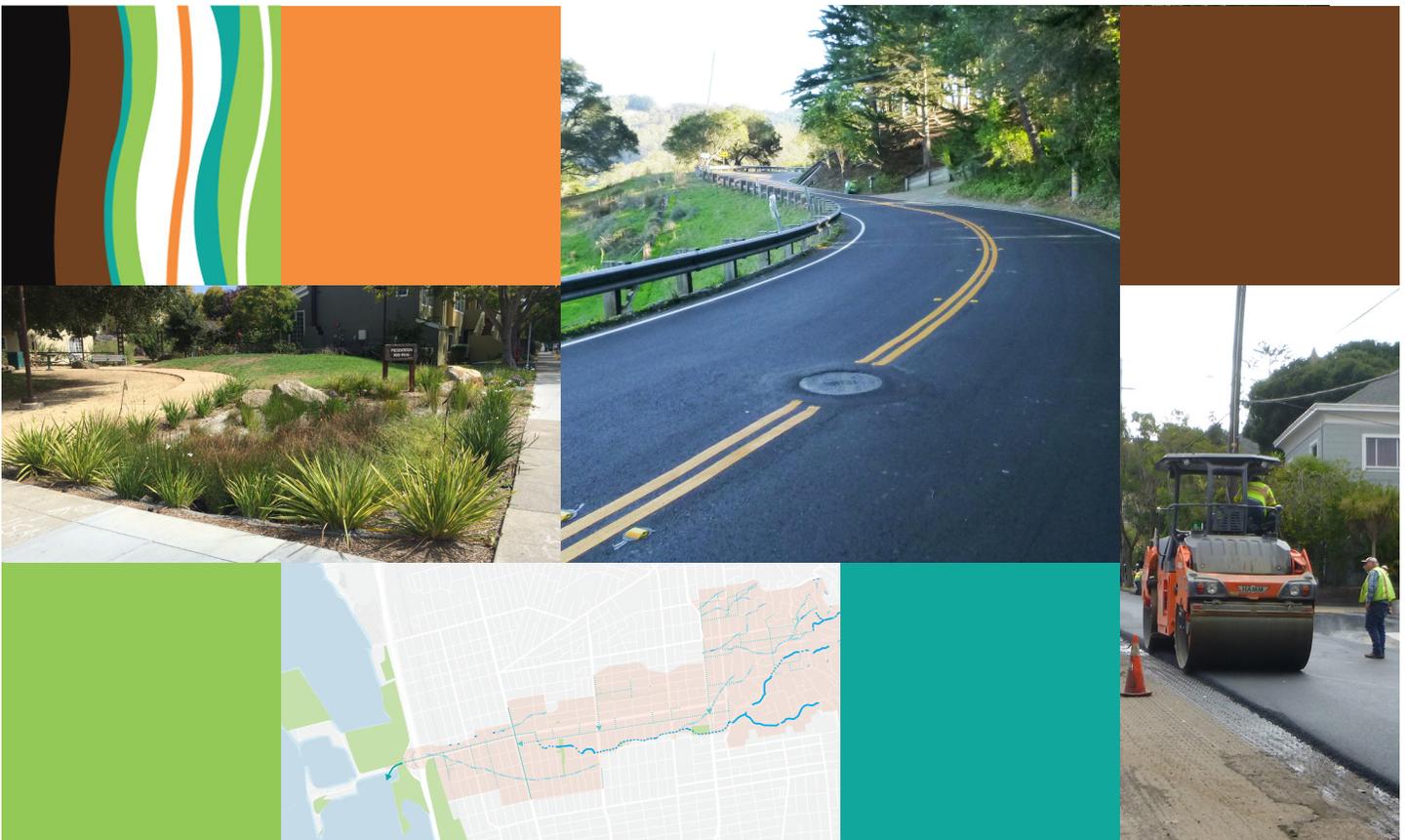


City of Berkeley
Measure M
Integrated Streets Investment Plan
Mid-Program Review | November 2015



Investing in Berkeley

Message from the Director of Public Works

With the support of the citizens of Berkeley, and the passage of Measure M, we have embarked on an ambitious schedule to improve the streets and watersheds in the City of Berkeley over a five-year period from 2014 to 2018. In 2013, the Public Works Department developed a five-year implementation plan to support the following community goals: maintain quality, safe streets, reduce flooding in our neighborhoods, and improve the sustainability and overall quality of life in Berkeley. To support these goals, the implementation plan includes the following objectives:

- Significantly ramp up street paving from approximately 4 miles per year to an average of 10 miles per year to improve over 50 miles of streets by the end of 2018.
- Improve the pavement condition on approximately 8 miles of arterial streets, 12 miles of collector streets and 30 miles of residential streets.
- Implement a range of new, cost-effective pavement treatments to stretch limited infrastructure dollars, avoid costly street reconstruction and extend the life of street surfaces up to 5 to 10 years.
- Install a wide variety of new green infrastructure demonstration projects around the City to gain valuable lessons learned about these new technologies.
- Improve 23 miles of bikeway streets in accordance with the adopted Bicycle Plan.

Now in year three of the five-year program, this report provides a Mid-Program Review to share accomplishments to date and plans for the future.



I welcome your input. Let us know how we are doing and how we can improve!

Thank you to the citizens of Berkeley for your continued support to help keep Berkeley a great place to live.

Phil Harrington
Acting Director, Public Works Department
City of Berkeley



In 2014, Measure M funds enabled the City of Berkeley to pave Wildcat Canyon, significantly improving bicycle and vehicular safety on this favorite scenic drive near Tilden Park.



About Measure M

Measure M Background

In November 2011, the City Auditor released a report concluding that Berkeley's streets were in an "at risk" condition and that approximately 134 (or 62%) of the City's 216 linear miles of streets needed to be resurfaced or reconstructed. The report estimated \$54 million would be needed over five years to achieve an average pavement condition rating of "Good". One year later, Berkeley voters passed Measure M, authorizing the City of Berkeley to invest \$30 million in bond funds in street repaving/rehabilitation and related green infrastructure when appropriate. In 2013, the City of Berkeley Public Works Department developed an implementation plan to invest \$30 million in paving and green infrastructure over five years.

Program Overview and Goals

The purpose of the Measure M bond funding is to 1) significantly accelerate street paving and rehabilitation consistent with the Street Rehabilitation and Repair Policy and Five-Year Paving Plan; and 2) install green infrastructure as defined in the Watershed Management Plan as part of the street work described in item 1 above, when appropriate.

During the summer of 2013, the Public Works Commission (PWC) in collaboration with Community Environmental Advisory Commission (CEAC), Transportation Commission (TC) and Parks & Waterfront Commission (P&WC), sponsored a community engagement process to gather public input on priorities for Measure M investments. During this process community members established the following goals to guide Measure M investments and prioritization criteria described further on page 4:

- Maintain streets in good, safe condition for all users
- Reduce neighborhood flooding
- Contribute to a more sustainable environment

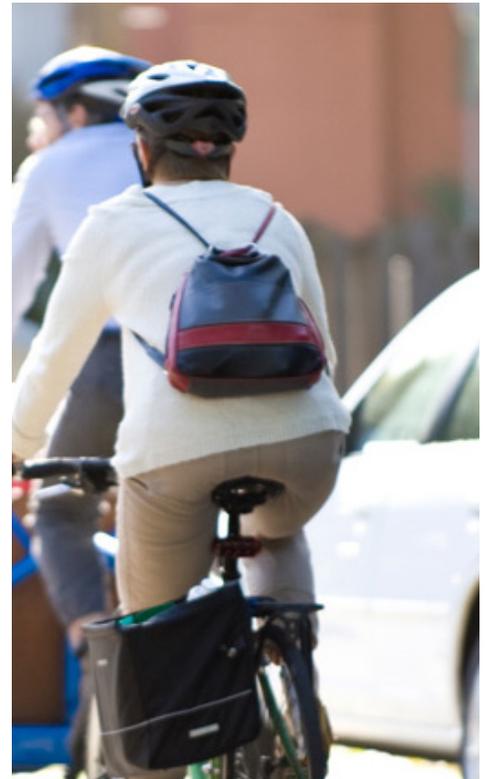
In addition to these objectives, community members advocated for maintaining the implementation schedule with cost-effective, efficient and innovative project delivery.

Measure M Implementation Timeline

Measure M funded paving and green infrastructure projects are delivered annually over the five year implementation period from 2014 through 2018. The following timeline summarizes the status of the annual Measure M projects.



1. Projected to be complete by the end of calendar year 2015.
2. By the Public Works Commission and City Council.
3. By the Public Works Commission and City Council.



Measure M funding has helped increase bicycle and pedestrian safety in Berkeley.

The Prioritization Process

The City currently maintains a rolling 5-Year Street Paving Plan in accordance with the Street Rehabilitation and Repair Policy. City staff update the plan every year to reflect current street conditions and available budget resources.

1. Pavement Condition Index

Every two years on average, the Public Works Department surveys every public street to assess the condition of the pavement and rates each street according to the Pavement Condition Index (PCI) See page 6 for more information on PCI.

2. StreetSaver

The results of the survey are input into a computerized program called StreetSaver. StreetSaver analyzes a variety of factors to identify the most cost-effective street improvements to raise the average pavement condition in the City. Factors evaluated include:

- the pavement condition index (PCI)
- type of repair required
- road classification
- cost effectiveness
- budget constraints

3. City of Berkeley Street Rehabilitation and Repair Policy

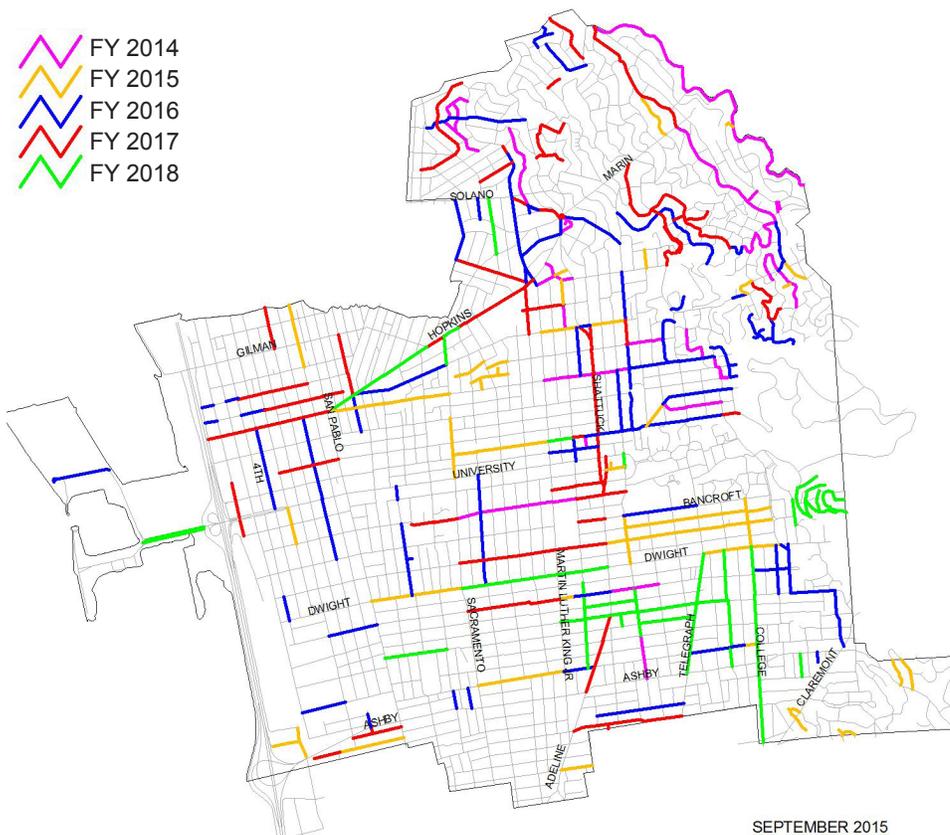
The Street Saver outputs are further prioritized using criteria from the City of Berkeley Street Rehabilitation and Repair Policy. The result is an updated Five-Year Paving Plan which is presented to the Public Works Commission each year for review and submission to Council with recommended approval.

Street Repair and Rehabilitation Policy Priorities

- Implement integrated solutions
- Coordinate with other City programs
- Coordinate with utility work
- Prioritize bus and bicycle routes
- Improve contiguous blocks where possible

Proposed 5 Year Paving Plan 2014-2018

-  FY 2014
-  FY 2015
-  FY 2016
-  FY 2017
-  FY 2018



SEPTEMBER 2015

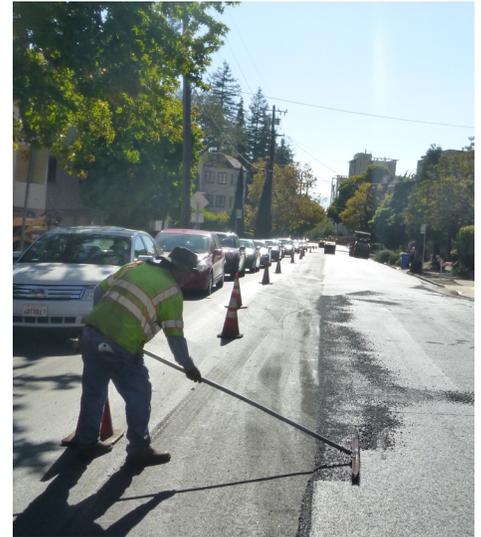
4. Scorecard

During the Measure M community engagement process, the PWC in collaboration with other commissions, integrated the public input into a scorecard to help prioritize projects meeting a set of criteria for Measure M funding.

City staff applied the scorecard criteria to arrive at the final project selection represented in the Five Year Paving Plan. These additional Measure M criteria have helped increase the investments supporting green infrastructure, bike safety and flood control.

Funding Street and Green Infrastructure Improvements

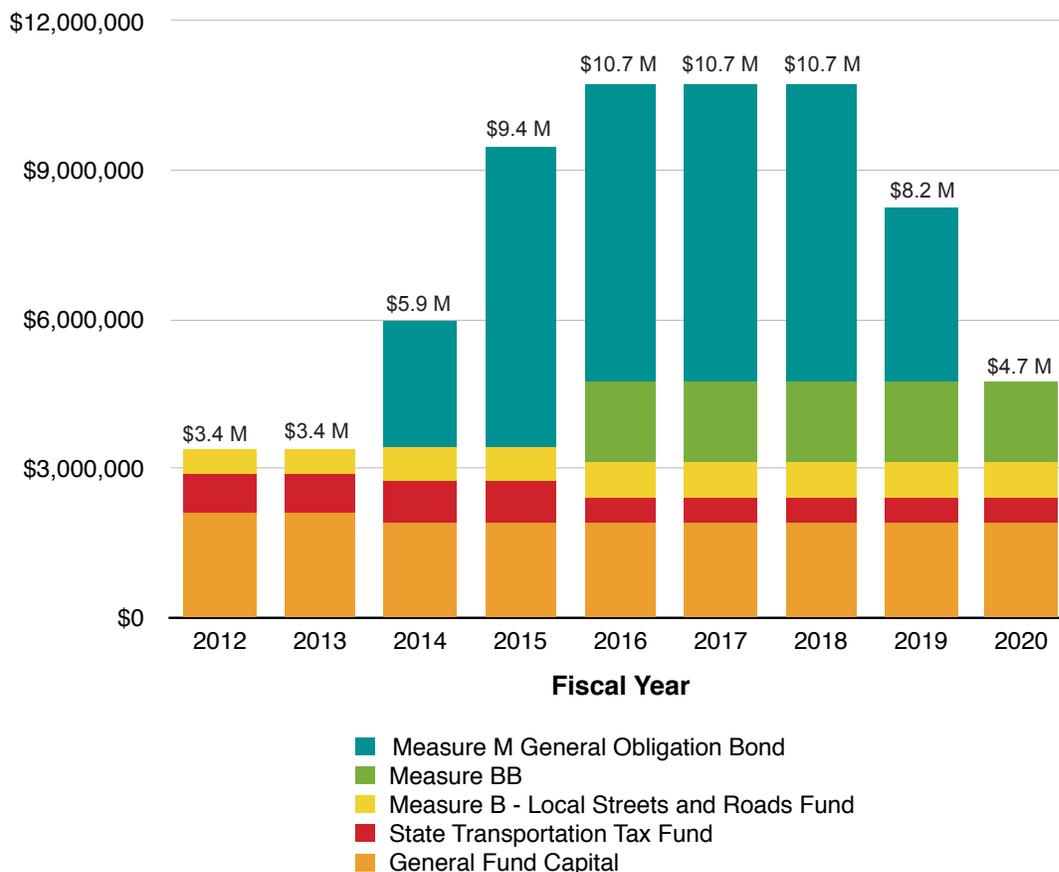
Since the 1980's, baseline funding for street paving in the City of Berkeley has remained a constant \$3.4 million per year (with the exception of one-time funding infusions), primarily funded by the general fund and the state transportation tax. This funding level is inadequate to properly maintain the street network in good, safe condition in a city the size of Berkeley. As a result, the City is now facing poor street conditions from decades of deferred maintenance. Recent regional tax measures such as Measure B and Measure BB are now providing long-term transportation funding that is divided among local jurisdictions. For example, Measure BB approved by Alameda County voters has added \$1.3 million to Berkeley's annual street paving budget for the next 30 years. These long-term annual funds will help maintain the conditions of Berkeley's streets paving.



Applying pavement treatments can extend the life of pavement 5 to 10 years.

With the voter-approved Measure M funding in 2012, the City of Berkeley was authorized to invest an additional \$30 million over five years to begin addressing the long-standing deferred maintenance that led to the failing street infrastructure. Measure M, the only funding source dedicated solely to Berkeley streets and related green infrastructure, has allowed the City of Berkeley to significantly accelerate paving improvements across the City. The following graph shows the annual street paving and green infrastructure budget from all funding sources.

Adopted Street Paving and Green Infrastructure Budget



Paving Accomplishments

Improving Pavement Condition

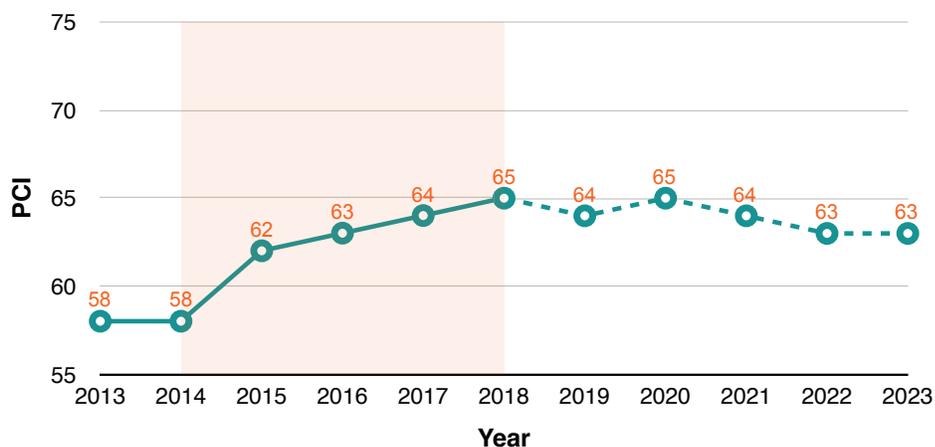
In 2011, approximately 134 miles of Berkeley's 216 miles of streets were in need of rehabilitation or repairs.

Street condition is characterized by a Pavement Condition Index (PCI) on a scale from 0-100 and rated according to the following scores:

Prior to Measure M investments, Berkeley's streets were assessed at

PCI	Rating
0-24	Failed
25-49	Poor
50-59	At risk
60-69	Fair
70-79	Good
80-100	Excellent

Pavement Condition Index

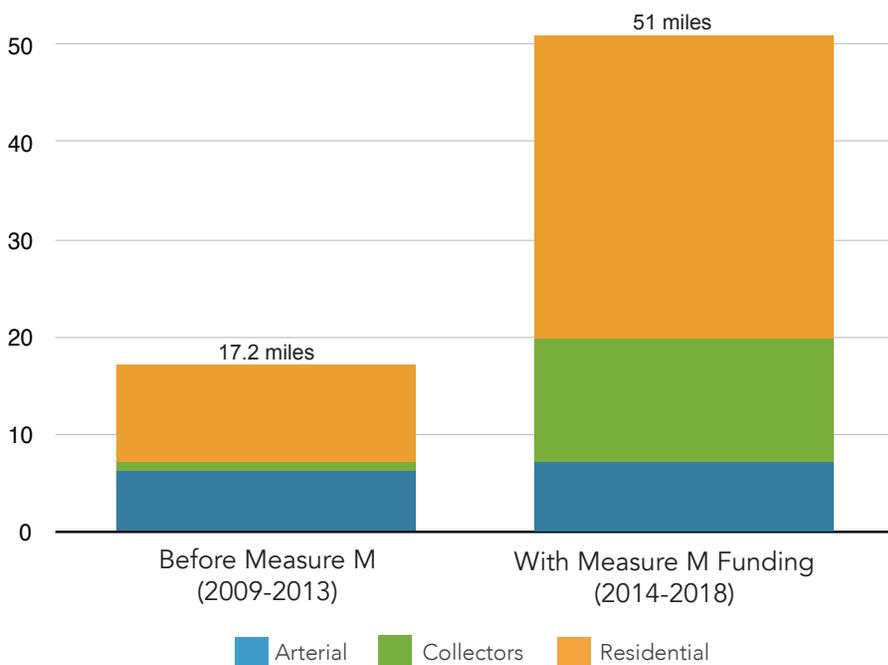


an average PCI of 58. For comparison, the average PCI for the Bay Area region in 2014 was 66. The City's goal is a PCI of 75. After the Measure M investments and other funding utilized during the 2014-2018 five year plan, Berkeley streets are expected have a PCI rating of 65. When Measure M funding ends in 2018, it is estimated that the PCI will remain slightly stable or decline.

Increasing Miles of New Street Paving

Prior to Measure M, the City could only pave an average of 4 miles per year. With the addition of Measure M funding, the City will pave an average of 10 miles per year and a total of 51 miles of streets between 2014 and 2018. The Measure M funding and scorecard criteria have helped pave over 12 miles of collector streets and over 30 miles of residential streets, many of which have not been paved in decades.

Miles Paved by Year and Type



Cost Effective Street Treatments

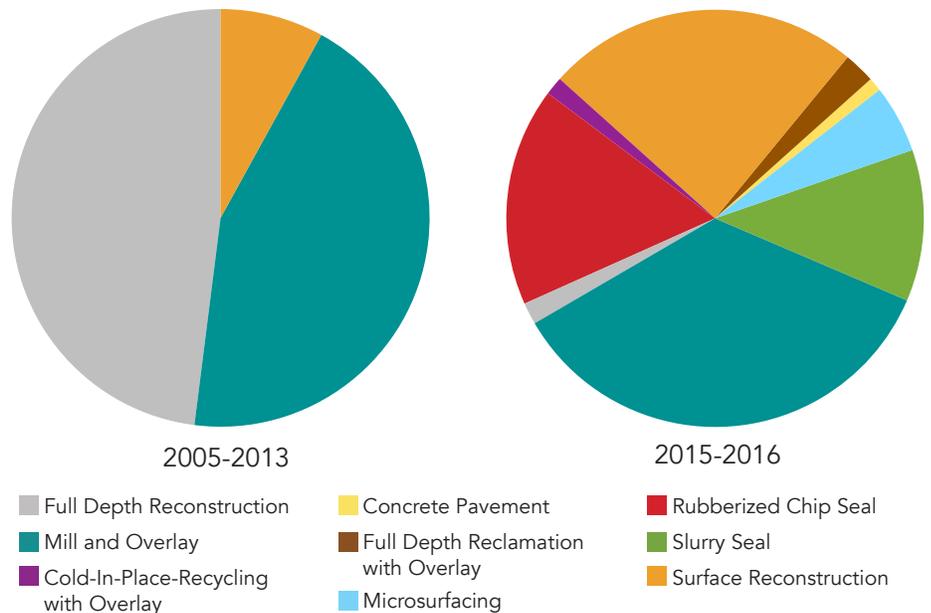
Prior to Measure M funding, street improvements were limited to overlays and reconstructions. As part of the Measure M five-year program plan, the City of Berkeley has added five new innovative treatments over the last two years, including full-depth reclamation, cold in-place recycling, and three types of new surface seals. In addition to being cost-effective, these alternative treatments significantly reduce environmental impacts by recycling paving materials in place thereby reducing truck trips and associated greenhouse gas emissions, and helping manage the dwindling supply of virgin aggregate. The City Public Works Department will continue to employ innovative and cost effective technologies to benefit the environment and extend limited paving dollars.

Conventional Treatments

Mill and Overlay: remove, mill and reapply a thin layer of asphalt on existing asphalt to renew and extend the life of structurally sound pavement.

Reconstruction: complete removal and replacement of failed pavement and roadway base.

Percent Miles of Treatment Type



Innovative Treatments

Cold-In-Place-Recycling with Overlay: involves milling the top layer of the old pavement and adding asphalt to create a cost-effective recycled pavement layer that can be applied relatively quickly to avoid traffic delays of more extensive reconstruction.

Concrete Pavement: uses Portland cement rather than asphalt to achieve a durable surface similar to sidewalks.

Full Depth Reclamation w/ Overlay: a cost-effective alternative to conventional reconstruction that re-uses existing in-place materials.

Micro-surfacing: a polymer-modified, asphalt resurfacing material that can cost-effectively extend the life of a street surface by 5-7 years by correcting

rutting and minor surface irregularities. The primary difference between micro-surfacing and slurry seal is that micro-surfacing contains small aggregate rock "chips", while slurry seal contains sand.

Rubberized Chip Seals: consists of applying an asphalt rubber seal coat followed by the application of a slurry seal coat, a highly cost effective alternative to traditional overlay to extend the life of a street surface by 8 to 10 years for half the cost of an overlay.

Slurry Seal: a cost-effective treatment to extend the life of a paved street using a liquid mixture of emulsified asphalt.

Surface Reconstruction: similar to full depth reclamation, but recycles only the top layer to extend the life of the pavement surface.

Integrating ADA Compliance and Active Transportation

Measure M projects have also integrated significant multi-modal investments from Measure M funds while leveraging other funding sources to help implement the Bicycle and Pedestrian Master Plans. These bike and pedestrian safety improvements will include:

- Improve over 23 miles of bikeway streets in accordance with adopted bike plans.
- Replace or install over 500 curb ramps to increase ADA accessibility.
- Replace deteriorated drainage throughout the City to reduce flooding at intersection crosswalks and other locations.



New ADA curb ramp on Cedar Street.

Green Infrastructure

What is Green Infrastructure?

Ten watersheds in the City of Berkeley collect rainwater from streets and storm drains as it flows across Berkeley and into the San Francisco Bay. In 2012, the City of Berkeley developed the **Watershed Management Plan (WMP)** to identify opportunities to reduce flooding, improve water quality and enhance our creeks and bays. The WMP outlines stormwater management goals and recommended technologies, including green infrastructure. Green infrastructure promotes storage and infiltration, often through natural processes using soils and plants. Examples can include rain gardens, vegetated swales, permeable pavement and cisterns, which can often be integrated into street improvement projects. More about the WMP can be found here: http://www.ci.berkeley.ca.us/Public_Works/Sewers_-_Storm/Watershed_Management_Plan.aspx

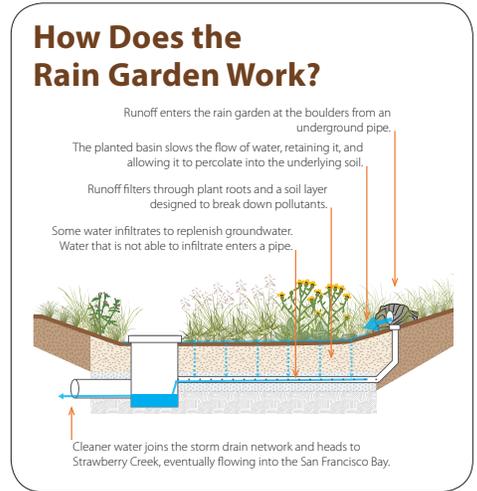


Diagram from public outreach sign for Presentation Park rain garden.

Measure M's Role in Green Infrastructure

Measure M funds have enabled the City of Berkeley to embark on a series of green infrastructure demonstration projects around the City to gain valuable insight about these new technologies. Informative signs have been developed for several of the projects to raise public awareness about the function and benefits of green infrastructure. A range of green infrastructure projects are planned or completed across Berkeley to help reduce flooding and erosion, remove pollutants and use water in a more restorative way. These projects are highlighted on the next few pages.

Green Infrastructure Investments in Berkeley

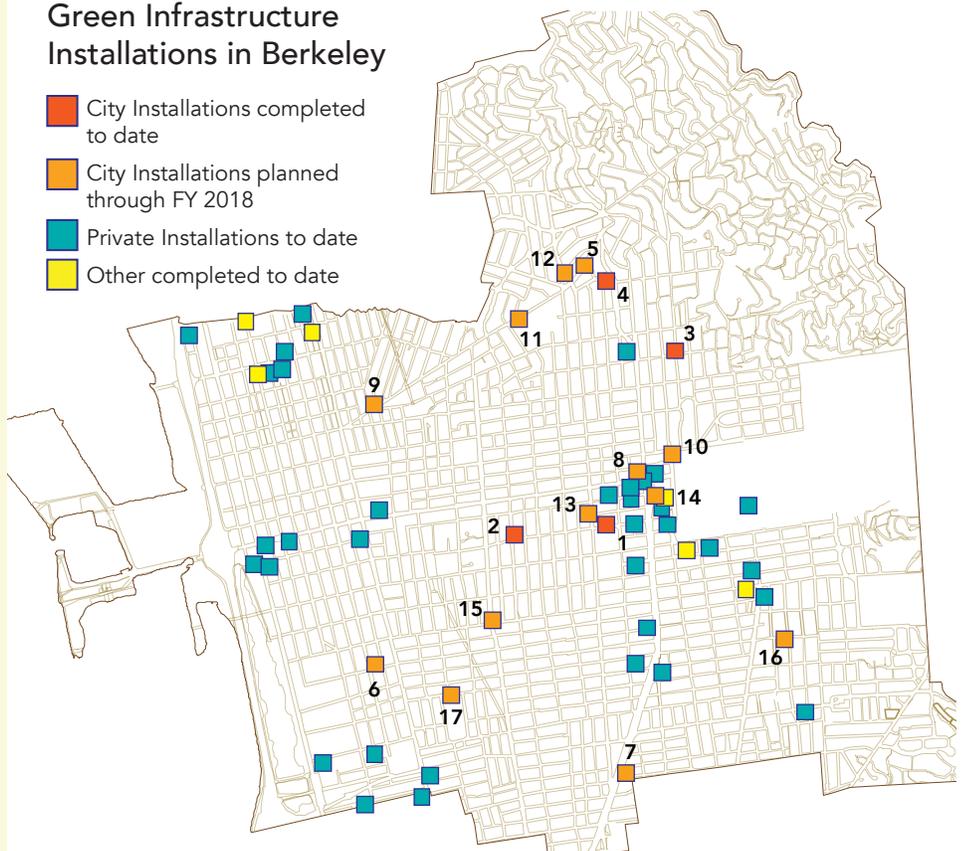
Green infrastructure (GI) projects are increasing across Berkeley, thanks to both public and private funding.

The City requires applicable private development to include GI in new construction, which has added many private GI installations over the last 10 years.

Approximately \$7 million in Measure M funding will contribute to 16 new GI and watershed management investments in Berkeley over the five year period. In addition to these installations, the City constructed the full width permeable paver project on Allston Way from Martin Luther King Jr. Way to Milvia in 2014 with other funding sources.

Green Infrastructure Installations in Berkeley

- City Installations completed to date
- City Installations planned through FY 2018
- Private Installations to date
- Other completed to date



Completed Projects

During year one of the Measure M five year plan, the City installed five new GI projects that included permeable pavers, bioswales, cisterns and a tree-well filter. The map on page 8 shows the location of these projects, which are described in more detail below.

1 Allston Way*

On Allston Way between Milvia Street and Martin Luther King Jr. Way, the City removed an existing asphalt roadway surface and installed a permeable interlocking concrete paver roadway. In addition to aesthetics appeal, this paver installation reduces storm water run-off and filters pollutants from the water. The paver roadway should have a 50 to 75 year design life and a moderate traffic calming effect.

*did not utilize Measure M funds

2 Presentation Park

A rain garden in Presentation Park collects, partially cleans and infiltrates stormwater runoff from Allston Way before it enters the creek just a few blocks west in Strawberry Creek Park.



Presentation Park rain garden. Above left, on a dry day; above right, during a rain event.

3 Vine and Spruce

Storm water runoff from Vine Street is captured in an inlet and routed into a planted bioretention area (rain garden) inside the traffic circle. This area reduces water volume on the street by holding the water temporarily, allowing it to infiltrate slowly through the vegetation and porous soil and recharge groundwater.



Spruce and Vine rain garden. Above left, on a dry day; above right, during a rain event.

4 Eunice and Milvia

This project combines permeable pavers and a retention vault to filter and store storm water from approximately 9 acres. The permeable pavers filter the storm water and the cistern stores up to 1624 cubic feet of storm water.

5 Milvia and Hopkins

The installation of permeable pavement and infiltration planter wells remove litter and sediment at the intersection of Hopkins Street and Milvia Street. The soil and plants provide bio-remediation of stormwater before runoff enters Codornices Creek.



Water retention vault being installed at Milvia and Eunice.

Green Infrastructure in 2016

During 2016, the City plans to install five additional GI projects that include permeable pavers, bioswales and cisterns. Many of these projects integrate GI into a full street redesign. The map on page 8 shows the location of these projects, which are described in more detail below.

6 Parker Street

This project is located at Parker Street between 8th and 10th Streets, and includes installing bioswale and permeable pavers that will absorb and treat stormwater before discharging to a new underground cistern consisting of twin concrete boxes 6 feet wide, 3 feet deep, and 220 feet long. This project will decrease the peak flows draining directly to Aquatic Park, and reduce localized flooding.

7 Woolsey Street

Green infrastructure investments at Woolsey and Adeline will include a 90,000 gallon cistern, a 100-foot bioswale, pavement reduction, and bioretention bump-outs. The outcome will improve water quality, reduce stormwater flows, calm traffic and create a park-like street setting to promote walk-ability. Located adjacent to the Ashby BART station and the Ed Roberts Campus, this innovative street will offer high-visibility education benefits and partnership opportunities.

8 University and Shattuck

Bus pads represent extremely heavy traffic loads and have traditionally been constructed with impermeable concrete. Staff will replace the bus pad at the northwest corner of University and Shattuck with pavers constructed out of permeable concrete. This site is a high trash generating site where trash is historically carried by stormwater into the storm drains. The permeable bus pad will allow water to flow through the pavers and its gravel subbase into the existing storm drain while stranding trash and debris on top of the pavers. Staff anticipates minimal labor to control the trash because this location is frequently swept in by mechanical sweepers.

9 Rose and Hopkins

The intersection of Rose/Hopkins contains large concrete traffic islands. These islands are impermeable and unused except for channeling traffic. The Public Works Department identified this as an opportunity to install bioswales while at the same time slightly altering the shape of the islands to provide traffic calming while maintaining emergency vehicle access to the residences and to transit through this part of the City.

10 Hearst Complete Street

Measure M funding is helping to add green infrastructure investments to the Hearst Complete Street north of the CAL campus. A bio-retention basin will be constructed near the southeast corner of the intersection of Hearst Street and Oxford. Storm water will be diverted into the basin and filtered before entering the City's storm drain system.



Rendering of Woolsey Street



Rendering of Hearst Complete Street

Green Infrastructure in 2017-2018

During 2017 and 2018, the City plans to install seven additional GI projects that include permeable pavers, bioswales and a cistern. Many of these projects are located in highly visible places including two middle schools and heavily used parks in Downtown and West Berkeley. The map on page 8 shows the location of these projects, which are described in more detail below.

11 King School Park

A bioswale will be installed at King School Park providing an educational opportunity for Martin Luther King Jr. Middle School students, park users and other residents in the area. The bioswale will infiltrate rainwater to regulate flows in Codornices Creek and improve water quality for steelhead habitat.



King School Park

12 North Branch Berkeley Library

A bioswale will be installed at the North Branch Berkeley Library offering educational opportunities for library visitors and residents in the area. Urban runoff will be treated before discharge to the steelhead habitat of Codornices Creek.



North Branch Berkeley Library

13 Civic Center Park

A bioswale will be added to this highly used downtown park to clean stormwater runoff and remove trash from a densely populated area of downtown. Educational signage will foster stewardship with nearby high schoolers, residents, business employees and downtown visitors.



Civic Center Park

14 Shattuck from Center to University

This project is currently in the planning phase. The design team is evaluating several locations within the project limits where GI elements could be installed. Currently, the Public Works Department is considering permeable pavers in parking strips. Final project design is expected in fall of 2016. Project construction is expected to begin in summer of 2017.

15 Dwight and Sacramento Bus Stop

Permeable pavers will be installed at this bus stop to infiltrate water and capture trash associated with this heavily used intersection.

16 Willard Park

A bioswale will be installed at Willard Park to clean and slow stormwater in the Potter Creek Watershed. Signage will provide watershed stewardship information to Willard Middle School students, UC Berkeley students and local residents.



Willard Park

17 San Pablo Park

A bioswale will be installed to clean and slow stormwater in this West Berkeley park to relieve downstream flooding in the Potter Watershed.

Mid-Program Review

In Summary

The City of Berkeley is on budget and on schedule to meet the project goals of the Measure M Program by 2018. Funding from Measure M has enabled the City of Berkeley to significantly improve the condition of our roads in Berkeley. In addition, adopting a range of innovative, new street treatments has enabled PWD staff to accomplish more and further stretch limited infrastructure dollars. Roads in good condition are much safer for biking and driving, can improve property values, and reduce wear and tear on vehicles. Measure M has also funded a number of green infrastructure demonstration projects to reduce local flooding and help improve the health of our urban creeks and the San Francisco Bay. New funding from Measure BB has supplemented Measure M investments to help achieve the goals to date.



A bicyclist benefits from improvements on Channing Way.

Looking Ahead

More investment is needed to address the decades of deferred maintenance and bring the City of Berkeley's streets up to the standard for the Bay Area. Many residential and other streets still remain severely deteriorated after the expenditure of Measure M funds. In addition, the continuing drought and anticipated climate change impacts are increasing the need for greater resiliency in our infrastructure. In the past, road condition and flood management were sufficient goals for infrastructure. Now water reuse, improved water quality, healthy creek and bay habitat, reduced heat island effect and multi-modal transportation are all considerations when investing in the future of our public rights-of-way. Moving forward, the Department of Public Works will continue to evaluate new and innovative technologies in paving and green infrastructure to address these changing conditions. In addition, the City of Berkeley will continue to seek additional sources of funding and gather community input on how to best balance these goals within the resources available.

How to Get Involved!

We welcome your input! Many improvements are underway across Berkeley. To track our progress, share your thoughts, or find out more information about the Measure M efforts, you can:

- Attend the Public Works Commission which meets the 1st Thursday of each month. Other commission meetings are listed on the City's website: <http://www.ci.berkeley.ca.us/commissions/>
- Check out the Department of Public Works web site www.ci.berkeley.ca.us/pw/ for updated information about:
 - » Street Repair Program
 - » Watershed Resources
 - » Construction Activity

For information specific to Measure M investments, please contact:

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