STA. 2890	2,890	25	72,400
VIA FLOREADO	VIA FLOREADO STA. 2890	LAS VEGAS	1,070	17	21,700
VIA LAS CRUCES	HONEY HILL RD.	LAS VEGAS RD.	730	29	23,480
VILLAGE GATE RD	ORINDA WOODS	RIDGE GATE RD	1320	25	33,900
VISTA DEL MAR	CAMINO DON MIGUEL	DEL MAR COURT	815	25	20,590
WANDA LANE	HIDDEN VALLEY RD.	MUTH DR.	1,020	25	27,850
WASHINGTON LANE	SLEEPY HOLLOW LANE	END	533	21	11,640
WATCHWOOD RD	VILLAGE GATE RD	WATCHWOOD CT	750	25	20,100
WHITEHALL DRIVE	686' E/MORAGA WAY	ARDITH DRIVE	686	33	22,670
ZANDER DRIVE	RHEEM BLVD.	ZANDER COURT	979	29	28,840

NOTE: The following road segments were removed from the originally-approved 2019 paving project list, because of construction conflicts on the roads: El Toyonal, Oak Flat Road, and a segment of La Espiral from La Vuelta to 91 La Espiral. All are tentatively scheduled for the 2020 or 2021 paving projects.

Section 6: Conclusion

To conclude this report, there are a few key points that merit repeating for emphasis. While a great deal has been accomplished, there are still several facets of the long-range plan for Orinda's roads, drainage, and related infrastructure that must be attended-to over the next several years and beyond.

The current available funding sources will carry the original public Residential road repair program to a very successful level of completion. By the of 2019 program, Orinda's Pavement Condition Index will achieve an average level of about 85, or "Very Good" condition; one of the best city-wide ratings in the area. Additionally, as stated in the report, the current paving projects have enabled the repair of many storm-drains under and adjacent to the Residential road upgrades.

However, in spite of all these successes, it must be noted that the effort is not complete. Current funding does not address the repairs and rebuilding required for some remaining Arterials and Collectors or projected repairs needed for a large number of storm drain pipes and culverts. As described in this report, the Citizens Infrastructure Oversight Commission continues to recommend that Orinda pursue additional funding efforts to address this unmet need.

Additionally, the City must bear in mind that roads and drainage systems wear out over time. This report continues to note that Orinda must identify and develop a long-term road and infrastructure program that creates sources of sufficient funds to maintain our road and drainage systems to a level that reflects the improvements achieved over the last several years. It would be extremely disappointing to every citizen of our city, if the money and effort that has been spent to date, were allowed to "wash away" due to lack of proper care and maintenance.

With respect, this report is submitted to the City Council by the Citizens Infrastructure Oversight Commission for your review and approval.

Attachments

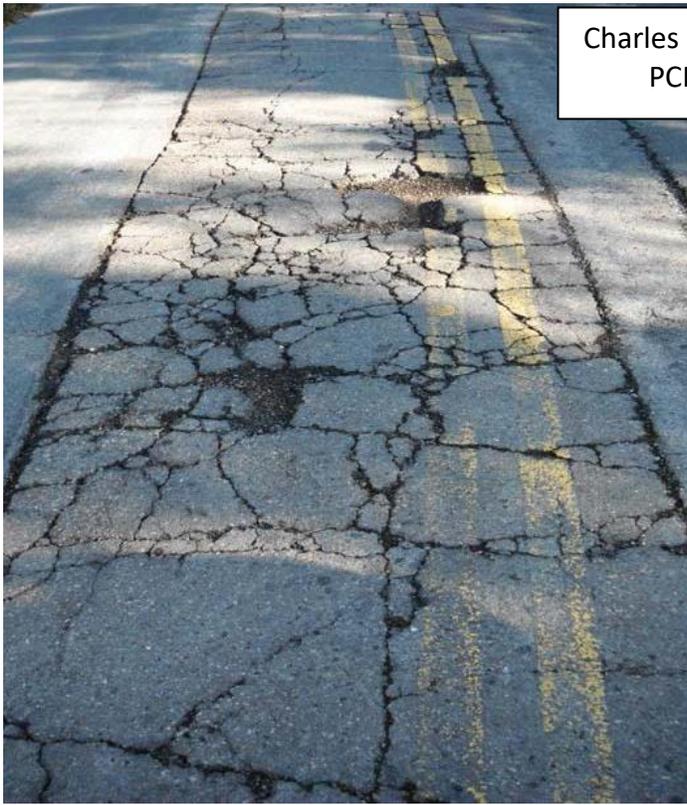
1. Attachment 1 – Pavement Condition Index (PCI) Ratings Definition with Images of Varying PCI Ratings and Impact of Drain Failure
2. Attachment 2 –City of Orinda Pavement Management Program Policy and Criteria for Selecting Streets for Repair Using Measure L Sales Tax Fund, Approved January 21, 2014
3. Attachment 3 – CIOC Annual Report to the City Council, 2017
4. Attachment 4 -- Glossary of Terms. Summary of terms used in this report
5. Attachment 5- Roads and Drains Projects History
6. Attachment 6 - - Grants Applied for and Awarded, to Support Orinda Roads and Drains Projects
7. Attachment 7-- Storm Drains Likely to Need Near-Term Repairs
8. Attachment 8 -- Arterials and Collectors Sill in Need of Repairs
9. Attachment 9 -- Description of the Full Depth Reclamation Process
10. Attachment 10 - Description of the StreetSaver Program
11. Attachment 11 - Development of Orinda's Road and Drainage Repairs Plan

Attachment 1

Pavement Condition Definitions

PCI Range	Condition	Description
81-100	Very Good	Little or no distress.
71-80	Good	Little or no distress, with the exception of utility patches in good condition, or minor to moderate hairline cracks; typically lightly weathered.
51-70	Fair	Light to moderate weathering, light load-related base failure, moderate linear cracking.
26-50	Poor	Moderate to severe weathering, moderate levels of base failure, moderate to heavy linear cracking.
0-25	Very Poor	Extensive weathering, moderate to heavy base failure, failed patches, extensive network of moderate to heavy linear cracking.

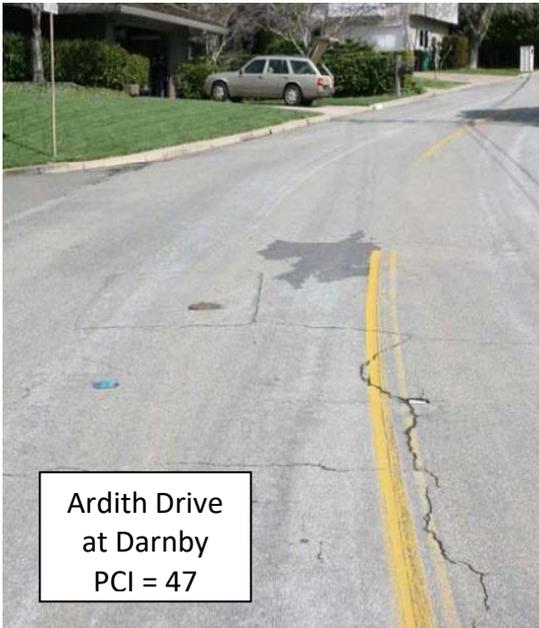
Please see the photographs below for examples of roads at various PCI ratings.



Charles Hill Road
PCI = 8



Greenwood
Court PCI =15



Ardith Drive
at Darnby
PCI = 47



Rheem Blvd
PCI = 70



Claremont Avenue
PCI = 80

Attachment 2

City of Orinda
Pavement Management Program (PMP)
Policy and Criteria for Selecting Streets for Repair Using Measure L Sales Tax Funds
Approved January 21, 2014

Policy

With the adoption of the Measure L, 0.5% Sales tax, the City has an additional source of funds for road repair and reconstruction. This Measure represents the first phase of a multi-year plan to repair all the City's streets. Even with this additional funding, current budgetary constraints and the poor and deteriorating condition of Orinda's roads require the City to apply budgeted funds only to those residential roads *where the most benefit for the most residents can be obtained*. With the Measure L funds the City has committed to make repair of the residential roads a priority. The goal of this program is to distribute the residential roads to be repaired throughout the City.

The Program

Annually, funds permitting, roads to be repaired will be selected as follows:

1. The street segments must be classified as *residential*.
2. The street segments must be among the *worst residential roads*, which means the Pavement Condition Index (PCI) for that segment of road as calculated by the StreetSaver program is less than or equal to 25, and with ride quality (roughness of ride) considered using an acceptable objective measure.
3. The most *heavily used residential road segments*, based on actual traffic counts, will be repaired first. The road segments will be rank in descending order of traffic volume, with the highest volume road segments forming a pool of candidate roads for the annual program.
4. Other factors, such as equitable distribution of the projects throughout the community and underground utility repair schedules, will be considered in selecting the annual list of road segments to be repaired.

Attachment 3

**Citizens' Infrastructure Oversight Commission
Annual Report to the Orinda City Council
June, 2019**

Attached by Reference

The Annual Report can be found on the City's Web Site under the Roads and Infrastructure Tab.

Attachment: Road and Drainage Repairs Plan - Updated Dec 17, 2019 (1980 : CIOC Road and Drainage Plan)

Attachment 4

Glossary of Terms

ADT - Average Daily Traffic This is a measure of the frequency of use of a road and is used to help determine which repair project will benefit the greatest number of residents.

Annual Report An annual report made by the CIOC to the Council detailing activities regarding the pavement management program over the past year.

Associated Drainage This includes existing pipes, culverts and gutters under and adjacent to the roadway surface. Note that the City has limited authority to address drainage that passes through private property (including PG&E property).

Bond and Tax Measures The sales tax [2012 Measure L] and bond measures [2014 Bond Measure J and 2016 Bond Measure L] approved by the voters to repair public residential roads.

Drain - Storm Drain Any of the drains used to carry off surface water.

CIOC - Citizens Infrastructure Oversight Commission A commission established by the City Council to recommend a long-term infrastructure plan for their review and approval, monitor the pavement management program, and report achievements and plans, at least annually.

City The City of Orinda

FDR-Full Depth Reclamation A process for rebuilding seriously damaged roads, in which the existing pavement is removed, pulverized and blended with cement to create a stable base for new pavement.

Gas Tax A portion of the taxes collected on each gallon of gas and returned to the City for our use.

MTC - Metropolitan Transportation Commission Transportation planning, financing, and coordinating agency for the nine-county San Francisco Bay Area.

Overlay Process where new pavement [can be thick or thin] is placed over existing pavement, to repair the road and extend the service life.

PCI - Pavement Condition Index Estimation of the overall condition of a portion of a road, determined by inspection. PCI issued by Staff, the CIOC and the Council to decide the order for work to be done and type of repair to be used.

Pavement Management Plan The plan developed by city staff and the CIOC and approved by the City Council for the repair of all public roads, including the associated storm drains.

PMP - Pavement Management Program The program for the repair and maintenance of City roads.

Roads Repair Policy The policy recommended by the CIOC and adopted by the City Council and used to determine the selection of roads to be repaired.

Private Roads Roads owned by anyone other than the City of Orinda [except Hwy-#24] where it is the responsibility of the owner(s) to repair and maintain both the road and any associated storm drains

P-TAP - Pavement Management Technical Assistance Program Reports prepared by an outside engineering firm, typically every two years on the odd-numbered years. The report includes assessments of pavement conditions for the city's roads, and projects repair and maintenance costs for the city's public roads.

Public Roads Any road owned or within accepted roadway easement that is maintained by the City [except Hwy #24].

RTS-Return to Source Funds from the Countywide Transportation Sales Tax returned to the City to fund transportation projects. This 1/2-cent sales tax program, managed by the Contra Costa Transportation Authority, is also known as CCT Measure J. This sales tax is completely separate from the 1/2-cent Orinda sales tax (Orinda's Measure L).

Slurry and Crack Seal A process where existing pavement has any cracks sealed and a coat of slurry [asphalt emulsion] applied to prevent water intrusion and extend the service life.

StreetSaver The software program developed for the Metropolitan Transportation Commission, to estimate remaining pavement lifetime and the cost to bring up to "very good" condition. Allows staff to make informed decisions regarding the maintenance and repair of roads.

Attachment 5

BACKGROUND: Development of Orinda's Road and Drainage Repairs Plan

In 1985, the newly-incorporated City of Orinda inherited approximately 93 miles of paved, publicly maintained roads [26 miles of arterials and collectors, plus 67 miles of public residential roads] from Contra Costa County. The City also includes about 90,000 linear feet (about 17 miles) of storm drain pipes and culverts.

Unfortunately, Orinda's available funds going forward were not sufficient to address all of the maintenance and repair needs for the new city's public roads and drains. Within the existing budget, the City was able to spend an average of \$2.3 Million per year on street maintenance and repairs. Approximately \$0.8 Million annually was drawn from the City's General Fund and the Garbage Franchise Fees and used for routine street maintenance (potholes, striping, sweeping, drainage, etc.). Approximately \$1.5 Million annually was made available for pavement rehabilitation and reconstruction, drawn from dedicated sources of funds -- Gas Tax, the countywide transportation sales tax Return-to-Source funds, and grant revenues from county and federal sources averaged over the 10-year period.

In October, 2004, the City Council created the Citizen's Infrastructure Committee, with a two-year charter to assess the status of the city's public roads and storm drains and quantify the funding requirements for repairs and maintenance.

In July, 2006, this group submitted a report with a detailed analysis of the city's infrastructure. The committee projected the 20-year cost of repairing all publicly maintained roads in Orinda to be approximately \$ 72Million, and estimated cost to repair all of the city's drains to be approximately 13 Million. They also analyzed a reduced-scope effort, limiting repairs to the most frequently-used roads (at least 500 average daily trips) and only the most

critical drains. They estimated that this more limited effort would still require approximately \$60 Million.

Based on this assessment, a series of funding measures was put on the ballot, beginning with a \$69.1 Million bond measure in 2006. This bond measure failed to receive the number of votes required for approval. A subsequent \$58.6 Million bond measure in 2007 also did not receive sufficient support.

In 2007, the City Council formed a new advisory group, the Citizens Infrastructure Oversight Commission [CIOC]. The charter of the new commission was to provide oversight of spending on Orinda's roads, to continue analysis of the nature and extent of the problem, including funding requirements, and to provide recommendations on how funds made available for road and drain repairs should best be allocated.

Considering budget limitations, the City Council, on the recommendation of the CIOC, decided in 2009 to focus repairs on the most-travelled roads; the arterials, collectors and school routes. The available funds (primarily gas tax, Return-To-Source funds from the County sales tax, and federal, state, and regional grants) were focused on repairs of the city's most heavily travelled roads. As a result, the condition of these roads began to improve. However, the condition of the city's Residential roads continued to decline.

In July 2012, the CIOC and city staff developed a 10 Year Plan that estimated the cost to repair the city's public roads and the associated storm drains to be approximately \$58 Million. Implementation of the plan required a series of funding measures anticipated to be accomplished over four phases, projecting completion of the repairs in 2022.

The first funding phase was funded through the passage in 2012 of Measure L, a one-half cent sales tax increase that provides approximately \$1 Million each year. The second and third funding phases were funded through the passage in 2014 of Bond Measure J (\$20 Million) and the passage in 2016 of Bond Measure L (\$25 Million). These three measures, combined, allow the City to raise \$10 Million (over 10 years) from the sales-tax measure, plus \$45 Million through the two general-obligation bond issues, with all these funds to be used for the

repair public Residential roads and the associated drains.

At the same time, the City continued repairs and maintenance of the Arterials and Collectors through the County Return-to-Source sales tax and gas tax funds, supplemented by some federal, state, and regional grants.

In the Nov. 17 and Dec. 15, 2015 City Council meetings, the Council reviewed recent reports from CIOC, and concluded that the goals for pavement quality should be made more stringent. While increasing near-term repair costs, long-term maintenance costs are expected to be reduced by more than the increase in repair costs.

In March, 2016, the City received the final report from Shaaf and Wheeler, an engineering firm hired to evaluate Orinda's storm drain system to make estimates of drain-system repairs that may be required, including prioritization and cost estimates for the repairs. In the March, 2016, update of the Road and Drainage Repairs Plan the CIOC and city staff recommended the introduction of another funding phase, to fund the modified pavement-quality goals and the increased storm-drain-repair requirements.

A detailed timeline of this development and implementation of the Road and Drainage Repairs Plan is listed below

Timeline: Roads and Drains Milestones and Projects

1985	City of Orinda Incorporated - - City inherits 92.5 miles of public roads
Aug., 1990	City Council establishes policy regarding conversion of private roads to public roads Resolution Number 56-90
1992 - 2012	Approximately \$1.5 Million annually was available for pavement rehabilitation and reconstruction, drawn from dedicated sources of funds -- Gas Tax, the countywide transportation sales tax Return-to-Source funds, and grant revenues from county and federal sources averaged over the 10-year period.
October, 2004	City Council created the Citizen's Infrastructure Committee City Council Staff Report, Agenda Item G-2 10/9/2004 Agenda Topic: Formation of Citizens' Committee to Develop a Strategic Plan for Reconstruction and Maintenance Infrastructure
July, 2006	Citizens Infrastructure Committee Report released. Conclusions included: - 20-year cost of repairing all publicly maintained roads in Orinda approximately \$72Million - Estimated cost to repair drains ~\$13 Million - Limiting repairs to the most frequently-used roads (at least 500 average daily trips) and the most critical drains would still require ~ \$60 Million, total. City Council Staff Report , Agenda Item G-2 7/18/2006 Agenda Title: Roadway, Storm and Water main Improvements, Adopt Ordinance 06-03 setting Election for Infrastructure Bond Measure City Council Passed and Adopted Ordinance 06-03 on 7/18/2006
Nov., 2006	Measure Q, \$60 Million general-obligation bond measure fails (64.4% in favor) City Council Staff Report , Agenda Item I-2 12/19/2006 Agenda Title : Infrastructure Discussion
March, 2007	City Council establishes the Citizen's Infrastructure Oversight Commission (CIOC) Resolution Number 04-07, Passed and adopted by the City Council on 2/7/2007
June, 2007	Measure E, \$60 Million general-obligation bond measure fails (63.4% in favor) City Council Staff Report , Agenda Item G-5 6/19/2007 Agenda Title: Canvass of Votes for June 5,2007, Special Municipal Election Resolution 36-07, Accepting Canvass of votes for the June 5, 2007, Special Municipal Election

Dec., 2007	<p>City Council updates and clarifies composition and charter of the CIOC Resolution Number 78-07 In the Matter of : Policies Governing the Citizens’ Infrastructure Oversight Commission Adopted by the City Council of the City of Orinda at a meeting of Council Held on 12/18/2007</p>
Aug., 2010	<p>City Council establishes Neighborhood Initiated Road Repair Policy City Council Staff Report , Agenda Item I-2 , 8/7/2010 Agenda Title: Review and Approve the Neighborhood Initiated Road Repair Policy</p>
May, 2012	<p>Contract award for the Glorietta Storm Drain Improvements Project. Total project cost \$1.65 Million. City Council Staff Report, Agenda Item I-1 Agenda Title: Award of the Construction Contract for the Glorietta Storm Drain Improvements Project No.3025</p>
July, 2012	<p>10-Year Roads Repair plan established. - Plan called for 4 funding phases, to raise a total revenue of \$58.4 Million (2011 dollars) - Pavement Condition Index Goal: Ave PCI =70 Gas Tax and Return-To-Source (Arterial s, etc.) \$10 Million, over 10 years Phase 1 (2012): 1/2-cent sales tax (estimated to be \$6.7 Million, to March, 2023) Phase 2 (2016): \$20M Bond or parcel tax Phase 3 (2020): \$20M Bond or parcel tax Phase 4 (2022): Extension of 1/2-cent sales tax (Approx. \$0.7 Million/yr, starting 2024) City Council Staff Report: Agenda Item I-2, 7/12/2012 Agenda Title: Proposed 10-year Roads and Drains Repair and Maintenance Plan Resolution Number 38-12, Approving a 10 Year Roads and Drains Repair and Maintenance Plan</p>
July, 2012	<p>Contract awarded for repair of segments of Orinda Way, Rheem Blvd, Camino Sobrante, Overhill Road, and Valley View Drive. Project total cost \$ 1.64 Million. City Council Staff Report, Agenda Item G-3, 7/17/2012 Agenda Title: Award of Construction Contract for the City of Orinda 2012-2013 Pavement Rehabilitation Project Number 3098 to Bay Cities Paving & Grading Inc., of Concord</p>
July, 2012	<p>Full-depth reclamation (FDR) was introduced, with initial use on Camino Sobrante, Overhill Road, and Valley View Drive, to reduce cost while retaining high quality.</p>
Oct., 2012	<p>Manzanita Rd Bridge replacement project awarded. Total Cost \$ 3, 275,800 Federal Fund : \$2,849,823 Transportation Impact fees \$274,393 Gas Tax: \$63,801 EBMUD Reimbursement: \$105,626 City Council Staff Report, Agenda Item G-3 10/16/2012 Agenda Title: Award of the Construction Contract for the Manzanita Drive Bridge Replacement Project Number 0043</p>

- Nov., 2012 1/2-cent sales tax approved by voters
 - Funds first available in April, 2013. Sales tax authorization ends in 2023
 - Funds created ~ \$1 Million per year
Resolution Number 65-12 , Adopted December 4, 2012
- Dec 2012 Condition of arterials and collectors continues to improve.
 April, 2009 # of Arterial/Collector segments with ave PCI < 50 = 43
 Dec., 2011 # of Arterial/Collector segments with ave PCI < 50 = 25
 Dec., 2012 # of Arterial/Collector segments with ave PCI < 50 = 19
- Dec., 2012 Tarabrook sinkhole developed December, 2012
 - - Repair completed last 2013 at a cost of approximately \$1.44 Million
Resolution number 71-12, Adopted by the City Council on 12/7/2012
Resolution number 74-12 Adopted by the City Council on 12/18/2012
Resolution number 08-13 Adopted by the City Council on 2/5/2013
Resolution number 12-13 Adopted by the City Council on 2/19/2013
Resolution number 17-13 Adopted by the City Council on 3/5/2013
Resolution number 26-13 Adopted by the City Council on 4/9/2013
City Council Staff Report Agenda Item G-5, May 20, 2014, Project Acceptance of the Tarabrook Drive Storm Water Improvements, City Council Accepted the Project on 5/20/2014
- Jan., 2014 CIOC recommends, and City Council approves, a policy in which residential roads be repaired starting with the "Busiest and Worst First"
City Council Staff Report, Agenda Item I-3 1/21/2014
Agenda Title: Approve Policy and Criteria for Selecting Streets for Repair Using Measure L 0.5% Sales Tax Funds
- April, 2014 10-Year Roads Repair plan updated and revised
 - Plan called for 4 funding phases to raise a total revenue of \$66 Million (2014 dollars)
 Gas Tax and Return-To-Source (Arterial s, etc.) \$9.5 Million, over 10 years
 Phase 1 (2012): 1/2-cent sales tax Approx. \$10 Million thru March, 2023
 Phase 2 (2014): \$20M Bond
 Phase 3 (2018): \$25M Bond
 Phase 4 (2022): Extension of 1/2-cent sales tax plus undefined additional funds for maintenance Approx. \$1.3 Million in 2023
City Council Staff Report, Agenda Item I-1 , 4/22/2014
Agenda Title: Adopt Resolution Approving 2014-10 Year Road and Drainage Repairs Plan
Resolution Number 13-14 Approving 2014-10 Year Road and Drainage Repairs
- Nov., 2014 Bond Measure J, \$20 Million General Obligation Bond approved

Nov., 2014

2015 Paving Programs Approved

- Length of roads repaired:	Residential 1.1 Miles	Arterials, etc. 2.9 Miles
	<u>Approved Plan</u>	<u>Final Cost</u>
- Arterials and Collectors	\$1.21 Million	\$ 0.69 Million
- Measure L 1/2-cent sales Tax	\$0.98 Million	\$ 0.91 Million
- Measure J (2014) Bond	<u>\$5.05 Million</u>	<u>\$ 5.02 Million</u>
	TOTAL \$7.24 Million	\$ 6.62 Million

City Council Staff Report I-3 11/5/2104

Agenda Title: Approval of list of Streets and Authorization to Proceed with Project Design for the FY 2015 Measure J Pavement Project

Oct., 2015

2016 Paving Programs Approved

- Length of roads repaired:	Residential 8.1 Miles	Arterials, etc. 0.7 Miles
	<u>Approved Plan</u>	<u>Final Cost</u>
- Arterials and Collectors	\$ 1.9 Million	\$ 0.89 Million
- Measure L 1/2-cent sales Tax	\$ 0.9 Million	\$ 1.04 Million
- Measure J (2014) Bond	<u>\$ 6.2 Million</u>	<u>\$ 5.26 Million</u>
	TOTAL \$ 9.0 Million	\$ 7.19 Million

City Council Staff Report, Agenda Item I-2 10/6/2015

Agenda Title: Approval of List of Streets and Authorization with Project Design for FY 2016 Measure J and L Pavement Project

Nov 2015

Award of an Engineering Design Services Contract for the 2016 and 2017 Annual and Measure J & L Pavement Rehabilitation Projects

City Council Staff Report Agenda Item I-4 11/17/2017

Agenda Title: Award of an Engineering Design Services Contract for the 2016 and 2017 Annual and Measure J & L Pavement Rehabilitation Projects

March, 2016

Storm Drain Plan completed, supported by Schaaf and Wheeler, Civil Engineers. Report describes status of Orinda's storm drain system and details key storm drain repair requirements.

City Council Staff Report, Agenda Item: G-2 3/24/2016

Agenda Title: Presentation of Final Draft Storm Drain Plan

Attachment: Road and Drainage Repairs Plan - Updated Dec 17, 2019 (1980 : CIOC Road and Drainage Plan)

March, 2016

Roads and Drains Plan Update

- Plan now calls for 5 funding phases, to raise a total revenue of \$88 Million (2014 dollars)

The staff report projected a cost increase of approx. \$13 Million to support this change. Further funding requirements were identified for repairs of key storm drains and conduits as well as remaining repairs to Arterials and Collectors. These funding requirements were combined into a new Phase 4.

- Gas Tax and Return-To-Source (Arterial s, etc.) \$10 Million, over 10 years
- Phase 1 (2012) 1/2-cent sales tax -- Funded
- Phase 2 (2014) \$20M Bond -- Funded
- Phase 3 (2016) \$25M Bond -- Bond measure passed in Nov., 2016
- Phase 4 (2018) \$22 Million new revenue
- Phase 5 (2022) Extension of 1/2-cent sales tax plus undefined additional funds for maintenance Approx. \$1.3 Million in 2023

City Council Staff Report, Agenda Item I-1 3/15/2016

Agenda Title: Adopt Resolution 21-16 Approving Road and Drainage Repairs Plan (As Updated in 2016), Dated March 15,2016

May, 2016

Contract awarded for the North Lane Storm Drain Project in the amount of \$2,298,827
- Approximately 1,300 feet of 60inch reinforced concrete storm drain pipe installed
- The new pipe works in addition to the pre-existing metal pipe/open-channel system
- 75% of construction cost funded by the Federal Emergency Management Agency
- The remaining 25 % was split between the City of Orinda and EBMUD.

City Council Staff Report, Item G-3 5/17/2016

Agenda Title: Award of Construction Contract for the North Lane Storm Water Mitigation Project N. 4070 to Bay Cities Paving & Grading, Inc. of Concord

Nov., 2016

The City Council agreed to change road repair goals to "Average PCI = 70, and no road with PCI < 50".

Nov., 2016

Bond Measure L, \$25 Million General Obligation Bond approved

Nov., 2016

CIOC status report: Reduced estimate of total repair costs, from \$47 Million prior estimate, to \$45 Million new estimate
1) Low oil prices and savings from the economy of scale of our large project;
2) Accelerating the rehabilitation work to be done faster than originally scheduled;
3) Net savings on the bids from 2015 and 2016 Paving project.

Nov., 2016

2017 Paving Programs approved: Length of roads to be repaired: Residential 10.5 Miles Arterials, etc. 0.9 Miles

	<u>Approved Plan</u>	<u>Final Cost</u>
- Arterials and Collectors:	\$ 0.82 Million	
- Measure L 1/2-cent sales Tax	\$ 0.99 Million	
- Measure J (2014) Bond	<u>\$ 10.49 Million</u>	
TOTAL	\$ 12.30 Million	

(Project in not complete, so final cost is not available)

Attachment: Road and Drainage Repairs Plan - Updated Dec 17, 2019 : CIOC Road and Drainage Plan

- Nov., 2016 2018 Paving Program - Preliminary plan approved - Length of roads to be repaired:
Residential 13.7 Miles Arterials, etc. 1.3 Miles
- | | |
|--------------------------------|-------------------------|
| | <u>Preliminary Plan</u> |
| - Arterials and Collectors: | \$ 0.60 Million |
| - Measure L 1/2-cent sales Tax | \$ 1.05 Million |
| - Measure J (2014) Bond | \$ 0.95 Million |
| - Measure L (2016) Bond | <u>\$ 12.17 Million</u> |
| | TOTAL \$ 14.76 Million |
- City Council Staff Report, Agenda Item I-1 11/1/2016**
Agenda Title: Approval of list of Streets for Pavement Rehabilitation in 2018 and 2019 for the Annual, Measure J and Measure L Pavement Rehabilitation Projects and Status of the City's Road and Drainage Repairs Plan
- Nov., 2016 2019 Paving Program - Preliminary plan approved:
- Length of roads to be repaired: Residential 25.4 Miles Arterials, etc. 1.5 Miles
- | | |
|--------------------------------|-------------------------|
| | <u>Preliminary Plan</u> |
| - Arterials and Collectors: | \$ 1.05 Million |
| - Measure L 1/2-cent sales Tax | \$ 1.00 Million |
| - Measure L (2016) Bond | <u>\$ 13.18 Million</u> |
| | TOTAL \$ 15.23 Million |
- City Council Staff Report, Agenda Item I-1 11/1/2016**
Agenda Title: Approval of list of Streets for Pavement Rehabilitation in 2018 and 2019 for the Annual, Measure J and Measure L Pavement Rehabilitation Projects and Status of the City's Road and Drainage Repairs Plan
- March., 2017 Bond Measure L, \$25 Million General Obligation Bond approved
Resolution No. 27-17 3/21/2017
In the Matter of:
RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ORINDA AUTHORIZING THE ISSUANCE AND SALE OF GENERAL OBLIGATION BONDS IN AGGREGATE PRINCIPAL AMOUNTS NOT TO EXCEED \$10,000,000 (ELECTION OF 2014, SERIES B) AND \$25,000,000 (ELECTION OF 2016, SERIES A) BY NEGOTIATED SALE; APPROVING THE FORM OF AND EXECUTION AND DELIVERY OF ONE OR MORE PAYING AGENT AGREEMENTS, BOND PURCHASE CONTRACTS, CONTINUING DISCLOSURE AGREEMENTS, AND TAX-EXEMPT GOVERNMENTAL BONDS TAX COMPLIANCE AND CONTINUING DISCLOSURE COMPLIANCE GUIDELINES; APPROVING THE FORM OF AN OFFICIAL STATEMENT DESCRIBING THE BONDS AND DISTRIBUTION THEREOF; AND AUTHORIZING OFFICERS OF THE CITY TO TAKE NECESSARY ACTIONS AND TO PREPARE NECESSARY DOCUMENTS IN CONNECTION THEREWITH
- May., 2017 **City Council Staff Report, Agenda Item G-5 5/16/2017** Award of Construction Contract for the 2017 Annual and Measure J & L Pavement Rehabilitation Project No. 4114/4115 to Bay Cities Paving & Grading Inc.

- May., 2018 **City Council Staff Report, Agenda Item G10, 5/15/2018**
Agenda Title: Award of Construction Contract for the 2018 Measure J & L Pavement Rehabilitation Project No. 4118 and Town of Moraga Pavement Project number 4132 to Bay Cities Paving & Grading, Inc., of Concord, California. The City Council award a construction contract for the 2018 Pavement Rehabilitation Measures J & L Pavement Rehabilitation Project No. 4118 and Town of Moraga Pavement Rehabilitation Project No. 4132 to Bay Cities Paving & Grading, Inc., of Concord, California for the total amount of \$15,101,659.80:
- March., 2019 **2018 Pavement Management Plan Update P-TAP Round 19 Final Report**
This report by provides a review of the 2018 Pavement Management System Update performed by PEI. PEI inspected and performed quality control on the City-maintained streets. The average PCI for the arterials and collectors was 71, and the overall PCI for the City was 75. With the inclusion of the planned 2019 projects the PCIs would be at 73 and 85 respectively.
- June., 2019 **City Council Staff Report, Agenda Item G6, 6/18/2019**
Agenda Title: Award of a Construction Contract to DeSilva Gates Construction LP for the: 2019 Annual and Measure J & L Pavement Rehabilitation Projects (Project Nos. 4119 and 4120 respectively); Glorietta Boulevard Safe Route To School Improvement (Project No. 4131); and ADA Transition Project (Project No. 4074)
The City Council awarded a \$12,148,651 contract for overall 2019 Paving Program to DeSilva Gates Construction LP on June 18, 2019. The project, consisted of the following four major elements:
1. The Annual Pavement Maintenance Program (CIP # 4119).
 2. The Pavement Rehabilitation Project - Measures J and L (CIP # 4120)
 3. The Glorietta Safe Route to School Project (CIP# 4120)
 4. The ADA Transition Plan Project (CIP # 4074)
- June., 2019 **2018 Citizens Infrastructure Oversight Commission Annual Report to the Orinda City Council** This report prepared by the COIC updated the status of the roads and drains repair program. The overall average PCI of the public roads had improved to 75 and drainage system improvements have also been accomplished.
- August., 2019 **Storm Drains Plan - Drake Haglan and Associates**
This report by Drake Haglan and Associates, focused on inspections for poor-condition of large diameter pipes, providing updated cost estimates for recommended repairs of those pipes and a prioritized list of repairs and potential improvements.

Attachment 6

Grants Applied for and Awarded, to Support Orinda Roads and Drains Projects

Name	Agency	Date of Grant	Amount of Grant(s)
Manzanita Bridge Rehab	DOT	5/4/2012	\$2,514,097
Camino Pablo/Santa Maria	CCTA	2/5/2011	\$75,000
	CCTA	9/17/2014	\$371,463
	Sub-Total		\$446,463
Camino Pablo Paving	CCTA	3/19/2014	\$100,000
	CCTA	11/17/2014	\$1,943,000
	Sub-Total		\$2,043,000
Moraga Way Pedestrian School Pathway	DOT	6/1/2012	\$166,000
Ivy Dr Pavement	DOT	5/18/2015	\$552,000
Rubberized Hot Mix Asphalt used for Pavement Rehabilitation	Cal Recycle	11/29/2017	350,000
Orinda Way Paving to be done in FY 2022	FHWA	7/2017	620,000
Total Grants, Roads			\$6,691,560
North Lane Storm Water Mitigation	Cal EMA	12/30/2010	\$145,125
	EBMUD	1/1/2011	\$45,687
	Cal EMA	8/29/2011	\$32,250
	Cal EMA	12/17/2013	\$1,088,105
	Cal EMA	5/18/2015	\$21,466
	Cal EMA	9/9/2015	\$883,112
	EBMUD	11/17/2015	\$365,000
Total Grants, Storm Drains			\$2,580,745
Total Grants			\$9,272,305

Attachment: Road and Drainage Repairs Plan - Updated Dec 17, 2019 (1980 : CIOC Road and Drainage Plan)

Attachment 7

Additional Information on the Orinda Storm Drain System

The City of Orinda has roughly 17 miles of storm drain pipes and culverts associated with our public roads. The storm drain system was investigated in detail as part of the Citizen's Infrastructure Commission's (CIC) investigations, as reported in the July, 2006 CIC report. More recently, the Schaaf and Wheeler engineering firm performed a study of the larger drains in the system, as reported in their March, 2016 Storm Drain Plan. An update of that study was performed in 2019 by Drake Haglan Associates, as reported in the August, 2019 Culvert Prioritization Program Report.

A more comprehensive study, including the large number of smaller drains in the system, is in process. As a part of this comprehensive study, the City staff is working to assure that the most up-to-date information about our storm drains is fully documented in a Geographic Information System (GIS), which integrates the information about each individual pipe with a map showing the location of the pipe.

Based on the latest GIS data, Orinda's storm drain system includes about 17 miles of public storm drain pipes and about 28 miles of private storm drain pipes. These pipes are made from various materials including Corrugated Metal Pipes (CMP), Reinforced Concrete Pipes (RCP), and various plastic pipes (HDPE, PVC etc.).

From the available data, the primary concern is the metal pipes, as most of these pipes have been in place well beyond their design life, and therefore many may need to be replaced. The other pipe materials have much longer lifetimes, and are thus less likely to be at risk.

City staff has proposed an extensive project to perform CCTV inspections of many pipes in the public storm drain system, which would provide a more accurate assessment of the status of these pipes, the risk of failures, and the cost of any needed repairs.

Storm-Drain Pipe Repairs

The table below summarizes the storm-drain pipes that will likely need repair or replacement in the next 10 years or so.

	Major dimension (Inches)	# of Pipe Segments	Length (Feet)	Cost
Repair/replace Existing Smaller Pipes	8, 10, 12	112	3,865	\$2,645,399
	15	26	1,191	\$827,257
	18	176	7,177	\$5,057,847
	21	7	369	\$276,883
	24	75	2,857	\$2,274,143
	30	10	515	\$466,725
	36	27	945	\$960,626
Increase Capacity	Less than 42	25	1,000	\$1,102,021
Smaller-Pipe Construction Subtotals			17,919	\$13,610,901
	Smaller-Pipe Construction contingency			\$3,402,725
	Smaller-pipe regulatory permits			\$1,370,000
Repair/Replace Larger pipes	42 to 120	31	2,323	\$10,604,100
Cost for Larger Pipes includes Contingency, Permits, Engineering				
	CCTV- pre con for all metal pipes			\$212,000
	CCTV non-metal pipes (contingency)			\$535,000
TOTALS		489	20,242	\$29,734,726

Storm-Drain Repair Priorities

The table below summarizes the initial prioritization for repairs of the higher-risk public storm-drain pipes in the Orinda system. Low numbers represent lower-priorities. Priorities of 4 and above are considered high risk, and should be repaired as soon as the availability of funds and the permitting process allow.

	Engineering Estimates	Recommended Funding	Overall Priority Category
Score 4 and above	\$778,500	\$9,600,000	A: In the next 3 to 5 years
Score 3 to less than 4	\$7,191,232		
PM/CM on DHA	\$897,100		
CCTV	\$748,000		
Score 2 to less than 3	\$7,582,596	\$20,100,000	B: Within the next 5 to 10 years
Score less than 2	\$10,102,961		
non-CMP capacity plus contingency.	\$1,377,526		
50 unknown pipes (see note 1)	\$1,057,095		
	\$29,735,010	\$29,700,000	

Note 1: Approximately 50 pipe segments are of unknown material and size. For estimating purposes, it was assumed that 30 are CMP at an average size of 18" diameter and 40 ft. long.

Regulatory Reviews for Storm Drain Repair Projects

For storm drains that convey creeks (typically the larger diameter pipes) the State Water Board and State Dept. of Fish & Wildlife have jurisdiction and therefore will require the City obtain permits. The permits typically require some preliminary engineering work, to show the replacement or repair plan and how it would impact the creek. For major creeks, this may require environmental and biological consultants to survey the work area. The process can take one year or more to prepare the initial permit applications and then revise the design, if needed to satisfy the State agencies. Therefore the engineering work is coordinated with the permit requirements and final design usually occurs near the end of the permit process. Ideally, the permit is secured, with the conditions, prior to advertising for bids for the construction work.

Storm Drain Distribution by Road Classification

The table shows the estimated cost of repairing or replacing all of the higher-risk pipes, with a preliminary distribution of those costs according to the type of road over the respective drains. This information can be used, along with the

prioritization table above, when preparing final plans for repair work.

Principal Arterial	\$3.8M
Minor Arterial	\$3,.4M
Collector	\$5.5M
Local with sole access	\$2.5M
Local more than one access	\$14.5M
TOTAL	\$29.7M

Public and Private Storm Drain Pipes

The table below summarizes the total lengths of the various types of Orinda's Public and Private storm drain pipes.

	# of Segments	Length (LF)	Length (mi)
<u>Public pipes</u>			
CMP and Steel (unlined)	487	19,123	3.6
RCP	417	33,500	6.3
HDPE	263	14,850	2.8
Other (incl. lined CMP, PVC, etc.)	302	20,724	3.9
Subtotal	1,469	88,197	16.7
<u>Private pipes</u>			
CMP and Steel (unlined)	800	65,600	12.4
RCP	369	33,500	6.3
HDPE	213	9,400	1.8
Other (incl. lined CMP, PVC, etc.)	418	36,500	6.9
Subtotal	1,800	145,000	27.5
TOTALS	2,431	233,197	44.2

Attachment 8

Arterials and Collectors Still in Need of Repairs

As discussed above, nearly all of our public Residential roads and a large fraction of our Arterials and Collectors have been repaired in the last several years. Detailed lists generated by the StreetSaver software, show the remaining repairs and recommended preventive maintenance for Orinda's full public road system. The results are summarized in the table below:

Needs Analysis - 2020 - 2024: After 2019 paving project			
Remaining Repairs		Preventive Maintenance	
Residential Roads	\$1,305,939	Residential Roads	\$7,201,990
Arterials/Collectors	\$10,440,061	Arterials/Collectors	\$2,423,955
Full System	\$11,746,000	Full System	\$9,625,945

The repairs for the Residential roads (about \$1.3 Million) will be completed with the remaining funds from the 2016 Bond measure and some of the ½-cent add-on sales tax. The remaining road maintenance and repairs funds for the next several years will be dedicated to completing repairs of the Arterials and Collectors.

The StreetSaver analysis projects about \$10.4 Million of repairs for the Arterials and Collectors remain. Clearly, the time required to complete these repairs is constrained by the available budget; approximately \$2.8 Million per year.

Starting with the Needs Analysis generated by Street Saver, Orinda's staff will generate a recommended list of Arterials and Collectors to be repaired each year. Staff will consider the repair priorities indicated through the Street Saver program and the estimated repair costs for those street segments. Based on this list, and considering such factors as how groupings of segments can minimize overall cost and minimize impacts to the citizens using the roads, staff will generate a list of recommended streets for repair that would be consistent with the anticipated available funds for that time frame.

Attachment 9

Description of the Full Depth Reclamation Process

Full Depth Reclamation (FDR) construction consists of four (4) phases:

- 1) Pulverize and mix pavement in-place
- 2) Removal of the top few inches for grading;
- 3) Re-mix material with cement
- 4) Paving new asphalt.

1) Pulverizing and Mixing In-Place: The existing roadway will be pulverized and mixed in place to a depth of 12 to 16 inches. Using large specialty FDR machines, the older and failed pavement surface will be mixed with underlying fill and native soil to develop a new base material for the reconstructed pavement. This “green” technology reduces the need to off-haul dozens of truckloads of roadway material by reusing the existing pavement materials and underlying soils. This technology also substantially reduces the need for truckloads of new material. This recycled material is safe for cars to drive on shortly after the FDR machine has passed through the roadway section. Please drive slowly as there may be loose gravel-like material on the recycled surface.

2) Material Removal: The next phase will remove some of the mixed recycled material to make room for the new asphalt. The amount of pavement to be removed will be 3 to 5 inches deep. The surface will be rough, please continue to drive slowly as there may be loose gravel-like material on the surface. Temporary rock ramps will be installed at each driveway to maintain access for all residents.

3) Re-Mixing with Cement: The remaining recycled material will then be re-mixed with the addition of cement and water in order to stabilize and strengthen the material, making it a sturdy base for the new pavement section. The surface will be exposed generally up to one week before the first layer of new asphalt is placed. Also, the contractor will sweep any excess material and maintain temporary access to driveways. Although the surface will be fairly smooth at this

point in the construction, please continue to drive slowly as there may be loose gravel-like material on the recycled surface.

4) Paving: The asphalt overlay is a liquid asphalt binder premixed with aggregate, which is placed and compacted on the street surface. To avoid tracking asphalt material onto your driveways and property, please pay attention to construction signs and wait until the street has been cleared for access.

Attachment 10

The StreetSaver Software and Its Application in Pavement Management Programs

Orinda uses the StreetSaver program as an aid to determine how to best use the available funds to repair and maintain our public roads. Quantitative data used in the StreetSaver analysis is provided by the Pavement Management Technical Assistance Program (P-TAP), a program developed by the Bay Area Metropolitan Transportation Commission (MTC).

The P-TAP program provides federal dollars to help Bay Area cities and counties stretch their budgets by defraying about 80% of the cost for consultants to physically inspect a city's roads, and to assess their condition. Arterial and Collector streets are assessed every two years, and Residential streets are assessed every 4 years. Quantitative assessments of the pavement condition, the Pavement Condition Index (PCI) for each road segment are entered into the StreetSaver program for analysis. The results of these assessments and recommendations developed by the StreetSaver program are then reported in a very detailed P-TAP report.

Based on the P-TAP report, City staff prepares lists of street segments and their recommended repairs or maintenance that are consistent with the available budget for the year. These lists are presented to the CIOC for review and discussion. Approved lists are then presented to the City Council for their review, adjustment where necessary, and approval.

Based on those approved lists, the City Staff prepares bid packages, selects vendors, and awards contracts.

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The paragraphs below give additional information about the StreetSaver program. This material was copied from: *MTC Pothole Report: Bay Area Roads at Risk; Sept., 2018*

Attachment: Road and Drainage Repairs Plan - Updated Dec 17, 2019 (1980 : CIOC Road and Drainage Plan)

All 109 Bay Area jurisdictions — and hundreds of other public agencies nationwide — now use MTC’s StreetSaver® pavement management software to inventory their street networks, determine maintenance needs and devise maintenance programs based on available revenues.

Building on pavement preservation principles established by the Federal Highway Administration, MTC developed a software package called StreetSaver to assist local agencies in maintaining their roadways. StreetSaver integrates the three main pavement preservation components: preventive maintenance, minor rehabilitation (non-structural) and routine maintenance activities, as well as pavement rehabilitation and reconstruction.

Today, all 109 Bay Area jurisdictions — and more than 350 additional public and private agencies nationwide and internationally — use StreetSaver. The software allows cities and counties to inventory their street networks, determine their maintenance needs and devise maintenance programs based on available revenues. The software develops a list of recommended treatments and prioritizes treatments based on a weighted effectiveness ratio. Within the constraints of each jurisdiction’s budget, the software selects the most cost-effective treatments for implementation and defers the remainder.

As with any other software package, StreetSaver’s effectiveness depends on the input of reliable data. So for StreetSaver to work, public works staff must promptly enter updated information about maintenance treatments once the treatments have been applied.

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The following text provides further insight into the StreetSaver software. This material was copied from: *2018 PMP Update, P-TAP Round 19 Final Report, March, 2019*

StreetSaver manages a collection of related data organized for easy storage and retrieval. The StreetSaver program includes a database comprised of several sets of related data ("tables") that contain information about the street network in the jurisdiction. This information includes pavement condition, the available maintenance/rehabilitation treatments and their costs, and the history of the network. Based on this information, budget analyses are performed. A budget analysis allows the user to project network maintenance and rehabilitation needs,

and costs to evaluate the consequences of various budget allocation alternatives. Alternatives can be evaluated in terms of maintenance and rehabilitation that can actually be performed, future pavement condition, and deferred costs.

When a pavement section is identified for maintenance or rehabilitation, a user defined network-level cost category for a pavement of that functional class, type and condition is used to determine the needed funds for that section. For sections falling within the preventive maintenance category (PCI 100 - 70), a time sequence is used to identify the appropriate treatment and cost.

For those sections falling into rehabilitation (PCI <70), the PCI is used to determine the repair category for a pavement section.

The repair category is combined with functional classification (as a surrogate for traffic) and surface type (as a surrogate for structural adequacy) to identify the appropriate treatment and cost. The treatment and cost identified for the section is a network-level budget planning treatment and is generally considered as a cost category for budgeting purposes rather than an actual treatment. Some sections will require more money than estimated, some will require less. A project-level analysis is used to determine the actual treatment to be used for a given section based on condition, structural capacity and other factors.

The funding needs are summed for all sections needing work for each year of the analysis period to determine the annual budget needs. The needs analysis provides a list of sections needing work over the selected analysis period and an estimate of the funds needed. In StreetSaver, this analysis period is generally 5 years. It identifies maintenance and rehabilitation needs without considering funding constraints, i.e. the Needs Analysis is unconstrained by the available budget. StreetSaver identifies candidate sections and funds needed to provide the level of service to meet agency-defined goals.

The StreetSaver Needs Analysis provides information on the condition of the network over the analysis period with and without application of the treatments. Sections of pavements that provide the best service for the least money are then selected as those that should be repaired first. StreetSaver provides a ranked listing based on this cost-effectiveness analysis. StreetSaver also shows the condition with and without treatment, the estimated costs for each section, the calculations used to determine the ranking, and a listing of sections not recommended for treatment.

Attachment 11

Pavement Management Approaches

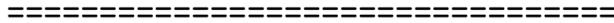
To determine how to best use the available funds for pavement repair and maintenance, the City must first have quantitative measures of pavement condition. A key element of this process is the Pavement Management Technical Assistance Program (P-TAP), a program developed by the Bay Area Metropolitan Transportation Commission (MTC). This program uses federal dollars to help Bay Area cities and counties stretch their budgets by:

- Implementing, updating and maintaining pavement management databases
- Providing accurate pavement condition data to city councils, county supervisors or other local decision makers
- Providing engineering design assistance for pavement rehabilitation projects
- Supporting management of non-pavement street and road assets such as signs, storm drains, curbs and gutters, traffic signals and street lights

Through this program, Orinda pays only a small fraction (about 20%) of the cost for consultants to physically inspect our roads, and to assess their condition. Arterial and Collector streets are assessed every two years, and Residential streets are assessed every 4 years. Quantitative assessments of the pavement condition, the Pavement Condition Index (PCI) for each road segment are entered into the StreetSaver program for analysis. The results of these assessments and recommendations developed by the StreetSaver program are then reported in a very detailed P-TAP report.

Based on the P-TAP report, City staff prepares lists of street segments and their recommended repairs or maintenance that are consistent with the available budget for the year. These lists are presented to the CIOC for review and discussion. Approved lists are then presented to the City Council for their review, adjustment where necessary, and approval.

Based on those approved lists, the City Staff prepares bid packages, selects vendors, and awards contracts.

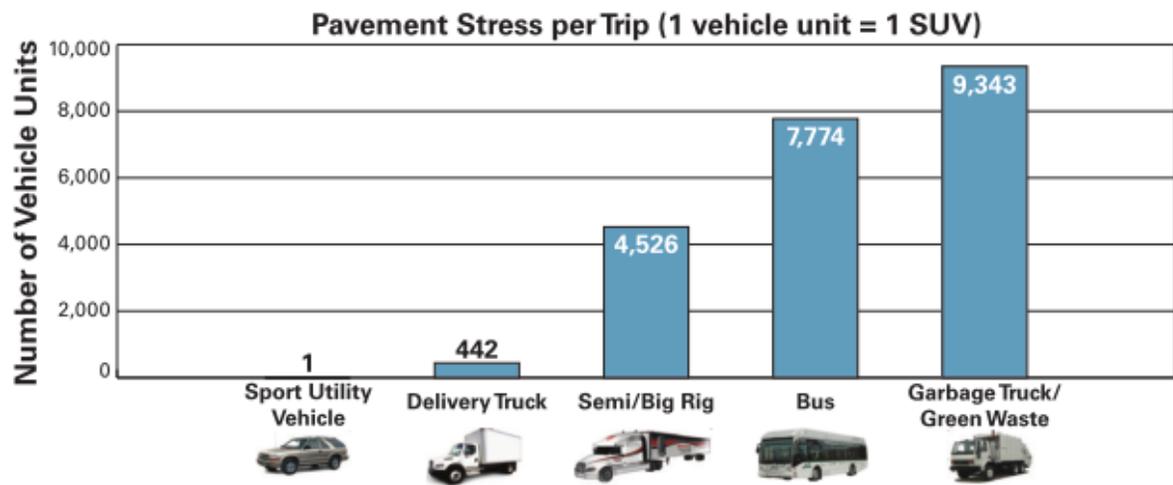


The following text and figures provide further insight into the Pavement Management Process. This material was taken from: *MTC Pothole Report: Bay Area Roads at Risk; Sept., 2018*

Streets and roads take a beating under the weight of traffic. The first sign of distress on surface pavement is usually cracking. While cracks may not immediately alter ride quality, they expose the sub-base of the roadway to water leaking through the surface layer. In time, water erodes pavement strength and cracks begin to lengthen and multiply, forming interconnected networks of cracks referred to as “alligator cracking.” At this point, the pavement is no longer able to sustain the weight of traffic. It then disintegrates, forming depressions more familiarly known as potholes. Since potholes result from damage to the roadway’s sub-base, once they appear — regardless of whether or not they are patched — the roadway will continue to deteriorate until it reaches a failed state.

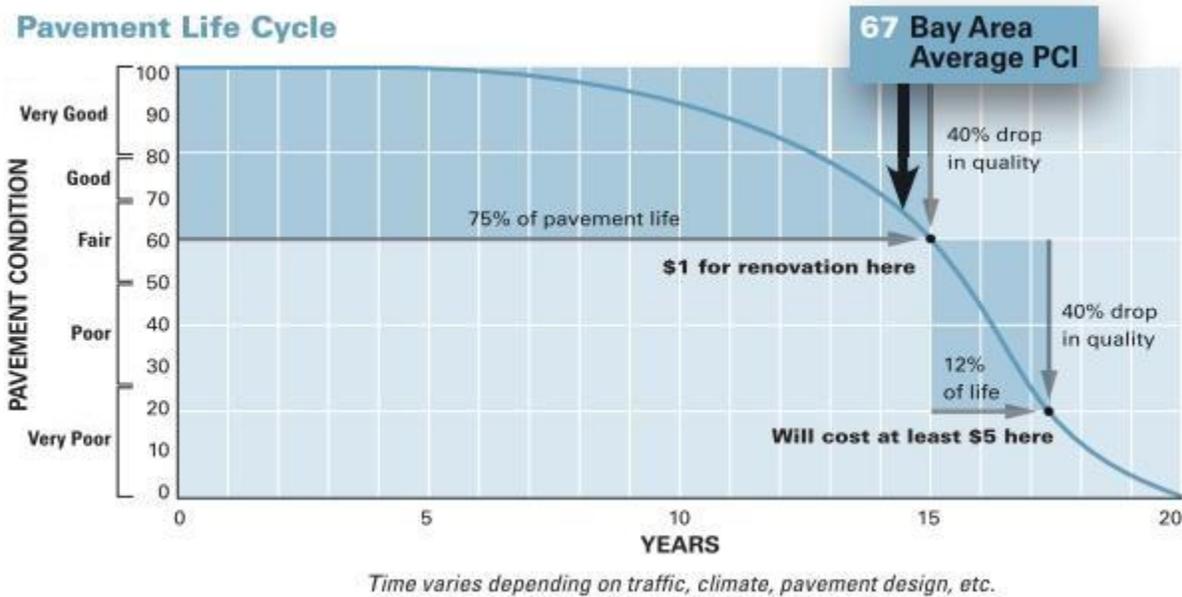
Heavy vehicles such as trucks and buses put far more stress on pavement than does a car. A bus exerts more than 7,000 times the stress on pavement than does a typical sport utility vehicle. And a garbage truck exerts more than 9,000 times as much stress as an SUV. Not surprisingly, cracks appear more quickly on streets with large traffic volumes and/or heavy use by trucks and buses.

Relative Impact of Vehicle Types on Pavement Conditions



Source: Pavement Engineering, Inc.

About 36 percent of the Bay Area’s local road mileage consists of arterial and collector roadways, which are heavily used by both trucks and buses. The pounding that pavement receives from trucks and buses can be especially problematic in more rural parts of the Bay Area, where many roadways have not been designed to accommodate heavy vehicles but which are nonetheless used by growing numbers of trucks carrying goods between farms and cities.



The most cost-effective way to maintain a roadway is to address cracks in the pavement as soon as they surface. Just as regular oil changes are far less expensive than a complete engine rebuild, it is five to 10 times cheaper to properly maintain streets than to allow them to fail and then pay for the necessary rehabilitation (see chart above). Deteriorating pavement carries private costs as well. A 2018 report by TRIP, a nonprofit organization that researches, evaluates and distributes technical data on highway transportation issues, estimated that drivers in the San Francisco-Oakland area pay an extra \$2,992 in annual operating costs for each vehicle as a result of roadway conditions.

The Bay Area has long emphasized the importance of early intervention through the adoption of proactive maintenance strategies, better education in pavement preservation concepts, and regional policies that give cities and counties incentives to practice pavement preservation on their street and road networks. MTC’s Plan Bay Area 2040 reaffirms this overall approach by conditioning regional funds for local street and road maintenance not only on need and level of system

usage but also on preventive-maintenance performance. By contrast, cities and counties that spend almost all of their paving budgets to fix only a handful of failed roadways, instead of proactively maintaining a much larger percentage of their network that is still in good condition, are practicing what is known as a “Worst First” strategy. With this approach, the good roads for which maintenance is deferred soon fall into disrepair and require more extensive and costly treatments.

Bay Area governments’ support for the preventive-maintenance philosophy — and their shift away from the ineffective “Worst First” strategy — has helped cities and counties squeeze the most out of existing resources. Indeed, the quality of Bay Area pavement (on average) actually increased slightly from 2011 to 2017, despite the fact that growth in maintenance revenues failed to keep pace with increases in the cost of paving materials.

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The following figures provide further insight into the Pavement Management Process. This material was taken from: *2018 PMP Update, P-TAP Round 19 Final Report, March, 2019*

PAVEMENT MAINTENANCE & REHABILITATION UNIT COSTS

Treatment	Arterial (Cost/ Sqyd)	Collector (Cost/ Sqyd)	Residential (Cost/ Sqyd)
Crack Seal (LF)	\$2.21	\$1.83	\$1.61
Light Maintenance	5.82	5.82	7.76
Heavy Maintenance	24.42	21.29	17.59
Light Rehab.	51.97	49.66	33.00
Heavy Rehab.	75.00	65.00	60.00
Full Depth Reclamation	90.00	80.00	70.00

*All Costs Include Surface Preparation, Design and Inspection

Treatment Descriptions

TREATMENT CATEGORY	TYPICAL TREATMENT
Light Maintenance	<ul style="list-style-type: none"> • Slurry Seal • Micro-Surface • Fog Seal • Scrub Seal
Heavy Maintenance	<ul style="list-style-type: none"> • Chip Seal • Cape Seal • Slurry Seal with Digouts • Micro-Surface with Digouts • Thin Maintenance Overlay (TMO)
Light Rehab.	<ul style="list-style-type: none"> • Overlay (2" and under) • Thin Mill and Fill
Heavy Rehab.	<ul style="list-style-type: none"> • Overlay (greater than 2") • Thick Mill and Fill • Cold-In-Place Recycling • Pulverize and Resurfacing
Reconstruct	<ul style="list-style-type: none"> • Full Depth Reclamation