To: Honorable Mayor and Members of the City Council  
From: Dee Williams-Ridley, Interim City Manager  
Submitted by: Phillip Harrington, Acting Director, Public Works  
Subject: Draft Mid–Program Review Report for Measure M Integrated Streets Investment Plan and Update of the 5-Year Street Paving Plan, FY 2016 to FY 2020

RECOMMENDATION
1) Adopt the recommendation from the Public Works Commission; and

FISCAL IMPACTS OF RECOMMENDATION
This 5-Year Street Paving Plan is based on the following estimated available funding levels from all sources, including Measure M, Gas Tax, Measure B, Measure BB, and the General Fund:

- FY 2016 ... $10,700,000
- FY 2017 ... $10,700,000
- FY 2018 ... $10,700,000
- FY 2019 ..... $8,200,000
- FY 2020 ..... $4,700,000

The above funding levels do not include grant funding the City may be able to obtain for additional watershed or paving improvements during the reporting period.

CURRENT SITUATION AND ITS EFFECTS
Staff concurs with the recommendation of the Public Works Commission (PWC) that Council approve the first two years (2016-2017) of the Five Year Paving Plan and defer approval of the last three years (2018-2020) of the plan to ensure the best possible expenditure of all funds. Further, staff is providing Council with additional information on the Draft Mid–Program Review Report for Measure M Integrated Streets Investment Plan (Attachment 1).
**Five Year Paving Plan**

In accordance with the Measure M Implementation Plan established in 2013, staff is implementing Measure M-funded paving and associated green infrastructure projects from FY 2014 through FY 2018 to significantly accelerate the City's Paving Program.

This spring, staff prepared a draft update of the City’s 5-Year Rolling Paving Plan and began a series of five meetings with the PWC’s Measure M Paving and Green Infrastructure Subcommittee to review and discuss the draft Plan. Staff made several modifications to the Plan over the course of the meetings. At the October 1, 2015 PWC meeting, the PWC recommended approval of detailed plans for FY 2016 and FY 2017. The PWC also recommended further consideration of the last three years of the Plan (FY 2018 through FY 2020) to incorporate potential changes due to the on-going drought, and apply lessons learned from early implementation of the plan, including the application of alternative cost-effective paving treatments and installation of a variety of green infrastructure projects.

Staff appreciates the support and community leadership provided by the dedicated Committee members who participated in this review process. If adopted, the plan will continue to accelerate paving and green infrastructure project delivery. The Five Year Paving Plan proposes to pave 47 centerline miles of streets from FY 2016 through FY 2020 and construct a total of 17 new green infrastructure sites by FY 2018.

On October 27, 2015 staff participated in a City Council Work Session to provide a Measure M Implementation Plan update. For additional information on the progress made to date on the Measure M Implementation Plan or on the 5 Year Paving Plan and green infrastructure program, please see the staff report for the workshop: www.ci.berkeley.ca.us/Clerk/City_Council/2015/10_Oct/City_Council_10-27-2015_-_Special_Meeting_Agenda.aspx

**Draft Mid–Program Review Report for Measure M Integrated Streets Investment Plan**

In collaboration with the PWC Measure M Outreach Subcommittee, staff prepared the attached Draft Mid–Program Review Report for Measure M Integrated Streets Investment Plan. The purpose of the report is to provide a condensed, easily accessible Measure M program update for both the City Council and members of the public as we approach the mid-point of program implementation. The Mid–Program Review Report includes:

- Measure M background, program overview, goals and implementation timeline.
- Prioritization process for Five-Year Street Paving Plan.
- Funding sources and budget for the City’s street paving and green infrastructure improvements.
• Paving accomplishments such as increasing Pavement Condition Index (PCI) and miles paved per year.
• City’s increased use of cost effective street treatments.
• Acceleration of green infrastructure installation completed and planned in Berkeley.
• Outlook for street improvements and watershed health post Measure M.

BACKGROUND
In November 2012, voters approved Measure M, a $30 million bond measure to accelerate street improvements and integrate green infrastructure where appropriate and consistent with the Watershed Management Plan. Measure M funding significantly increases funding for street paving from pre-Measure M levels and provides funding for green infrastructure.

In 2013, the Public Works Commission led an extensive community outreach process for Measure M. The process gathered significant community input and created outcome and performance measures, monitoring and oversight recommendations, and scorecard criteria to be added to the paving plan development process. The process and resulting recommendations were summarized in the PWC’s Integrated Streets Investment Plan submitted to Council on October 2013.

The paving and green infrastructure funded by Measure M and other funding sources is incorporated into the City’s rolling Five Year Paving Plan. Staff takes a deliberative approach to selecting streets to include in the paving plan, utilizing the Street Rehabilitation and Repair Policy and Measure M scorecard criteria. The Five Year Plan is generated with the aid of Streetsaver software, developed by the Metropolitan Transportation Commission and used by all cities in the Bay Area. Streetsaver criteria for street selection include: a) pavement condition, b) type of repair required, c) road classification (arterial, collector, residential), d) cost effectiveness, and e) budget constraints. The Street Rehabilitation and Repair Policy further guides the development of the paving plan, as follows:

• Implement integrated solutions
• Coordinate with other City programs
• Coordinate with utility company work
• Budget distributed to: arterials – 10%, collectors – 50%, residential – 25%, discretionary and demonstration – 15%
• Prioritize collector and residential streets with AC Transit bus routes or bicycle routes
• As much as possible, improve contiguous blocks rather than one block at a time.
ENVIRONMENTAL SUSTAINABILITY
The paving plan includes the installation of a wide variety of green infrastructure improvements (bioretention cells, permeable pavers, tree well filters, cisterns, etc.) at locations throughout the City, to serve as demonstration projects for future implementation. The improvements will treat polluted urban runoff before it reaches local creeks and the Bay, and minimize potential flooding.

Alternative pavement treatments such as “full depth reclamation” and “cold in place recycling” recycle much of the existing pavement and subbase in place, reducing truck trips, and helping manage the dwindling supply of virgin aggregate.

RATIONALE FOR RECOMMENDATION
The Paving Plan is consistent with Berkeley’s Street Rehabilitation and Repair Policy. The attached Draft Mid–Program Review Report for Measure M Integrated Streets Investment Plan has been prepared to provide an update on Measure M implementation.

ALTERNATIVE ACTIONS CONSIDERED
None.

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Attachments:
1: Draft Mid–Program Review Report for Measure M Integrated Streets Investment Plan
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.
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.
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 StreetSaver 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

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.

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](image)

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

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.
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

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.

How Does the Rain Garden Work?

Runoff enters the rain garden at the boulders from an underground pipe. The planted basin slows the flow of water, retaining it, and allowing it to percolate into the underlying soil. Runoff filters through plant roots and a soil layer designed to break down pollutants. Some water infiltrates to replenish groundwater. Water that is not able to infiltrate enters a pipe. Cleaner water joins the storm drain network and heads to Strawberry Creek, eventually flowing into the San Francisco Bay.

Diagram from public outreach sign for Presentation Park rain garden.
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.

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.

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.*
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.
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.

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.

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.

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 a 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.

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.
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.

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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