# STRATEGIC ASSET MANAGEMENT PLAN

## City of Berkeley

APRIL 2022


CITY OF
BERKELEY

# EXECUTIVE SUMMARY

I am pleased to present the City of Berkeley's (City) Strategic Asset Management Plan (SAMP). Asset Management is an important concept in which the City's infrastructure systems are managed throughout the life cycle from 'cradle to grave'. Taking an asset management approach was a key part of the City Council adopted Vision 2050 recommendations to provide sustainable and resilient infrastructure to the residents of Berkeley.

The purpose of this document is to develop policy guidance, to review the City's current maintenance practices and to prepare a roadmap of key initiatives for implementing a full Asset Management Program (AMP) in Berkeley's Public Works and Parks, Recreation & Waterfront Departments.

Berkeley's streets, sidewalks and utility pipelines date to the early decades of the 20th century. Critical systems that we depend on every day are simply wearing out. Recent budgets were inadequate for infrastructure capital and maintenance needs, let alone modernizing them. Aging infrastructure is not only costly to maintain but it does not meet current or future requirements. An AMP is needed to manage our infrastructure assets throughout their useful life.

The City retained a consultant to assess the City's current asset management practices against a global standard benchmark on Asset Management in these six areas: asset strategy and planning, asset management decision-making, lifecycle delivery, asset information, organization and people, and risk assessment. Based on the benchmark, Berkeley's average assessment was in the 'developing' level of asset management implementation and comparable to many U.S. cities, but not nearly good enough.

The consultant worked with City staff to develop a 'Roadmap' of key initiatives in the next two years to implement an effective AMP. The components include:

- Prepare an Asset Management policy for City Council adoption
- Form an Asset Management team, consisting of a team leader and two program staff
- Form an AM Steering Committee to guide the program implementation
- Provide consultant support resources
- Prepare the strategies, procedures and analyses to implement an AMP

I thank the team for this important work and look forward to a future of well-maintained infrastructure systems.

**DEE WILLIAMS-RIDLEY**
**City Manager**

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# 01

# BACKGROUND AND PURPOSE


Street surface in need of repairs

Sewer rehabilitation

Marina dock in need of repairs

## 1.1 Vision 2050 Background

The Vision 2050 concept was initiated by Mayor Arreguin at his 2017 State of the City address. A residents' task force of over 40 members was formed and the group worked to prepare a framework to modernize Berkeley's infrastructure. Their report was adopted by Berkeley's City Council in September 2020. Berkeley voters approved Measure R in November 2018. The measure asked: "Shall the measure, advising the Mayor to engage citizens and experts in the development of Vision 2050, a 30-year plan to identify and guide implementation of climate-smart, technologically-advanced, integrated and efficient infrastructure to support a safe, vibrant and resilient future for Berkeley, be adopted?" The response was a resounding yes.
Berkeley's streets, storm drains, sewers, and water lines date to the early decades of the 20th century. Critical systems that we depend on every day are simply wearing out. Recent budgets were inadequate for infrastructure capital and maintenance needs, let alone modernizing them. Aging infrastructure is not only costly to maintain but it does not meet current or future requirements. This leaves the community vulnerable to unplanned failure and service interruptions. For residents, workers, and businesses trying to go about their daily lives, this can translate to unsafe conditions, unexpected costs, and inequity between neighborhoods.

Now, as we begin to grapple with Berkeley's $1.2 billion in needed infrastructure improvements, new challenges are emerging. The local impacts of global climate change are a major threat to our aging infrastructure. Extreme storm events, wildfires, heatwaves, drought, and sea level rise will challenge streets, pipes, and open spaces that were designed for a more benign environment. And all of this will be happening as we wait and prepare for the next major earthquake. If our city is to survive and thrive, we must confront these challenges.
It was vital to reach out to the broader Berkeley community to both build awareness and provide opportunities for input and engagement. Initial Vision 2050 outreach began early in 2018 with four information nights across Berkeley. This continued with outreach to neighborhood and faith-based groups and community organizations. To support this endeavor, the Mayor's Office partnered with Berkeley's Youth in Government, a group of high school students, who were trained as Vision 2050 ambassadors. Using this model, the Mayor's Office presented at thirteen community organization meetings.

## VISION 2050

The Vision 2050 Task Force reviewed over 20 of the City's current infrastructure plans. The plans are the result of lots of hard work by City staff and community members over the years. It is helpful to build on current planning and to learn what has worked well and what hasn't. The City of Berkeley has an infrastructure system that has allowed us to thrive and grow for over 100 years. Now is the time to incorporate new technologies and meet new environmental standards so that our systems can continue to reliably support us for another 100 years.

The Vision 2050 report recommended three guiding principles, five strategies and several actions, all of which are summarized to the right in Figure 1.

An important concept in the report is Strategy Two: Manage Infrastructure from Cradle to Grave. This was a recognition that we not only need to build more sustainable infrastructure, but that we need to properly maintain it over its useful life. More specifically, Strategy 2, task B recommends the development of an Asset Management Program.

### PRINCIPLES, STRATEGIES AND RECOMMENDED ACTIONS

**1 STATEGY ONE** Use Integrated and Balanced Planning

- Use multi-criteria decision-making
- Use adaptive planning
- Prepare and implement a Dig Once policy

**2 STATEGY TWO** Manage Infrastructure from Cradle to Grave

- Institute structured master planning
- Develop an Asset Management Program

**3 STATEGY THREE** Adopt Sustainable and Safe Technologies

- Accelerate the transition to clean energy and electrification
- Implement Complete Streets to provide sustainable and healthy transportation
- Develop natural streetscapes that provide ecosystem services
- Use sensors, data, and advanced technologies
- Prepare a wildfire mitigation and safety plan

**4 STATEGY FOUR** Invest in Our Future

- Take advantage of a strong financial position to address infrastructure needs and commit to reducing large unfunded infrastructure liability by doubling capital expenditures

**5 STATEGY FIVE** Prepare the City's Organization to Implement a Major Capital Program

- Develop an organization that is integrated and has capacity to deliver
- Prepare a program approach with management tools
- Provide independent oversight and reporting

▲ **Figure 1:** Vision 2050 Principles, Strategies, and Recommended Actions

## 1.2 Purpose of a Strategic Asset Management Plan

A Strategic Asset Management Plan (SAMP) is the start to implementing a full Asset Management Program. The purpose of this document is to develop policy guidance, to review the City's current maintenance practices and to prepare a roadmap of key initiatives for implementing a full AMP in Berkeley's Public Works and Parks, Recreation & Waterfront Departments. This includes setting specific and measurable Asset Management objectives. The SAMP was prepared by the consultants AMCL and Bellecci and Associates, working with City staff. A description of the project participants is in Appendix A.

Few U.S. cities currently have a comprehensive approach to Asset Management (AM) across different asset categories and service areas. Berkeley has succeeded in moving forward in selected asset categories, such as with the sewer system, fleet and vehicles, and parking meters. The objective now is to develop a comprehensive AMP that is integrated, funded and staffed to maintain all asset categories.

Protected Bicycle Lanes on Adeline Street

# 1.3 Scope of Asset Categories

The scope of the SAMP will include all the following families of physical assets, with the asset information required to maintain them, throughout their lifecycles.

## Public Works Department

- Streets and roads
- Sidewalks
- Streetlights
- Transportation assets (bikeways, parking meters, traffic signals, parking garages, signage, etc.)
- Sanitary sewers
- Stormwater and green infrastructure
- Zero waste
- Fleet and vehicles
- Building facilities

## Parks, Recreation, and Waterfront Department

- Parks
- Camps
- Recreation facilities
- Waterfront
- Trees
- Natural environment and habitat

To put these in context, much of Berkeley's critical infrastructure is not owned or controlled by the City; Figure 2 summarizes what is and is not controlled by the City.

Transportation Infrastructure Serving All Users

## MAJOR INFRASTRUCTURE SYSTEMS IN BERKELEY

| Infrastructure System | Controlled by City | Controlled by Others |
|---|---|---|
| Streets, sidewalks, paths, bikeways, and tunnels | • 215 miles of streets<br>• 300 miles of sidewalks<br>• 50 miles of paths and bikeways | • AC Transit buses<br>• BART system<br>• AMTRAK and trains<br>• Taxis, Lyft, Uber and rideshare, ZipCar<br>• Bicycles and Micro-Mobility |
| Power and communication systems | 7,000 street lights | • PG&E, EBCE electricity and natural gas delivery systems<br>• Private telecommunications and Internet services |
| Parks, street trees and public plantings | • 42,000 street, park, and camp trees<br>• 52 parks and play grounds | East Bay Regional Parks |
| Water supply system | 11 creek watersheds | EBMUD potable and recycled water |
| Sanitary sewers | 380 miles of sewers | EBMUD sewage treatment |
| Stormwater system | 220 miles of storm sewers<br>6,000 storm drain facilities | Large portion of creeks |
| Solid waste management | • 7.45 acre transfer/ recycling station<br>• All residential, multi-family and commercial collection of refuse, recycling (fiber, glass, etc.) and organics (green/food) materials.<br>• Roll-off box (primarily compactors) services | • Private landfill<br>• Alameda County household hazardous waste services center (residents only)<br>• Organics composting<br>• Construction and demolition hauling, sorting and recycling<br>• Roll-off box services |
| Public buildings | 95 public buildings | BUSD buildings, UC Berkeley buildings, transportation hubs e.g. Berkeley City College |
| Berkeley marina | Berkeley marina<br>Municipal pier | State of California |

▲ **Figure 2:** Major Infrastructure Systems in Berkeley

02

# CONCEPTS IN ASSET MANAGEMENT

## 2.1 Definition of Asset Management

Asset Management is a pro-active process to ensure that the design, construction, maintenance, refurbishment, replacement and disposal of physical assets are planned together to optimize cost and that the systems perform properly. The process is data driven and includes preparing an asset inventory, assessment of the condition of assets, risk assessment and the pro-active repair and replacement of asset over its useful life. This concept is illustrated in Figure 3.

As a society, we have effectively managed infrastructure assets for many decades, relying on the commitment, experience and knowledge of our teams on the ground. Good practice Asset Management continues to depend on such commitment and knowledge but adds to this key information and analysis in order to be able to optimize the assets, in other words to deliver levels of service at the right balance of cost, performance and risk (see Figure 4).


▲ **Figure 3:** Proactive Asset Management


▲ **Figure 4:** Asset Management optimizes Asset Cost, Risk and Performance

Woolsey Cistern and Bio-Swale by Billy Hustace

## 2.2 Key Elements in Good Practice Asset Management

A good model of Asset Management used around the globe starts with the **alignment** of goals and activities: how the organizational goals must explicitly drive how we manage the assets. This may sound obvious, but in practice, asset decisions are often uncoordinated and not explicitly focused on levels of service and other targets. Organizations continue doing what we have done in the past, rather than actively seek to maximize asset contribution to current and future goals.

To coordinate asset decisions to deliver our goals, the model shown in Figure 5 highlights six main elements.

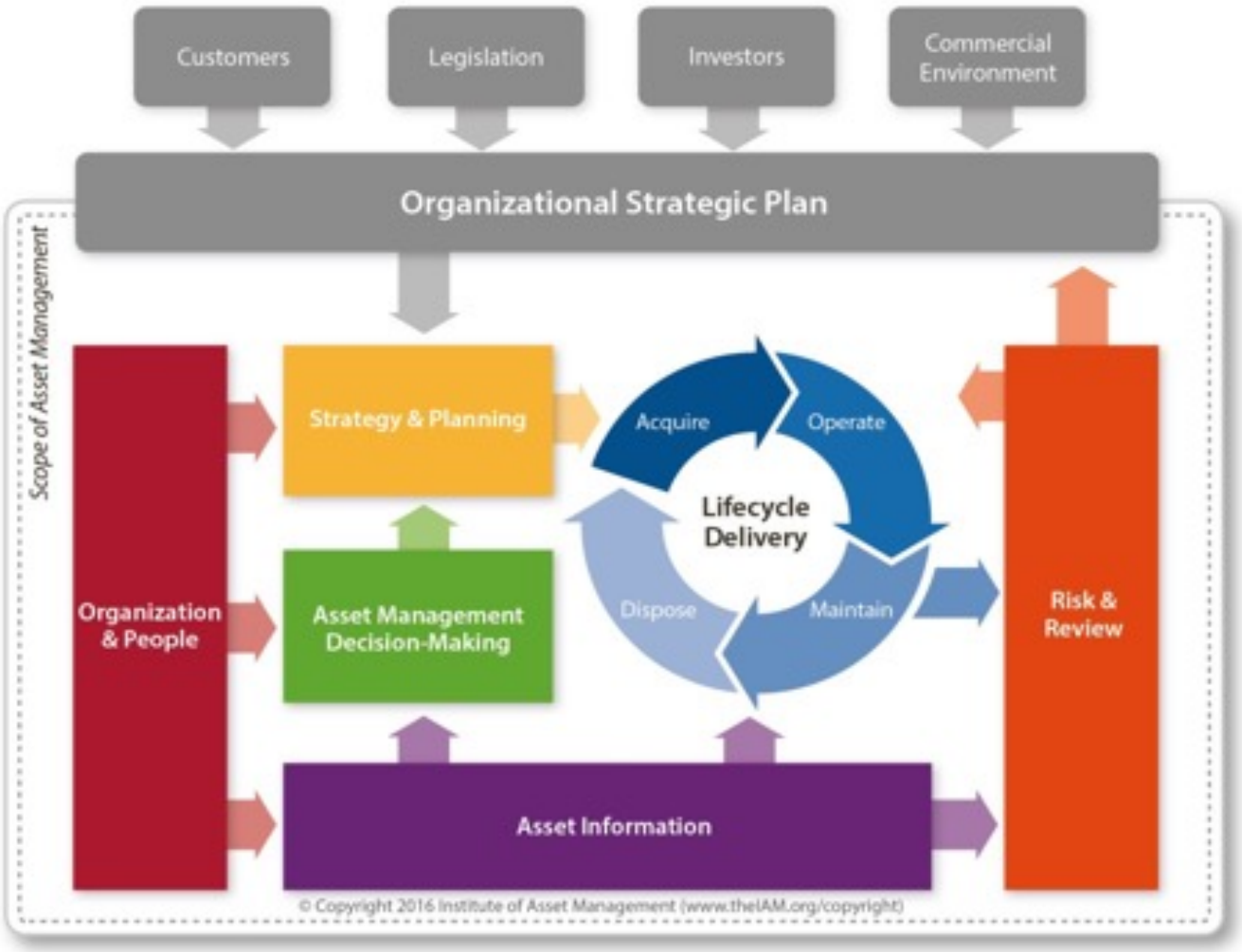
The first core elements are proactive asset **strategy** and integrated **planning**, together with improved **decision** techniques. This could be summarized as making full use of developments in risk-based asset decisions, in a framework of 'thinking again' and 'thinking longer term'. More strategic approaches to longer term asset planning, and good practice decision techniques such as prioritizing replacement and maintenance on their impact to levels of service ('risk to customer service'), depend on good **asset information**: on adequate data on what assets we have, their condition and rate of deterioration, good understanding of past failures in order to forecast future risks, as well as the knowledge and experience of our skilled people on the ground.

This also depends on having adequate **resources** – enough of the right people in the right jobs – and a general **culture** of proactive, coordinated and longer-term management of our physical assets.

As well as embedding **continuous improvement**, formal 'Plan-Do-Check-Act' learning processes, good asset management is explicitly based on a better understanding of **risk** – where risk is defined as the impact of uncertainty on our organizational objectives. **Risk** includes safety risks, but it also includes how physical assets may impact any of our goals, including the environment, equity, cost control, and committed levels of service to our customers.

These elements – asset strategy and planning, asset decision-making, asset information, organization and people, risk, and review, along with the adequacy of current delivery processes – were used to assess the current understanding and practice in all the service areas in scope.

Good Asset Management practice is also described by the International Organization for Standardization, ISO, in their ISO 55001 – Asset Management. This International Standard specifies the requirements for the establishment, implementation, maintenance and improvement of a management system for asset management, referred to as an "asset management system". This informed the proposed 'roadmap', or initiatives to implement the Asset Management Program.




▲ **Figure 5:** Asset Management Landscape Conceptual Model

## 2.3 Lifecycle costs

The costs and resources required to manage assets through their useful life are far more than just the upfront costs to build them.

In practice, for many assets, the costs after construction are significantly larger than the cost to construct.

Managing the asset after construction is a major commitment, up to 80% or more of the total cost of ownership. This document particularly focuses on what is required after construction, as that is usually less visible.

▲**Figure 6:** Typical Lifecycle Costs, from AMCL AM Training


▲ **Figure 7:** Typical costs to manage a facility from construction to disposal, from RTD Denver

03

# THE IMPORTANCE OF MAINTENANCE

## 3.1 What is Maintenance?

Maintenance is often categorized into re-active (fix it when there is a problem) or pro-active (fix it before there is a problem). There are also other terms used to describe maintenance and these are summarized as follows.

1. **Repair or replacement on failure** – also called 'reactive' maintenance. Failure is best defined in terms of function: can the asset still fulfil its functions for the City? Such a definition includes continuing to function safely, in compliance with laws, and meeting customer needs.

2. **Routine inspections and regular condition assessment** to catch problems that require reactive maintenance or more generally to monitor the degradation of assets, to plan ahead for preventative actions before they become problems.

3. **Preventative actions** such as planned replacement of components (e.g., changing the timing belt in a vehicle) before they fail.

   Inspections, condition assessments, and preventative work are generally all categorized together as **planned maintenance**, as opposed to **reactive maintenance**.

4. **Major refurbishment** of worn assets, often using capital funding (where available). Refurbishment covers a wide range of options short of total replacement of an asset. Major structures such as roads, bridges or even some buildings may never be 'replaced', only repeatedly refurbished.

5. **Replacement** of worn or obsolete assets, generally using capital funding. Replacement is usually 'capital', but because it is about continuing to provide an existing function, is better grouped with maintenance than with new investment. Many organizations have a general category of **renewals** to cover both refurbishments and replacements, bringing out the cyclical nature of asset management.

6. **Life-extension** of existing assets tends to cover refurbishment, replacement of some components, and timely repair, that is a lower cost means to maintain function without having to replace the whole asset. The basic concept is the same: to not allow an asset to degrade past the point where it can only be replaced.

7. **Upgrading** existing assets to make them compliant, more equitable, or safe, or to exploit new technology to better deliver the existing services, should also be included in a definition of sustaining the assets to sustain the service they provide. Replacing 'like for like' is often not the best option, and 'modern equivalent asset' a better default.

These different levels of maintenance can involve work defined as 'capital' or 'on-going operations and maintenance'. The accounting and funding categorization of the work may be defined by a dollar threshold or on whether the work adds to the balance sheet. Funding is frequently more readily accessible for work defined as 'capital'.

However, Asset Management seeks to optimize cost over an asset's useful life, including getting value from the existing assets. This involves considering the optimized combination of several different kinds of work and the best value for money may often come from improved on-going maintenance.

## 3.2 Benchmark for Maintenance Funding

While proper maintenance funding can prevent much more expensive repairs later, identifying a proper benchmark to gauge whether the City of Berkeley's maintenance funding is sufficient can be more art than science. The Society of Maintenance and Reliability Professionals (SMRP) suggests that best-in-class values for total annual maintenance cost should range between .7% and 3.6% of the asset's estimated replacement value. It is safe to assume that assets with longer useful lives, such as underground pipes, are probably on the lower end of that range, and those with shorter useful lives, such as pavement and building components, trend toward the higher end. However, this determination is asset specific, and as the City's asset management practices gain in maturity, City-generated data and analysis will enable the use of more accurate and localized benchmarks rather than a generalized one.

Street Paving Work 2021

04

# CHALLENGES

## 4.1 Aging Asset Base

Much of Berkeley's infrastructure was built before the Second World War, during the Great Depression, as the population grew. Both civic facilities and infrastructure systems are wearing out and require increasing maintenance and renewal.

Aging infrastructure often also does not meet current or future requirements, whether that is safety standards, demand, or equity. The City prepares a Capital Improvement Program (CIP) and the plan for FY2022 outlined a greater need for investments in our public infrastructure. The estimated funding need is over $1 billion and is summarized as follows.

| INFRASTRUCTURE CATAGORY | FUNDING NEEDS $ MILLIONS |
|---|---|
| PARKS, PARK BUILDINGS, POOLS, WATERFRONT, AND CAMPS | 220 |
| PUBLIC BUILDINGS | 285 |
| SIDEWALKS | 10 |
| STREETS AND ROADS | 250 |
| SEWERS | 175 |
| STORM WATER | 245 |
| TRAFFIC SIGNALS AND PARKING | 15 |
| TOTAL | $1.2 B |

▲ **Figure 8:** Capital and Maintenance Costs (continuously updated)

While this estimate is high, known emerging issues will likely drive this estimate higher. These issues include:

- The City is updating its Watershed Management Plan that was last prepared in 2011. The new plan will incorporate new concepts and will likely have different estimated costs.
- The City is preparing a long-term street surfacing plan. The new plan will incorporate sustainable technologies, traffic safety and complete streets concepts.
- The City has prepared a plan to underground overhead utility wires along its evacuation routes to improve safety. The cost of that program is not included in the above estimates.
- This calculation does not yet reflect the cost to implement the City's adopted bicycle and pedestrian plans in future years.
- This calculation does not yet reflect cost estimates related to the to improving Civic Center, including the old City Hall building and the Veteran's building, and the City's Transfer Station.
- This calculation does not reflect the costs of implementing the City's Resilience and/or Climate Plan in future years.
- A Berkeley Marina Area Specific Plan is being prepared that will recommend improvements to the Marina, waterfront, municipal pier and a potential ferry. The planning is not completed yet.

## 4.2 Finance for Sustainability

The City has a need to fund capital improvements and on-going operations and maintenance costs. The estimate in Figure 8 includes both capital and maintenance costs. However, the distinction between what is capital and what is maintenance is currently not well defined. The development of the full AMP will need to analyze the following financing topics.

- Define the threshold for maintenance and capital costs
- Incorporate updates from the long-range infrastructure planning underway
- Define the current level of maintenance funding and prepare an estimate of long-term maintenance funding needed
- Evaluate creating a building replacement fund.

North Berkeley Senior Center in Construction

## 4.3 Emerging Challenges

Emerging challenges to existing infrastructure include planning for an environment that is changing and becoming more challenging. The Vision 2050 process sought to anticipate the changes and to create a future Berkeley that is safe and liveable. Our approach to meeting the challenges include the following:

- To address the multiple risks from climate change, including extreme storm events, wildfires, heatwave, drought and sea level rise. This is on top of the risk of major earthquakes. Our infrastructure will need to be sustainable and resilient in all its aspects, including the use of green technologies, low impact development, undergrounding utilities, water reuse and using long lasting materials.
- To provide infrastructure services equitably to all of our communities.
- To improve the quality of life in our City by having vibrant public realm that includes open spaces, trees, recreational opportunities, community placemaking and safety for bicyclists and pedestrians.
- To incorporate new technologies, including reliable wi-fi available to the public and electrification to reduce our greenhouse gas emissions.

Our infrastructure systems need to be maintained at a state of operational readiness. Letting systems deteriorate will limit our ability to meet the wide range of conditions that are emerging. And keeping these systems in a state of operational readiness means having a workforce that is engaged, well-trained, and healthy.

05

# OVERVIEW OF ASSET PORTFOLIOS

## 5.1 Streets and Roads

There are approximately 215 centerline miles of improved streets in Berkeley and their estimated replacement value is $816,753,950. Every two to three years, portions of Berkeley's streets are inspected using the Metropolitan Transportation Commission's Pavement Management System (PMS) to identify repair needs and assign a pavement condition index (PCI). The City uses the PMS and PCI to track and prioritize pavement rehabilitation and maintenance needs on individual asphalt streets and the overall condition of the City's street pavement network.

The primary purpose of the street rehabilitation program is to maintain a safe surface conveyance system in the public right-of-way for vehicles, bicycles, and transit. The right-of-way also provides pedestrian access and ancillary functions of a storm water conveyance system and the location of public utilities. Regular street maintenance includes Public Works' staff crack sealing and filling potholes, and ongoing capital projects for seals, refreshing markings, and other activities. Asphalt streets are upgraded with a surface overlay or are reconstructed.

The following is a summary of Berkeley's current street condition.

- Of the 215 centerline miles of streets (22mi of arterials, 37mi of collectors and 156mi of residential streets), the current overall average PCI rating is 56 (out of 100). This puts Berkeley's streets in the 'at-risk' category.
- Studies show that $1 invested in pavement treatment early in the pavement's useful life can save $8 spent on more expensive repairs later. Yet the City's annual paving funding is far short of the needed amount to make cost-effective repairs. To keep City streets at the current PCI would require boosting annual funding from approximately $7 million to $15 million, according to the City's pavement management system. With current annual funding, Berkeley's PCI is expected to decline by 6 points (to a PCI of 51) in the next five years.
- The recently updated *Street Maintenance and Rehabilitation Policy* (2022) identified a goal of good condition for the City's streets, which is a PCI between 70 to 79. To reach a PCI in this range would require $115-$200 million or more.
- The needs described above only address the pavement surface, markings, and curb cuts. The costs related to drainage improvements, green infrastructure, and implementation of the City's bicycle, pedestrian, and Vision Zero plans are not included.

The City dedicates approximately $7.5M annually to the maintenance of the City's streets, or .92% of the replacement value. This is at the very low end of the maintenance funding benchmark. Given street condition is "at risk" and declining even more in the next five years, it is clear that this maintenance funding is far short of what is required. Boosting annual funding to $15 million would result in a maintenance over replacement value of 1.84%, which is the mid-range of the benchmark for maintenance funding. The following illustrates some of the work to maintain our streets.

Street surface in need of repairs

Street being repaired

Completed street surface overlay

## 5.2 Sidewalks

The City has 400 miles of sidewalk. Public Works manages a sidewalk repair program to keep the City's sidewalks safe and provide for safe pedestrian passage, including make-safe repairs, annual proactive repair program, and the City's 50/50 replacement cost-share program in which the City shares the costs for broken sidewalks with property owners. Public Works staff respond to all reported sidewalk hazards, assesses each situation and installs an asphalt make-safe or grinds the sidewalk hazard if applicable, and on occasion perform limited sidewalk removal and replacement if a sidewalk hazard can't be made reasonably safe.

These sidewalks have an estimated replacement value of $400,000,000. Approximately $1 million is available in annual funding towards sidewalks maintenance and repair from baseline allocations from the Capital Improvement Fund and 50/50 Program contributions from residents. This represents .25% of sidewalk replacement value, which is at the very low end of the maintenance funding benchmark. This is consistent with the growing backlog of sidewalk repairs and the results of a recent proactive condition assessment of sidewalk, rather than relying on residents reports, that suggests a possible $50M+ backlog of repairs.

The following illustrates some of the work to maintain our sidewalks.

Sidewalk tripping hazard

Sidewalk hazard repaired

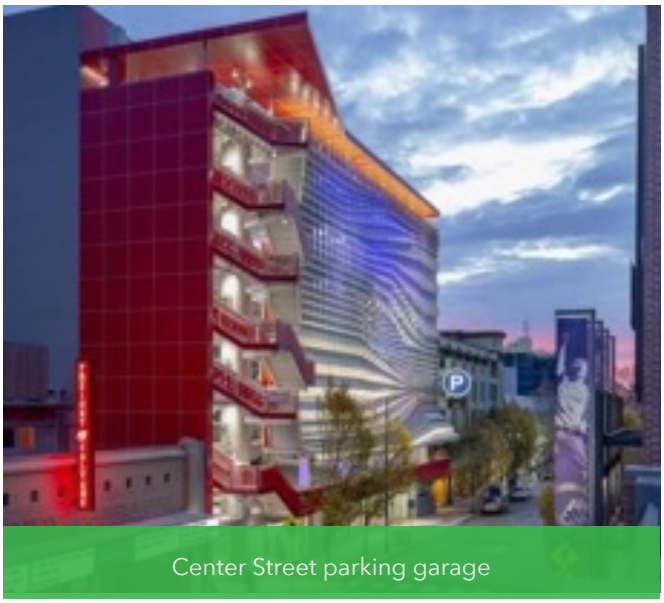
## 5.3 Transportation

The City is committed to improving traffic safety; encouraging transit use, bicycling and walking; and addressing a variety of transportation issues. Public Works' Transportation and Engineering Divisions manage various capital projects related to the City's parking facilities; street improvements; traffic calming measures, such as signs, markings, striping, and traffic circles; and bicycle and pedestrian infrastructure improvements, such as pathways, on-street facilities, and bicycle parking. Multiple transportation capital projects were implemented in the past few years, including:

- Center Street Garage construction completion and opening
- Ordination of the installation of City's 37 Ford GoBike Bike Share stations
- Completion of Ashby Corridor Safety Improvements Project which included bike lanes, new rectangular rapid flashing beacons at Tunnel Road/The Uplands, new pedestrian hybrid beacon at Ashby/Hillegass, and new left turn signal phase at Telegraph/Ashby
- Completion of traffic calming measures along Le Conte Ave., including signal upgrade at the Hearst/Gayley intersection
- Completion of construction of the Shattuck Avenue Reconfiguration, Downtown Berkeley BART Plaza and Transit Area Capital Improvement Projects
- Expansion of the goBerkeley Program in the Euclid/Hearst Area

Public Work's Traffic Maintenance Unit handles maintenance of street signs and pavement markings, the full inventory of which was collected in the last year using 3-D scanning. The department's Parking Meter Maintenance Unit handles maintenance of the parking meters. The City's parking meters have an online management system, and an up-time of 97%. However, the inventory is aging and a replacement of many existing meters is necessary to ensure adaptability to the new 4G networks. Developing replacement values so that the City can benchmark its Transportation maintenance budget is a required next step of the SAMP.

Hearst Avenue complete street



Center Street parking garage

## 5.4 Sanitary Sewers

The City owns and operates 255 miles of sewer mains and 165 miles of lower laterals. Their estimated replacement value is $820,000,000, and annual maintenance funding is $15,140,637. The result is a ratio of maintenance funding to replacement value of 1.85%, which is in the mid range of the maintenance funding benchmark. This level of funding is probably on target, given underground pipes are expected to be on the lower end of the benchmark range and much of the sewer pipe network has been replaced since the 1980's.

In 2014, the City (along with EBMUD and all agencies conveying flows to EBMUD) concluded negotiations with the Environmental Protection Agency and the Department of Justice for violation of the Clean Water Act and agreed to a stipulated settlement known as the final Consent Decree. To comply with the Consent Decree, the City is required to rehabilitate an average of 4.2 miles of sewer pipeline annually based on a three-year rolling average. Effectively, this mandated significant additional maintenance activities and capital improvements, and resulted in increased costs of managing the City's existing sewer system. After a sewer rate study was completed, a series of rate adjustments were adopted beginning in FY 2016 to support the added financial load of the Consent Decree requirements. The City is currently on track to meet rehabilitation mileage targets with revenues generated from sanitary sewer fees, however, the costs per mile for sewer construction have increased since the rate study was completed. These costs will have to be closely monitored going forward over the duration of the Consent Decree, in case funding supplementation from additional sources or future rate adjustments are needed to fund the cost of the required capital improvements.

Storm Drains Repaired

Deteriorated pipe

Green infrastructure

Piedmont Circle

## 5.5 Stormwater and Green Infrastructure

The City's engineered storm drains include approximately 78 miles of underground pipes, manholes, catch basins and cross-drains, all of which have an estimated replacement value of $440,253,101. Annual maintenance funding is $4,397,750, which is 1% of replacement value. Given the life of these assets, expanding green infrastructure requirements, and new threats from more intense, climate-fuelled storms, maintenance funding should probably grow to the middle end of the maintenance funding benchmark range. Assuming near term growth to 1.5%, that would require $6,603,796 of maintenance funding annually, or $2,206,046 more than the current funded amount.

Much of the stormwater infrastructure is over 80 years old and needs substantial rehabilitation. The backlog of projects includes: rehabilitation of pipeline reaches; replacement of deteriorated drain inlets and piping; major cleaning of the primary storm collectors in the lower Berkeley drainage watersheds; and replacement of street cross drains. The City desires to address these issues while forwarding its policies to improve the environment by pursuing Low Impact Development (LID) methods. The City has already started to address implementing LID. In 2012, City Council adopted the City's Watershed Management Plan (WMP). The WMP uses LID methods to develop an integrated and sustainable strategy for managing stormwater resources that addresses water quality, flooding, and the preservation of local creek habitats and the San Francisco Bay. Since then, the City has installed green infrastructure at 30 locations.

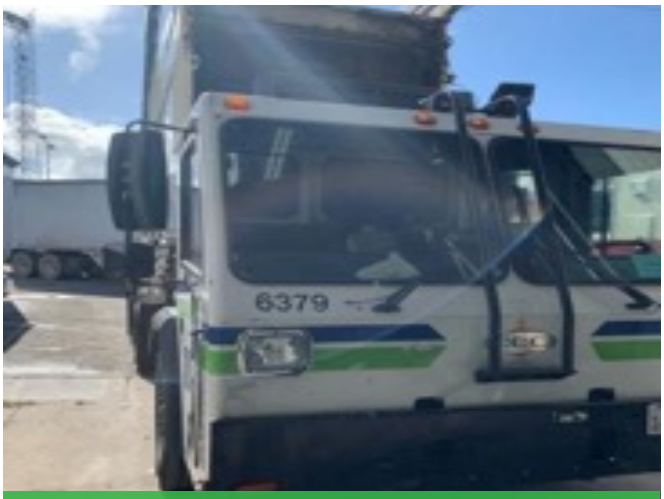
The City prepared a Green Infrastructure Plan (GI Plan) in 2019 as required by the Stormwater NPDES Permit. The GI Plan is a dynamic planning document that includes goals for future green streets retrofits, prioritization tools, and guidelines for incorporating green infrastructure into future capital projects.

The GI Plan and the WMP do not address rehabilitating and replacing the aging infrastructure. The City needs to integrate the findings of the WMP and the GI Plan with requirements to rehabilitate or replace aging infrastructure and address future flows. This integration will be done by preparing a Stormwater Comprehensive Plan, which is kicking off in calendar year 2022.

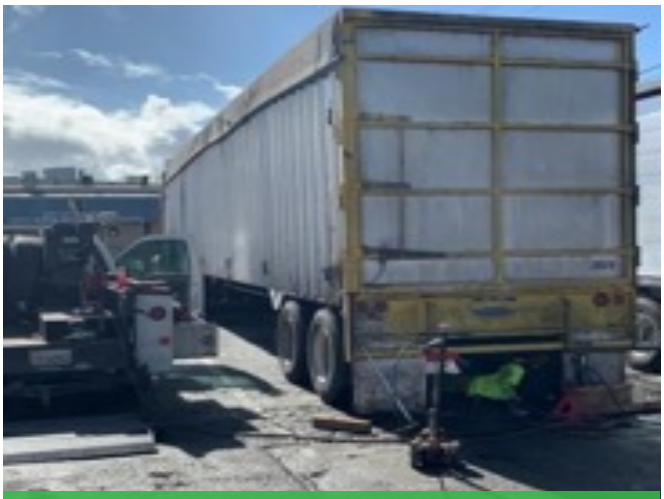
## 5.6 Zero Waste

The Transfer Station, which was constructed in 1982, is in need of a redesign and has an estimated replacement value of $76 million. A Feasibility Study was completed in 2019 and included over 40 hours of public input. The project is proceeding with design/engineering plans (to 10% design level) and CEQA Process (to be completed mid-2023). Currently, the Transfer Station has two below-grade refuse and organic materials load out tunnels that top-load trailers with up to 20 tons materials. The Transfer Station and its ancillary structures and operations are in need of replacement; the facilities are showing considerable wear and tear after thirty 38 years of operation; and the current facilities are not configured for efficient diversion or customer-friendly recycling of incoming materials due to the complexity of a site with one government and two non-profit partners. The Transfer Station replacement is especially important for ensuring the City makes progress towards its goal of Zero Waste.

Transfer Station




Zero Waste



Transfer Trailer

## 5.7 Equipment and Fleet

The City has a fleet of 621 vehicles. All City Departments make annual replacement contributions into the Equipment Maintenance Fund and to the Equipment Replacement Fund. The former funds the mechanics, technicians, and parts and supplies required to maintain the fleet, and the latter funds the eventual replacement of vehicles when they reach or exceed their useful life.

Historically, the Equipment Maintenance Division has been responsible for determining what each Department's replacement contribution will be, recommending a schedule of vehicle replacements to the City Manager, and purchasing the replaced equipment in accordance with the replacement schedule. Staff continue to be identify vehicles on the schedule that can be replaced with electric vehicles. The Division utilizes a newly implemented computerized fleet management system AssetWorks and Syn-tech, fuel management software.

Total replacement value of the fleet is $53,592,626. Vehicles and equipment are a unique asset category not subject the maintenance funding benchmark. The equipment replacement backlog is currently estimated at $13.2 million per the City Auditor's report.

Vactor truck maintenance

Waste collection truck maintenance

## 5.8 Building Facilities

The City is responsible for the maintenance of 95 facilities, not including Library facilities and facilities leased to other entities, which were not part of this analysis. Of these 95 facilities, 39 are in the Parks Recreation and Waterfront's inventory and 56 are in Public Works' inventory. A third-party expert has provided facility condition assessments for 30 of these buildings. All projects included in these assessments are considered maintenance, according to the definition used in this report. Repairs to minor components such as plumbing, electrical, HVAC, painting, etc.—what this SAMP refers to as routine maintenance—are handled by the Facilities Division. Staff have developed a 5-Year Facility Capital Improvement Program with approximately $85 million in building maintenance projects, yet the current budget allocation for this work over that time period is only $4 million.

The total replacement value of the buildings in this inventory exceeds $540 million. The City allocates $4,686,074 annually for maintenance and $900,000 for major refurbishment or replacement of building components. This results in a ratio of 1.04% maintenance funding to replacement value. Given building components are on the higher end of annual maintenance cost according to SMRP guidance, the shortfall is estimated at 2-3.6%, or $5.2 million to $11.7 million annually. Some of this annual funding gap is covered by one-time allocations from the General Fund or T1 funds.

Mental Health Building Renovation

King Park renovation

Berkeley Tuolumne Camp renovation

San Pablo Park playground

## 5.9 Parks, Camps, Recreation Facilities, Waterfront, and Trees

The Parks, Recreation & Waterfront Department (PRW) operates, maintains and manages 52 parks, 4 community centers, 2 clubhouses, 2 pools, 3 resident camps, 15 sports fields, 49 sports courts, 63 play areas, 36 picnic areas, 42,000 street, parks and camp trees, 152 landscaped street medians and triangles, 263 street irrigation systems, and 30 restrooms and out-buildings. In addition, PRW operates and maintains the Berkeley Waterfront and its related facilities, including the docks, pilings, channel, streets, pathways, parking lots, buildings, trails, Adventure Playground, and 1,000 boat and berth rentals.

The unfunded needs in parks, waterfront, pools and camps and infrastructure are estimated at $220 million. The majority of these unfunded needs are at the Waterfront, where many of the docks, pilings, buildings, parking lots and streets have reached the end of their useful life and are starting to fail. As documented in multiple reports over the few years, there is a diminishing ability to pay for the pressing capital needs in the Waterfront. The Marina Fund, which is the City's mechanism for managing all Waterfront revenues and expenditures, is approaching insolvency. Revenues steeply declined in the last two years as a result of safety and security concerns and failing infrastructure. The combination of falling revenue and increasing expenditure needs have strained the relatively small Marina Fund to a breaking point.

The City has begun a long-term planning effort – the Berkeley Marina Area Specific Plan – to establish the community's vision for the Waterfront and a plan for making the Marina Fund viable and stable. There is still a need to address an estimated $10.33 million in urgent infrastructure repairs to finger docks, pilings, electrical systems, and restrooms. If these investments are not made, facilities and infrastructure will either require more costly emergency funding or be closed as in the case of the Berkeley Pier. Waterfront customers will continue to leave the Berkeley Marina, continuing the downward spiral of revenue loss and blight.

06

# REVIEW OF CURRENT ASSET MANAGEMENT PRACTICES

## 6.1 Assessment of Asset Management Maturity

To develop a forward-looking Asset Management Program, current practices were reviewed. This included both project management and on-going maintenance ('Lifecycle Delivery') as well as strategic activities on asset planning, asset decision making, asset information and data, resourcing, and understanding risk management.

To do this efficiently in a short time, AMCL used an existing best practice methodology for assessing Asset Management Maturity and tailored it to Berkeley priorities. A series of workshops were conducted in July 2021 with the managers responsible for maintaining each of the City's asset categories to understand the City's current practices and their understanding of life cycle asset management principles.

A summary of the findings is as follows:

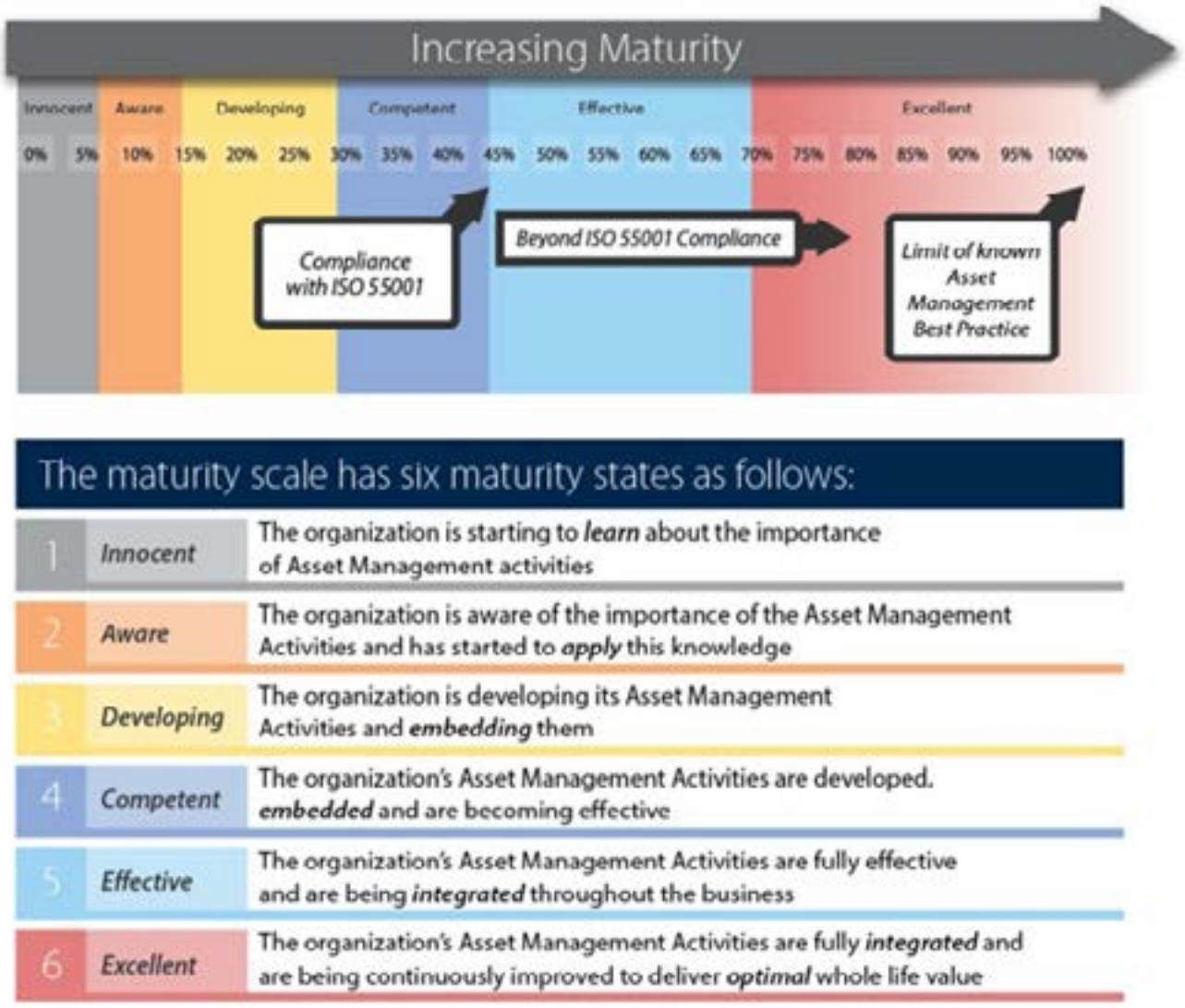
- Small teams are all working hard with limited resources to maintain the assets. Vacancies are of particular concern.
- There is limited pro-active maintenance being done due to the lack of resources, especially in some areas such as with facilities and building maintenance.
- There is encouraging evidence of good practice such as capital project management, reliability engineering and a promising start on life cycle management with sewer maintenance.
- A key development will be the successful implementation of NexGen, a new IT system for asset data and work management. Teams are enthusiastic about this development, although this cannot happen without sufficient resourcing on the data processes needed to populate and maintain the core asset data.
- Based on AMCL's experience, the City's Public Works and Parks, Recreation & Waterfront Departments measure up well on Asset Management understanding against many U.S. cities. The U.S. municipal sector is generally less developed in Asset Management compared to places where it has been practiced for a longer time (such as the U.K., Australia and Canada). This gives the City a good start to learn from good practice elsewhere.

The questions posed to each workshop (one each on streets & transportation assets; sanitary sewers, stormwater & green infrastructure assets; parks, recreation & waterfront assets; facilities and buildings; vehicles; and zero waste assets) were organized in these assessment categories:

| Assessment Catagories |
|---|
| Asset Strategies |
| Demand Analysis |
| Asset Management Planning |
| Optimization |
| Capital Investment Decision-Making |
| Resourcing Strategy |
| Asset Creation & Acquisition |
| Maintenance Delivery |
| Fault & Incident Response |
| Asset Information Strategy |
| Asset Information Systems |
| Data & Information Management |
| Cost data |
| Procurement & Supply Chain Management |
| Asset Management Leadership |
| Competence Management |
| Risk Assessment & Management |
| Asset Performance Monitoring |
| Asset Health Monitoring |

▲ **Figure 9:** Topics covered in Workshops

The results were tabulated using a standard approach to 'maturity', as shown on Figure 10.




▲ **Figure 11:** AMCL AM Maturity Scale

The average score against the scale was 24%, with some areas higher and some lower than this. To put the results in context, fully meeting the international standard on Asset Management, ISO 55000, would require an average of 45%. The City of Berkeley is currently rated at the 'developing' level. This means that the City has a good start for developing an AMP.

The average score across the Public Works and Parks, Recreation and Waterfront departments is shown on Figure 11.

James Kenney Park

| AVERAGE MATURITY SCORE | |
|---|---|
| **Assessment Catagories** | **Average Score** |
| Organizational Direction | 20% |
| SAMP | 25% |
| Asset Strategies | 28% |
| Demand Analysis | 30% |
| Asset Management Planning | 35% |
| Optimization | 31% |
| Capital Investment Decision-Making | 35% |
| Resourcing Strategy | 20% |
| Asset Creation & Acquisition | 21% |
| Maintenance Delivery | 31% |
| Fault & Incident Response | 36% |
| Asset Information Strategy | 19% |
| Asset Information Systems | 22% |
| Data & Information Management | 26% |
| Cost data | 10% |
| Procurement & Supply Chain Management | 20% |
| Asset Management Leadership | 20% |
| Competence Management | 15% |
| Risk Assessment & Management | 15% |
| Asset Performance Monitoring | 26% |
| Asset Health Monitoring | 24% |
| **Total Average** | **24%** |

▲ **Figure 12:** Major Infrastructure Systems in Berkeley

## 6.2 Summary of Asset Management Gaps

The following is a summary of the current gaps in having a full Asset Management Program.

1. Asset Planning needs to be integrated to move beyond reactive work to sustainable proactive maintenance, both with capital renewals and on-going work. Vision 2050 explicitly calls for integrated planning. Planning should optimize different activities and should integrate across short, medium and longer-term perspectives.

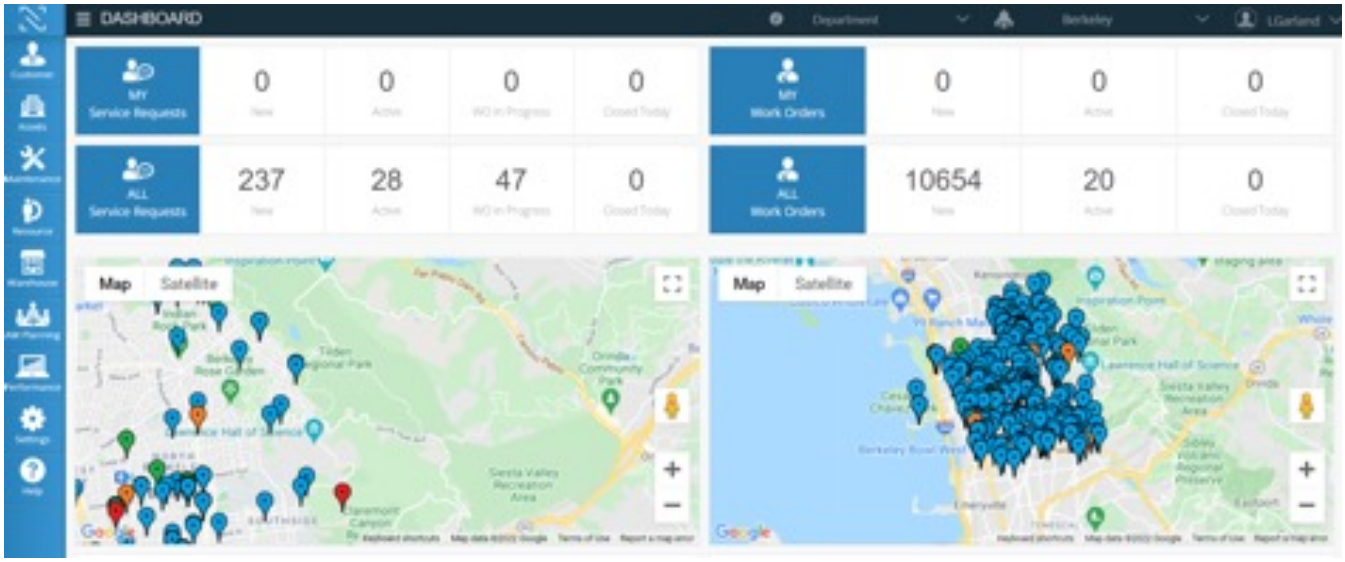
   Integrated planning supports a realistic understanding of funding and resourcing needs going forward. Progress should be monitored and reported, and the principle of continuous improvement applied to the planning itself – that every planning cycle learns from the last one, towards increasing maturity in meeting City objectives.

2. A more strategic approach to Asset Information, including appropriate data governance processes, is needed to understand what information is needed to make asset decisions, how the City will collect that information, and how the City will ensure that the information is accurate and of good quality.

3. The operations and maintenance costs of infrastructure systems are not currently captured and tracked, which hinders the ability to understand lifecycle costs and determine optimal strategies for each type of asset.

4. The next steps are to ensure an overall understanding of an ISO 55000-type Asset Management system and to put an AM effective framework in place, to build on what is already there and implement good practice Asset Management across the different service areas.

One important step already taken by the City is the implementation of NexGen Asset Management software in Public Works operations. The system went live at the end of 2021 and it will be valuable in maintaining asset inventories, in issuing work orders and maintaining a record of work accomplished.




▲ **Figure 13:** Screen Shot of NexGen system

07

# STRATEGIC ASSET MANAGEMENT OBJECTIVES

**The following are AM objectives developed through this SAMP.**

1. Develop an internal communications and awareness plan around an ISO 55001 compliant AM system.
2. Develop a communications and awareness plan of sustainable Asset Management with external stakeholders.
3. Prepare a plan of the organizational structure, staffing resources, consultants, and system programs needed to fully implement an AMP. This should be prepared in time for the FY2023 budgeting process.
4. Develop an understanding of the maintenance funding shortfalls and to place a revenue measure on the November 2022 ballot.
5. To move towards preparing an annual maintenance plan across asset classes that increases transparency and defines the critical required maintenance, the funding and resources to perform the work.
6. To increase the AM maturity score year over year.
7. To have a long-term projection of the infrastructure repair and replacement cost and schedule across all asset categories. The goal is to have pro-active maintenance while minimizing risks and optimizing costs.
8. Maintaining a record of work accomplished.

# 08

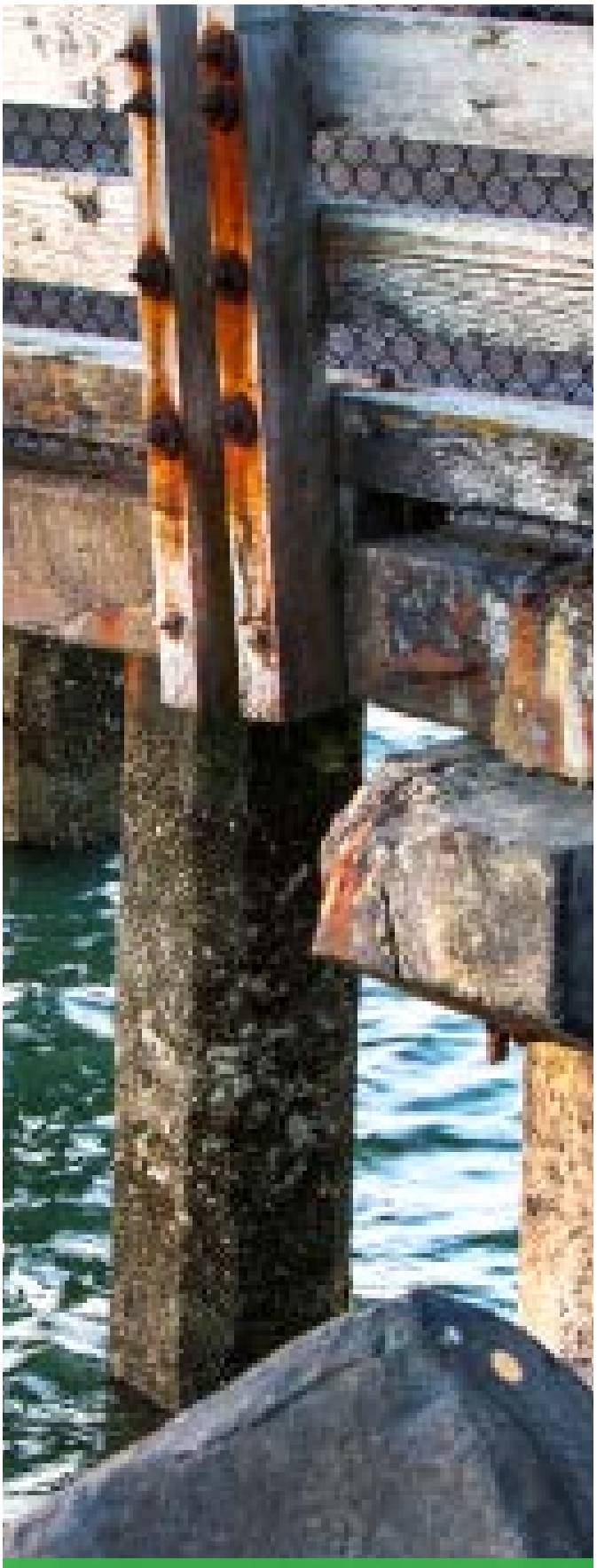
# ROADMAP FOR IMPLEMENTING AN AM PROGRAM

This section presents a proposed 'roadmap' of key initiatives in the next two years for moving to implementing an effective Asset Management Program.

## 8.1 Principles for AM Policy

We propose that a City policy on Asset Management be presented to the Council along with this SAMP report. The following are some principles to be included with the policy.

- **Life Cycle Approach** – Apply a life-of-an-asset methodology for managing infrastructure assets, including planning, acquisition, operations, maintenance, renewal and surplus or disposal.
- **Financial Stewardship** – Understand the resources and funding required to sustain the assets to deliver defined levels of service, through appropriate asset cost, risk and performance information
- **Service Level** – Understand the service level and use of each asset to inform the prioritization of asset maintenance or replacement as it relates to the capital improvement plan.
- **Risk Mitigation** – Understand and mitigate risk associated with physical assets based on their condition and usability.
- **Process Optimization** – Continuously seek opportunities and tools to improve asset management processes.
- **Standard Operating Procedures (SOP)**– Establish and, as processes and tools change, update SOPs to allow for consistent implementation of asset management policy principles.
- **ISO 55000** - Compliant Asset Management system based on Plan-Do-Check-Act with targets, independent audit and continuous improvement.



Marina dock in need of repairs

# 8.2 AM Roadmap

This report proposes a 'roadmap' of key Asset Management initiatives from now until 2024 to build an effective AMP. Asset Management Roadmaps generally plan for an implementation period of 18 to 24 months. The intent is to develop near term 'quick wins' and to set the foundation for longer term processes. A major part of any successful AM Roadmap is communications and awareness building.

This Roadmap describes the implementation activities and schedule, forming an Asset Management Steering Committee, identifying an Asset Management Program Manager and the team and a recommendation for resources.

## Implementation Activities and Schedule

The following activities are proposed from the beginning of 2022 to the end of 2023.

### Work Activities in 2022

The activities in 2022 are to launch the AMP and to incorporate the needs of Asset Management in the FY2023 budgeting process. The activities shall include the following.

1. Develop funding requests for staffing and consultant support in the FY2023 budget.
2. Conduct outreach to internal staff and external stakeholders on the AMP.
3. Continue expanding inventory of assets and include replacement values.
4. Continue expanding condition assessments of assets.
5. Form an Asset Management Steering Committee and create a charter.
6. Prepare a job description for an Asset Management Program manager and staff and begin the recruitment upon approval of funding.
7. Prepare data on current maintenance budgets, estimated budget needs and options for funding the shortfall.
8. Implement the NexGen software system.

### Work Activities in 2023 and 2024

With the Asset Management team in place, the work activities through 2023 shall include the following.

- Prepare a manual of inital Asset Management Standard Operating Procedures.
- Prepare a clear definition of capital versus maintenance and the required budgets for each.
- Define equity and how Asset Management can promote it in Berkeley.
- Communicate progress to internal staff and external stakeholders.
- Continue expanding inventory of assets.
- Continue expanding condition assessments of assets.

## Asset Management Steering Committee

We recommend that an Asset Management Steering Committee be formed to guide the implementation of the AMP. The members of the

committee could include the following people:

- Director and a Deputy Director of Public Works Department
- Director and Deputy Director of Parks, Recreation and Waterfront Department
- Assistant City Manager
- Finance Director or his designee
- Other staff, commissioners, or residents with expertise in Asset Management
- We recommend that the committee prepare a charter that defines the objectives and performance goals for an AMP.

## Asset Management Program Manager and Team

**We recommend that an Asset Management Program Manager be hired or appointed from current staff.** Asset Management is about people, relationships, assets and strategies. We will need an AM leader that has knowledge of each. The responsibilities of the person shall include the following.

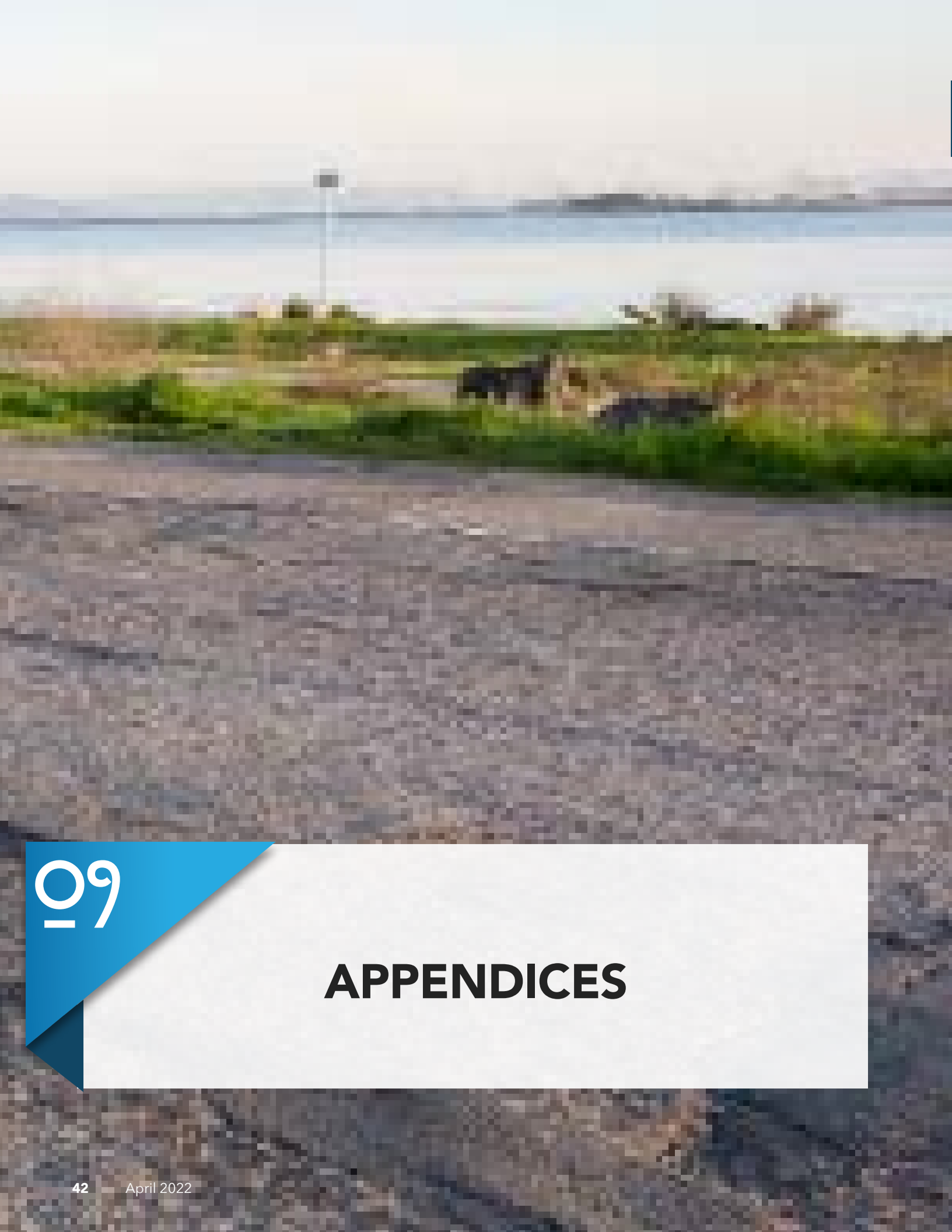
- Coordinate the preparation of Asset Management Standard Operating Procedures
- Lead the implementation of Asset Management, including AM training and communications
- Define capital versus maintenance and develop models for tracking funding needs
- Key role in defining the asset information strategy
- Key role in defining the asset risk framework
- Focus for improved asset decision techniques and models

**We propose that the Asset Management team include two other staff. Their skills can be in budgetary analysis, condition assessment, asset management software, risk analysis or other related topics.**

## Resource Requirements

The following resources are likely to be needed to support the Asset Management team.

- Funding for consultant services to support the preparation of Standard Operating Procedures, strategies and funding analysis
- Funding for consultant services to support improving inventory and condition assessments
- There is the potential for additional software needed to implement the AMP



09

# APPENDICES

# Appendix A: Aknowledgements

## City of Berkeley

Liam Garland, Director
Public Works

Scott Ferris, Director
Parks, Recreation and Waterfront

Ray Yep, Vision 2050 Implementation Team Lead (volunteer)

Margo Schueler, Vision 2050 Implementation Team Co-lead (volunteer)

Andrew Brozyna, Deputy Director
Public Works

Farid Javandel, Deputy Director
Public Works

Christina Erickson, Deputy Director
Parks, Recreation and Waterfront

Joe Enke, Manager of Engineering
Public Works

Input from Division Managers in the Public Works and Parks, Recreation and Waterfront Departments

## Consultant Team

### AMCL

Ruth Wallsgrove, Project Manager

Nick Lee, Project Engineer

### Bellecci & Associates

Daniel Leary, Principal

# Appendix B: Glossary of Terms

### Asset Categories

A logical grouping of similar assets or equipment types used to categorize, organize and manage the asset portfolio. Also termed 'asset type' in ISO 55000. IAM definition: Grouping of assets having common characteristics that distinguish those assets as a group or class. This is normally defined using pragmatic asset management considerations rather than theoretically defined by value, size or criticality.

### Asset Class Strategy

The document or group of linked documents that states how City of Berkeley will achieve the objectives for an asset class or family. The Asset Class Strategy will consider all phases of the asset life cycle, including design, procurement, operations and maintenance, the approach for capital replacements and upgrades over the asset's life cycle, and retirement and salvage.

### Asset Information Strategy

The Asset Information Strategy is the plan and process to achieve and implement identified improvements to asset information. The Asset Information Strategy defines the current and future states, along with priority improvements in support of the Asset Management System.

### Asset Planning

Data driven planning that improves operational, maintenance and capital forecasting of potential needs, and optimization of portfolios of investments to realize the greatest value from assets while operating within established constraints.

### Asset Life Cycle

Time interval that commences with the identification of the need for an asset and terminates with the legal disposal of the asset and any associated liabilities. The phases of an asset life cycle include initiation, planning, design, construction or installation, hand-over, operations and maintenance, replacement/ refurbishment, decommission/ retirement and salvage/disposal.

### Asset Life Cycle Delivery

The execution of asset operations, maintenance and investment plans.

### Asset Management Capabilities

An organization's people, processes, technology, leadership and culture to derive and deliver value from its assets to meet the needs of the organization and its stakeholders in a sustainable manner.

### Asset Management Enablers

The tools, processes, skills and competencies that support effective asset management.

### Asset Management Maturity

The level of an organization's AM capability normally assessed by a standard proprietary or non-proprietary assessment tool; effectively a benchmark of the organization against a standard (such as ISO 55000) or database of other organizations.

### Asset Management Objective

The plan and process to achieve and implement an identified improvement to the asset management system. The SAMP identifies foundational asset management objectives that are necessary to build and improve City of Berkeley's asset management system.

### Asset Management Plan (AMP)

An Asset Management Plan provides a typically 5-plus years forecast of capital and operating requirements for asset systems and classes to achieve the appropriate balance of asset cost, performance and risk to meet the organization's asset management objectives.

### Asset Management Policy

The approved Policy which expresses the key AM principles to be applied to all decision making when managing the organization's assets.

### Asset Management Roadmap

The program of asset management initiatives that City of Berkeley has in place to develop and improve its asset management capabilities and asset management system.

### Asset Management System

The Asset Management System is the set of people, processes, tools and other resources involved in the delivery of asset management, including governance.

### Asset Sustainment Requirement

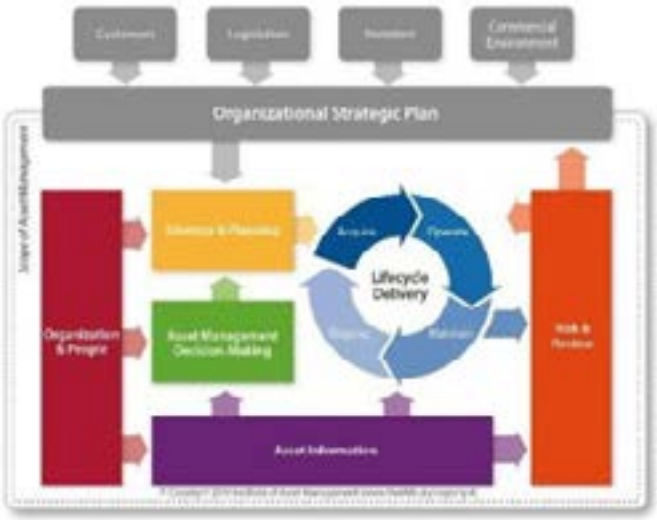
Work plan identifying all work activities required to maintain a specific asset throughout its lifecycle, as identified by the asset strategy. It includes both resource requirements and forecasted capital and operating expenditures.

### Asset System

An Asset System is a grouping of assets; usually grouped for reporting, organizational, technical or financial purposes. Example in City of Berkeley include a sewer or stormwater network, a fleet of vehicles, or a parking meter system.

### Six Box Model

Widely used diagram of main elements of Asset Management, from the Global Framework for Maintenance & Asset Management Asset Management Landscape. These six elements are: Organization & People, Strategy & Planning, Asset Management Decision Making, Asset Information, Lifecycle Delivery, Risk & Review.




### ISO 55000 Series

The international standard on Asset Management. Often referred to as ISO 55000, the 'meat' of the standard is in ISO 55001.

### Optimize

To achieve by quantitative or qualitative method, as appropriate, the best value compromise between conflicting factors such as performance, cost and risk within established constraints.

### Strategic Asset Management Plan (SAMP)

A SAMP translates the corporate goals and objectives to Asset Management Objectives and documents the strategic actions identified to build and improve the asset management system. The SAMP lays out a roadmap for the ongoing build out of City of Berkeley's Asset Management System to meet organizational objectives and challenges and define performance targets for the assets.

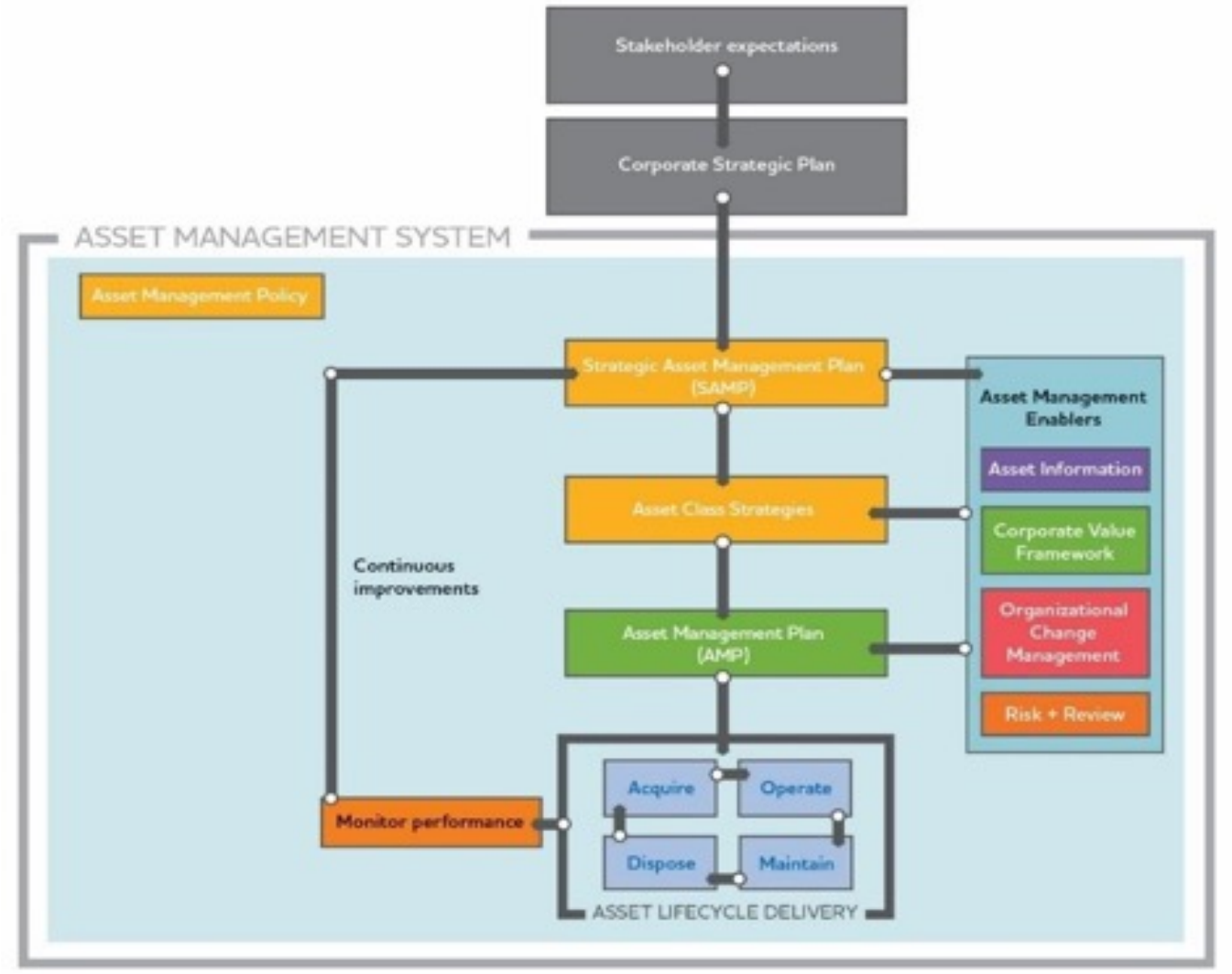
The Corporate SAMP – this document – is a City of Berkeley wide strategy driven by corporate challenges and the Corporate AM Policy.

## References

The following references were used in the development of this terminology list:


- ISO 55000 Series, 2014
- BSI PAS 55-1 Asset Management Part 1: Specification for the optimized management of physical infrastructure assets, 2008
- Institute for Asset Management (IAM) Definitions https://theiam.org/knowledge/definitions
- IAM Asset Management: an anatomy, version 3, December 2015
- International Infrastructure Management Manual, 2015

# Appendix C:
# Typical AM System Framework



# STRATEGIC ASSET MANAGEMENT PLAN

City of Berkeley

APRIL 2022

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CityofBerkeley.info