Countywide
Strategic Asset Management Plan (SAMP)

El Paso County Asset Management – Infrastructure, Strategic Plan

May 2024

Prepared for:

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The contents of this document were derived based on communications with El Paso County and represent a snapshot in time of that information, to the extent that it was made available to this work. This work is based on a desktop review of information and was not scoped to involve field observations. Any cost estimates provided in this document should not be considered of an accuracy greater than Class 5 as defined by the Association for the Advancement of Cost Engineering (AACE). This document is not technically exhaustive. All information provided is intended to provide planning level information to support future investment discussions. As projects are further planned, the high recommendation is made that detailed feasibility, design, and estimating efforts be completed that specifically consider required actions, determine scope, identify necessary code and regulatory compliance requirements, costs, priorities, sequence, and to identify the most efficient implementation approach.

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Acronym List

AASHTO	American Association of State Highway and Transportation Officials
AM	Asset Management
BoCC	El Paso County Board of County Commissioners
CAD	Computer-Aided Design
CAMS	Capital Asset Management System
CDOT	Colorado Department of Transportation
CI	Condition Index
COA	Course of Action
CoF	Consequence of Failure
DoD	Department of Defense
DOT	Department of Transportation
DPW	Department of Public Works
EPC	El Paso County
GIS	Global Information System
GPS	Global Positioning System
IAM	Institute of Asset Management
IIMM	Infrastructure Management Manual
ISO	International Standards Organization
KPI	Key Performance Indicator
LCC	Life Cycle Cost
LED	Light Emitting Diode
LoS	Levels of Service
MAMF	Matrix Asset Management Framework
MCA	Multi-Criteria Analysis
MODA	Multi-Objective Decision Analysis
O&M	Operations & Maintenance; Operate & Maintain
PACES	Parametric Cost Engineering System Software
PoF	Probability of Failure
PRV	Plant Replacement Value
RoF	Risk of Failure
ROI	Return on Investment
SAMP	Strategic Asset Management Plan
SoGR	State of Good Repair

Key Definitions for This Particular Program

The following key definitions have been defined and/or adapted particular to El Paso County's Countywide Asset Management Program. The definitions written out below are considered most key and uniquely defined for this program out of asset management terminology. Definitions of additional terms are per those from the ISO 55000 Series on Asset Management and the Institute of Asset Management.

Asset - In the County's Asset Management Program, an "asset" is a physically tangible infrastructure item that has potential or actual value to the organization. It usually has a typical replacement value of $5000 or more, a typical useful life of 1 year or more, is the lowest level for which a work order is assigned, and/or is highly critical due to service, lack of redundancy, safety, regulatory compliance or other priorities. Additionally, it may be determined by the County as useful to track and manage.

Asset Management – The coordinated activity of an organization to realize value from its asset. It involves the balancing of costs, opportunities and risks against the desired performance of assets to achieve an organization's objectives. It is typically more strategic and proactive than solely the management of assets and may involve multiple organizational levels and consideration of cross-departmental objectives and resources across the long-term.

Consequence of Failure (CoF) – How impactful an asset's failure is to the organization's mission and performance.

Management of Assets – The day-to-day operation of physical infrastructure assets, typically reactively, to meet their needs. It typically focuses on the short-term to keep assets operational, such as repairs, maintaining current methods and functions, tracking asset locations and conditions, and attaining performance levels in the near-term. Typically, it lacks emphasis on a strategy beyond maintaining operation, long-term strategy, and cross-departmental objectives and resources.

Probability of Failure (PoF) – How likely an asset will fail.

Risk of Failure (RoF) – The effect of uncertainty on an organization's mission and performance should an asset fail. It is determined by the product of the numerical score of the factors of PoF multiplied by CoF. The key equation to keep in-mind when considering risk-based prioritization, and the framework within this SAMP and its child TAMPs is *RoF = PoF x CoF*. This is a common approach to risk analysis and is based on standards, such as ISO 55000 Series on Asset Management and ISO 31000 regarding risk management.

State of Good Repair (SoGR) – According to the AASHTO Transportation Asset Management Guide, SoGR refers to a condition in which existing physical assets, both individually and as a system, are functioning as designed within their useful service life and are kept functional through regular maintenance and replacement programs.

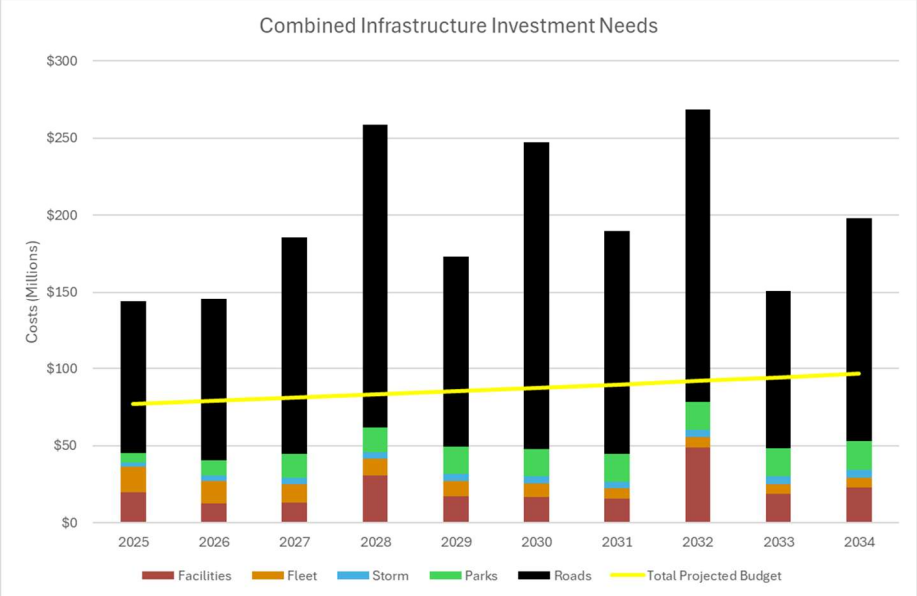
Executive Summary

El Paso County provides a diverse range of services essential to the community's quality of life. The delivery of many County services depends on physical infrastructure assets. These citizen-owned government assets provide a foundation for a community to thrive economically, culturally, and environmentally. Managing existing assets and planning for future assets influences the quality and reliability of essential governmental services provided to the public. Effective infrastructure management is a strategic priority for County executive leadership and elected officials, as reflected in the prioritization of asset management (AM) in the County Strategic Plan to address this need, and AM addresses many of the more general aspects of the Plan. The Countywide Asset Management program also is of great value to its emergency response, especially for fires and floods. This best practices-based Countywide AM Program enables the County to have a cohesive, systematic, and formalized process based on industry best practices contained in the International Standards Organization (ISO) 55000 series on AM. To this end, the County partnered with Matrix to develop its first Countywide Strategic Asset Management Plan (SAMP) and AM Capabilities Improvements Roadmap for the following asset classes:

- Facilities
- Fleet
- Parks
- Transportation
- Stormwater

Progress of Countywide AM through This Project. Much collaborative progress has been made assessing, planning, establishing, ramping up, and delivering the Countywide AM Program based on industry best practices, experience, and the County's unique case:

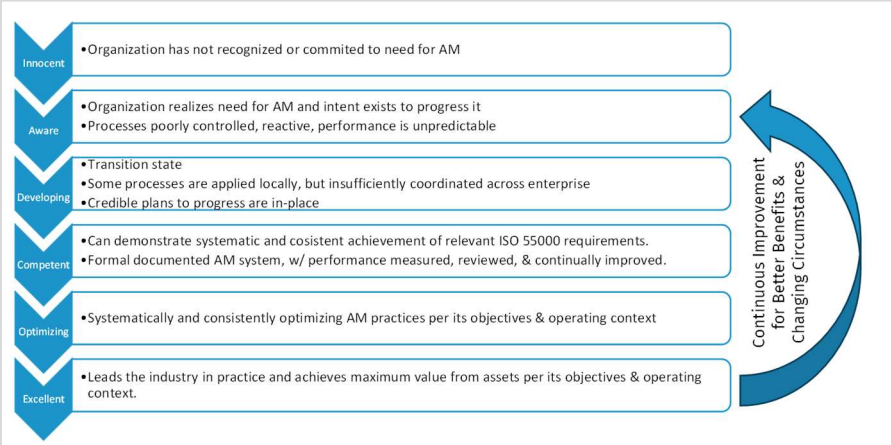
- Countywide Asset Management Policy
- Communications Plan
- Strategic Asset Management Plan (SAMP) with a rolled-up merged investment needs forecast
- Tactical Asset Management Plans (TAMP) for each asset class
- Building a model and framework for determining the investment needs, timing, and risk-based priorities for each of the five major asset classes across the lifecycle of their assets.
- Infrastructure investment needs multi-year forecasts, iterative scenarios, and tailored infrastructure investment recommendations
- Levels of Service (LoS) and Key Performance Indicators (KPI) creation and refinement
- Asset Management Capabilities Assessment with a Recommended Improvements Roadmap



Previous AM Efforts and Status. Individual departments responsible for each of the five major asset classes have historically made strides in AM over time, some in more recent years, and others over decades. These efforts were built upon and refined to stand up the Countywide AM Program. Additionally, the AM Capabilities Gaps Assessment and Improvements Roadmap have identified various AM capabilities that still need enhancement. The most urgent of these gaps is improving asset data quality. Key characteristics of data quality include aspects such as completeness, consistency, accuracy and precision, uniqueness, timeliness and currency, validity, format, relationality, interoperability, accessibility, and useability. Deficiencies in asset data quality exist in multiple of these aspects in most cases. Data is the foundation of an AM program, and a significant effort in which to invest to realize the benefits of AM to accomplish the intents and goals and principles of the County's Strategic Plan and Countywide AM Policy. The emphasis of the AM Program so far has been to produce the products in the bulleted list above. Near-term future efforts should prioritize improving data quality, and refining, formalizing, and documenting AM processes, roles and responsibilities, maturing AM capabilities to support pursuing a State of Good Repair (SoGR), and after other capabilities have matured, further advancing performance monitoring through deeper integration of service levels in the risk framework.

Strategic Focus and Vision of Future Operations. Through the course of the establishment of the Countywide AM Program, the County has selected the SoGR philosophy around which to orient its AM strategy and vision. This also supports the notion of advancing the Countywide AM Program to risk-based prioritization, but also towards optimization, to the extent that existing County capabilities enable. The County has expanded upon the definition of SoGR provided at the beginning of this document with the notion of driving its asset investment strategies around keeping its most important assets in good condition, improve the condition of its most important assets that are in bad condition, and generally catch up improving the condition of the rest of the assets.

Next Steps. The standup of the Countywide AM Program has created initial capabilities at the Countywide level and has set the framework and script for the path forward for AM. The Institute of Asset Management (IAM) highly orients itself around ISO 55000 and recognizes seven sequential phases through which to achieve AM: policy and strategy development, planning, implementation, capabilities development, performance improvement and ultimately asset knowledge. The County has progressed these through this program. Together with continuous improvement of capabilities and performance the County has set a good path to mature its Countywide Program rapidly over near-term years.



AM Continuum based on Matrix's distillation of ISO 55000, IAM, and British Standards Institute PAS-55 Standard for AM

Introduction

El Paso County provides a diverse range of services essential to the community's quality of life. The delivery of many County services depends on physical infrastructure assets. These citizen-owned government assets provide a foundation for a community to thrive economically, culturally, and environmentally. Managing existing assets and planning future assets influences the quality and reliability of essential governmental services provided to the public. Effective infrastructure management is a strategic priority for County executive leadership and elected officials, as reflected in the prioritization of asset management (AM) in the County Strategic Plan to address this need.

El Paso County is dedicated to providing safe and reliable infrastructure, facilities, and recreational assets that enable the quality-of-life residents and visitors rely on. In addition to the myriad of day-to-day needs and best business practices reasons to implement a Countywide AM program, a highly important need and driver of a best practices-based Countywide AM program is emergency response, especially for fire and flood. Recreation and snow removal are also significant geographic-specific drivers for AM at the County. The County's facilities and fleet need to be in good shape to be operable and comfortable for their occupants for the County to operate. Stormwater infrastructure must perform to attain water quality compliance and prevent flooding. Roadways must be of sufficient and safe condition to transport the County's residents and visitors. This best practices-based Countywide AM program will help the County to better respond through improved knowledge and stewardship of its assets, understanding which assets are most critical to invest in for maintaining and replacing them to sustain their level of service.

Like many organizations, investment needs of these assets far outpace the funds and resources available. Intentional planning and proactive management of infrastructure assets are critical to supporting the County's citizens and achieving desired levels of service now and into the future. AM directly addresses this.

The County has recognized the value of AM and stated that implementation of an organization-wide AM Program is a strategic priority and vital objective. The County's physical assets deliver a diverse range of services essential to the community's quality of life. Effectively managing existing assets and planning for future growth will directly impact the quality and reliability of essential services the County makes available to the public.

AM ties directly to multiple County objectives and values indicated in its Strategic Plan. Specifically, implementing AM will improve effectiveness, quality of service, and optimize responsiveness to risks such as fire and floods. An organization-wide AM approach will improve transparency and defensibility of future investments given the limited availability of public resources.

Developing a County-wide Comprehensive Asset Management Program enables the County to have a cohesive, systematic, and formalized process based on industry best practices contained in the International Standards Organization (ISO) 55000 series on AM. To this end, El Paso County partnered with Matrix to develop its first Countywide Strategic Asset Management Plan (SAMP) and improvement roadmap for the following asset classes:

- Facilities
- Fleet
- Parks and Recreation

- Transportation
- Stormwater

Asset Management Conceptual Model, Adapted from IAM 2014

Per the Institute of Asset Management (IAM), asset management (AM) is the "balancing of costs, opportunities and risks against the desired performance of assets to achieve an organization's objectives." This SAMP is a comprehensive document, developed in accordance with International Standards Organization (ISO) 55000 Series on Asset Management, and is designed to guide the effective and efficient management of the County's assets**.** This plan aligns with the County Strategic Plan to "…sustainably fund, manage, and improve public-owned infrastructure" and supports the accomplishment of the five goals/tasks outlined by the El Paso County Board of County Commissioners (BoCC) in its Strategic Plan's first stated objective, which focuses on the County's infrastructure:

1. Complete a comprehensive inventory and condition assessment of public infrastructure in each of the five major asset classes.
2. Implement a Comprehensive Asset Management Program.
3. Develop Infrastructure Asset Management Plans for the five major asset classes.
4. Define a multi-year financial strategy to determine how multi-year capital plans and operations/maintenance costs drive annual budget appropriation schedules to meet stated service levels.
5. Publish a public-facing asset scorecard that baselines and racks the condition of the infrastructure in each of the five major asset classes.

Background

Many needs and drivers exist for the County to perform AM. The County has wisely realized the need to perform AM across its organization for its five major asset classes, and to develop a wholistic view of managing its assets at the Countywide level.

The County has performed AM at varying levels of advancement for select assets, such as pavement and bridges, for over a decade. In more recent years, it has done so increasingly for all five of its major asset classes. Both its historical efforts and newer efforts have made important progress on which further advancement is necessary to address the strategies and needs of the County, but also are a useful foundation upon which to build current and future AM efforts.

In 2023, the County kicked off its most formal initiative yet to develop a Countywide AM program. In collaboration with the County, Matrix assisted it with:

- Devising the Countywide AM policy, and related approach and business rules.
- Establishing a best-practices framework for AM at the Countywide level.
- AM communication planning
- Creating the County's first Countywide SAMP to help manage the entire portfolio of its infrastructure assets across its major asset classes.
- Developing Tactical Asset Management Plans (TAMPs) that are specific to applying AM to each of its five major asset classes and the prioritized and optimized investment needs they have, but that also consider the common Countywide perspective of AM and strategies applied to the direction of those TAMPs to incorporate with the asset owner team of each of their five major asset classes.
- Formulating asset levels of service (LoS) and key performance indicators (KPIs).
- Performing a Countywide-level AM capabilities gaps assessment and recommended improvements roadmap of the Countywide-level of the organization and also of its five major asset classes.

The County and Matrix have worked together to steer the course of the work on the activities above, navigate challenges encountered, and collaborate to deliver innovative, tailored solutions to accomplish the objectives of these initiatives. These efforts to set up, establish, and ramp up the Countywide AM Program have been built on industry best practices and standards, skills and expertise of these team members, experience, and the unique needs of the County now and to support it going forward.

Purpose and Scope of This Document

The County Strategic Plan features four vital objectives that reflect the County's strategic priorities. Objective One focuses on County infrastructure:

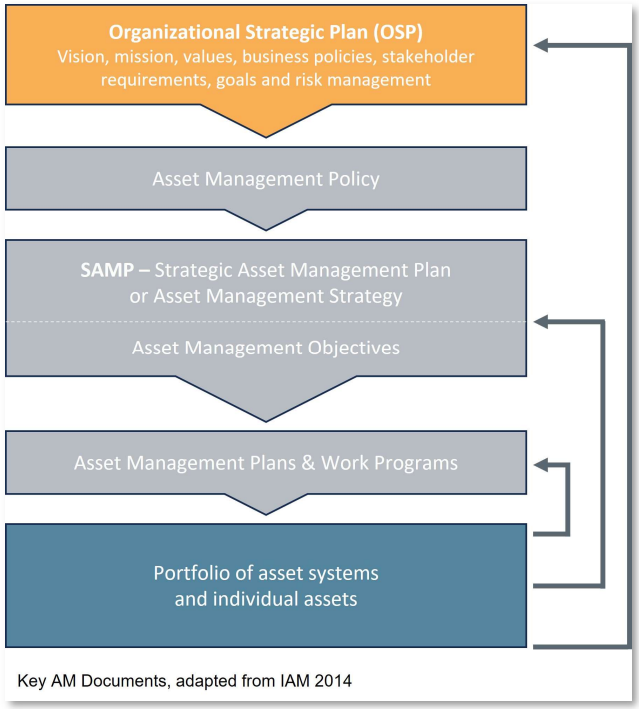
- To assess the condition of the roadway, stormwater, facility, fleet, park assets, and implement strategies to sustainably fund, manage, and improve public-owned infrastructure through implementation of a Comprehensive Asset Management Program
- Development of Asset Management Plans for the five major infrastructure asset classes
- Define a multi-year financial strategy to determine how multi-year capital plans and operations and maintenance (O&M) costs drive annual budget appropriation schedules to meet stated service levels.

This SAMP sets the trajectory for these and drives them.

The SAMP is part of the initiative to establish, ramp-up, and deliver El Paso's Countywide AM Program. The SAMP is derived from the County's Strategic Plan and its Countywide Asset Management Policy.

The SAMP applies the County's strategies to set the strategic direction for its infrastructure assets. Its intent is to trickle down and convert the aspects of the Strategic Plan to AM. The "Key AM Documents", adapted from IAM shows how the organization's strategy is developed first that leads to the AM policy that will inform the SAMP and subordinate TAMPs, which apply the Strategic Plans elements to each of the five major asset classes. The Countywide AM Program is aligning with the best practices of the Institute of Asset Management (IAM), which are largely based on ISO 55000 and other industry standards and best practices.

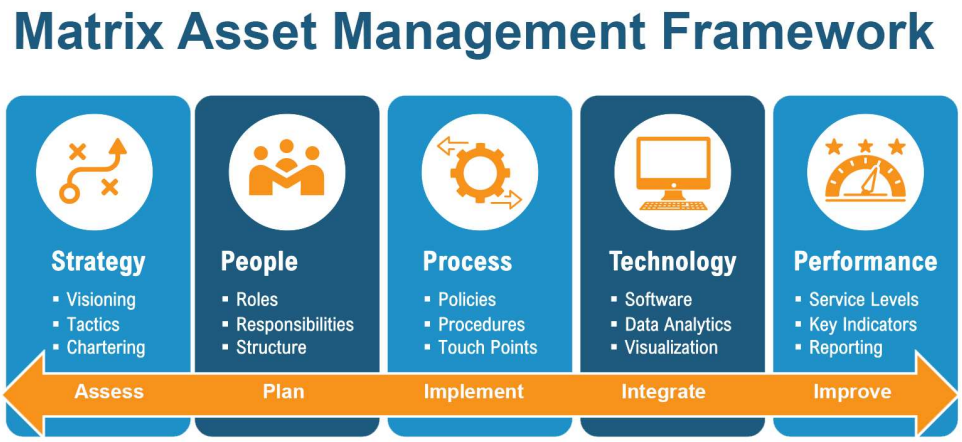
Given the tasks outlined in the RFP and the short-time line to deliver on them, Matrix followed a similar approach with parallel tracks for the SAMP and TAMP that makes the most sense for the County. This approach aligns with ISO 55000 and IAM standards, while at the same time providing a tailored, practical solution for the County to adopt and implement in the near-term and that is solid to build upon going forward. The County's TAMPs are child documents to the SAMP and utilized to apply tactics to plan and enable how the County's infrastructure asset classes will be managed to accomplish these strategies. This is summarized in the Key AM Documents figure, which summarizes the trickle-down of an organization's strategic plan down through its policy and into applied tactics in its individual asset class management plans.



Key AM Documents, adapted from IAM 2014

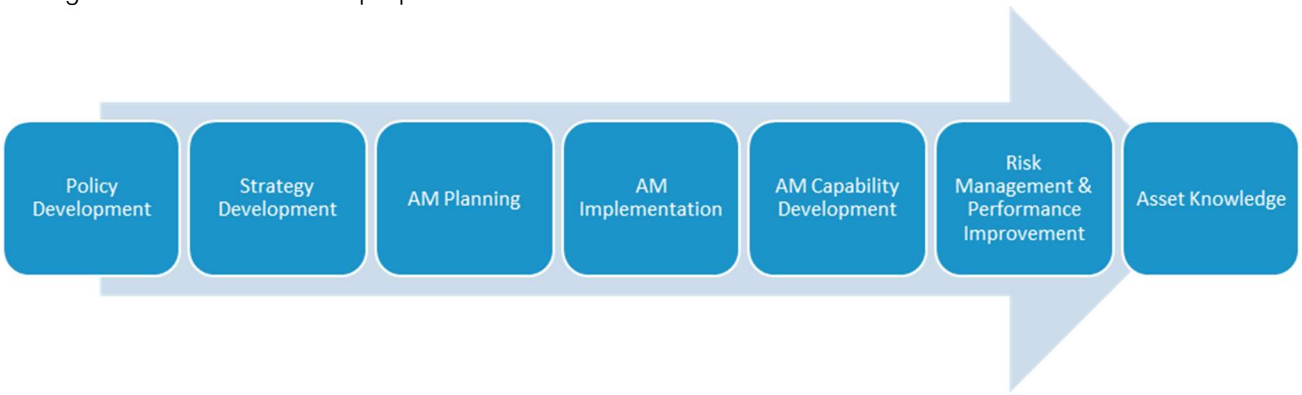
The Matrix Asset Management Framework (MAMF) is an approach that organizes and simplifies the many aspects of AM standards, best practices, and experience into a framework. The aspects of the MAMF have been taken into consideration in the Countywide AM Program and this SAMP. The authorized scope of the program currently and, thus, this SAMP focus on some of these aspects of the framework more than others. For instance, the authorization's greater emphasis is on Strategy, Data, and Performance; less formal emphasis on People and Technology; and lesser formal emphasis on Process. However, these have all been considered and addressed to some extent in establishing the Program, and in the AM capabilities

gaps assessment and recommendations. For instance, Matrix examined technology utilized for AM and supporting capabilities among the different asset classes, their departments, and other departments



interfacing with them. A process was devised for developing the Tactical Asset Management Plans (TAMP) for each of the County's five major asset classes and the selection of the iterations and scenarios pursued and selected. Additionally, roles and responsibilities for AM have been examined for each of the assets' departments, as well as which ones do what with regards to implementing the Countywide Asset Management Policy.

The IAM recognizes that a purpose of AM is to optimize the delivery and performance of physical assets. In this endeavor, IAM highly orients itself around ISO 55000 and recognizes seven sequential 'roles' through which to achieve this purpose.



AM programs are iterative in maturing their capabilities, to stay updated, to consider scenarios and develop sound solutions, and to continuously improve for better benefits and efficiency. The Program will be revised as information and updates are gleaned from the assets, systems and TAMPs. The iterative nature of the AM journey is what ensures the long-term viability and success of the organization-wide AM program. While most of these steps typically follow a linear process to establish AM capability and mature it over time through performance measurement and continuous process improvement, real world application of these standards follows a more coordinated approach, and hence another reason for the application of the MAMF.

Objectives

The Countywide AM Program has aimed to develop a systematic process of cost-effectively deploying, operating, maintaining, upgrading, and disposing of assets. It has been designed to manage assets to maximize value and service life and minimize the total cost of ownership. Higher level documents of the Program, like this Countywide SAMP and the Policy have a broad focus of the trajectory and strategies applied for AM across the County. The TAMPs have a deeper focus on the tactics, analytics, service levels, and more detailed aspects of its Countywide AM.

Through the course of establishing this AM program, capabilities have been established or improved to address the following business objectives of this County project:

- Adopt an AM Policy
- Develop an AM Strategy
- Implement AM Plans
- Define service levels for each asset class and how they are measured and monitored
- Develop a comprehensive multi-year capital investment plan that maintains the asset portfolio at the highest level of service for the lowest cost
- Develop methods and tactics to identify the AM gaps, risks, and improvement opportunities and how they are prioritized and addressed.
- Develop a framework for monitoring, evaluating, and reporting on the progress and outcomes of the AM program, including,
    - Key Performance Indicators (KPIs)
    - Performance Review Schedule
    - Reporting on Achievements and Challenges
    - Communication Plan
    - Feedback Mechanisms
    - Continuous Improvement Processes

To effectively manage assets over a variety of activities, clear objectives must be defined to establish a roadmap and framework to guide the county's actions, ensure efficient use of resources, and enhance accountability and transparency within the organization. The following are key objectives of this plan:

1. Optimize Asset Lifecycle and Sustainability: Implement strategies to maximize the lifespan and performance of assets, ensuring they are maintained, upgraded, or replaced as needed. Incorporate sustainable practices in asset management to reduce environmental impact and promote green initiatives.

2. Enhance Fiscal Management: Develop and utilize a long-term financial strategy that supports asset management goals, manages risks, while balancing budget constraints.

3. Data-Driven Decision Making: Utilize data analytics and technology to inform decisions, improve transparency, and increase efficiency.

4. Community and Stakeholder Engagement: Foster collaboration and communication with stakeholders to align asset management with community needs and priorities.

5. Improve Service Delivery: Ensure that assets are managed in a way that enhances service delivery to the community, aligning with public needs and expectations.

Policy

The Countywide AM Policy is included in the Appendix. Plans of the County and its departments emphasize establishing AM programs to leverage asset data and analytics in a transparent manner, and in decision-making to help use taxpayer resources effectively. Infrastructure is one of the County's targeted vital objectives identified as Objective One in its Strategic plan.

The development of the Countywide AM Policy as part of the setting up of the Countywide AM Program provides a clear policy directive for the County and supports the direction set by the Strategic Plan. This policy aligns with the County's principles, vision, purpose, and values reflected in its Countywide Strategic Plan, including its vital Objective One for Infrastructure. The policy builds on a history of recent strategic plans directing the County to perform AM and other strategies that at least indirectly required multiple AM activities and milestones to accomplish those strategies.

The Policy has been developed with the County's visions and values in mind and to highlight its commitment to align its actions with the Countywide Asset Management Program. This policy applies key County strategies for asset departments to act on pertaining to AM. As ISO 55000 notes, an AM policy formally expresses the AM intents and direction of an organization.

Documenting a policy on AM at the Countywide level is a best practice that is important to show leadership's formal sustained directive for its departments to perform aligned AM across its departments as part of its routine daily business. It is also consistent with industry standards, such as ISO 55000 and others. AM is not a one-time effort, but a best practices-based ongoing way of conducting daily business.

Establishing the requirement through formal policy to perform AM empowers and supports departments to take action to do AM so the County can realize the benefits of AM and allocate the necessary resources to support it. Examples of benefits are mentioned in ISO 55000 and other sources. Alignment through a policy directive such as this helps staff to understand that AM is important, that it is happening and routine way of doing daily business, and it can help them feel more supported in identifying new and better ways of performing their daily duties and decisions, including creativity and innovation, to accomplish the County's goals effectively and efficiently.

The Countywide AM policy governs decisions on AM at the County to orient the further development and implementation of the County's AM. It applies to all assets planned, designed, constructed, operated, and/or maintained by the County among facilities, fleet, parks, roadways, and stormwater asset classes and their teams. The policy applies to all employees, contractors, consultants, and partners associated with the County.

The County commits through the policy to work collaboratively with the asset owners of assets owned by other agencies and promote the principles outlined in the policy. The policy is collaboratively formulated and recommended by the Countywide Asset Management Committee (Committee). The Policy recognizes that Committee will conduct an AM workshop at least annually to collaborate, achieve consensus on cross-asset optimization, and subsequently recommend asset planning budgets in at least near-term years.

Communications

Communication is addressed for the following:

- Project Communications – Regarding the project to establish and ramp-up the Countywide AM Program for the present and near-term efforts of the project. This is summarized in a separate document.
- AM Communications – Regarding the Countywide AM efforts and Program with an emphasis on AM and strategically looking towards the future. This is summarized below.

AM Communications

Key AM Topics to Broadcast

Some key AM topics to broadcast to internal and external stakeholders are below. These could be included in newsletters, on the website, with the Accountability Dashboard, and other mediums. Recurrent communications are often helpful to serve as reminders and to educate newer stakeholders.

- What AM is
- AM Benefits
- Goals of AM (Data-Driven, Transparent, Justified, Strategic, Proactive)
- Deferred Maintenance, and Implications Thereof
- State of Good Repair (SoGR), and The Associated Transition
- Probability of Asset Failure
- Consequence of Asset Failure
- Service Levels
- Key Performance Indicators
- Risk of Asset Failure
- Prioritization
- Optimization
- Cross-Asset Optimization
- Multi-Objective Decision Making
- Scenario, Alternatives, and Trade-offs Analysis
- Industry Best Practices and Standards
- AM Integration Points
- Work Orders
- Success & Meaningful Progress & Benefits of AM Program

Policy Announcement

Once a policy on AM has been approved by leadership, it should be communicated internally throughout the organization. It should also be readily accessible to those performing and responsible for AM at the County. Formal announcement of the approval of the policy and what it says should closely follow its approval.

Awareness & Education

Ongoing promotion of AM and its key education points through strategic communications with various County stakeholders is important for a successful AM program. Outreach is important to County leadership teams, asset class teams, and other key stakeholders to have meaningful conversations around AM and this project.

Successfully building increasing awareness about AM principles and maintaining it involves a strategic and comprehensive approach to ensure that key stakeholders understand the importance, benefits, and implementation of these principles. Key elements include:

1. Clear Communication Strategy. A clear and concise communication strategy is important that outlines key messages about AM principles. Tailor communication to different stakeholders, considering their level of familiarity with asset management concepts.

2. Educational Initiatives. Conduct training sessions, workshops, and seminars to educate stakeholders on the fundamentals of AM. Provide educational materials, such as brochures, manuals, and online resources, to support learning.

3. Engagement with Stakeholders. Actively engage with key stakeholders, including employees, executives, and external partners, to discuss the benefits and implications of adopting AM principles. Seek feedback and address concerns to ensure a positive reception.

4. Leadership Support. Gain support from organizational leaders and executives to endorse and champion AM principles. Leaders should communicate the strategic importance AM and set an example for others.

5. Customized Messaging. Tailor messages to highlight specific benefits that resonate with different stakeholder groups (e.g., cost savings, improved efficiency, risk mitigation). Emphasize how asset management aligns with overall organizational goals and objectives.

6. Demonstration of Value. Provide real-world examples and case studies that illustrate the tangible benefits of implementing asset management principles. Highlight success stories from other organizations that have effectively integrated asset management into their operations.

7. Consistent Communication Channels. Utilize a variety of communication channels, including internal newsletters, intranet portals, emails, and social media, to ensure consistent messaging. Regularly update stakeholders on progress, achievements, and any changes related to asset management.

8. External Stakeholders. Also consider engagement, education, and open channels of communication with the public and partners about AM efforts underway, what they are, benefits, and make them tangible to lay audiences.

9. Integration with Organizational Culture. Integrate AM principles into the organization's culture and values. Emphasize how AM contributes to long-term sustainability and resilience.

Advocacy

A primary objective of Countywide AM is to achieve consensus and endorsement from the BoCC of AM needs and recommendations, associated budget elements, and subsequent implementation. Executing an effective advocacy campaign aimed at gaining their endorsement requires a well-coordinated approach that incorporate each of the following facets:

1. Clear and Compelling Message. Messages should be clear and compelling that succinctly convey the purpose, benefits, and importance of AM aspects. Messages should be tailored to resonate with the values and priorities of the Commissioners.

2. Research and Data. Provide robust research and data to support the proposal. Use facts, statistics, and case studies to strengthen the credibility of each argument. Clearly articulate the potential positive impact of the decision on constituents or the community.

3. Identify Key Decision-Makers. Identify and understand the key decision-makers who have the authority to support or endorse messages or requests to the BoCC. Tailor messaging to address the specific concerns and priorities of these decision-makers.

4. Coalition Building. Build coalitions and alliances among organizational influencers and leaders, as a united front can enhance the credibility and strength of the advocacy campaign.

5. Engagement and Relationship Building. Establish relationships with decision-makers through meetings, briefings, and other forms of engagement. Cultivate ongoing relationships to ensure they are receptive to advocacy efforts.

6. Strategic Timing. Choose strategic timing for your advocacy campaign, aligning with key decision-making milestones or events. Be aware of the political calendar and consider times when decision-makers may be more receptive.

7. Advocacy Materials. Develop well-crafted advocacy materials, including fact sheets, policy briefs, and infographics. These materials should be easily digestible and serve as quick references for the Commissioners.

8. Monitoring and Adaptation. Monitor the political landscape and be prepared to adapt your advocacy strategy based on emerging developments or shifts in priorities. Stay agile and responsive to changes that may impact the decision-making process.

Dissemination of AM communications across appropriate County personnel is crucial to overall project success. As AM evolves, future iterations of maturing AM capabilities, progress, successes, and updates will add more granularity to specific engagement milestones, stakeholders, goals, objectives, products, and accomplishments.

Strategic Focus and Vision of Future Operations

Through the course of the establishment of the Countywide AM Program, the County has selected the State of Good Repair (SoGR) philosophy around which to orient its AM strategy and vision. This also supports the notion of advancing the Countywide AM Program to risk-based prioritization, but also towards optimization, to the extent that existing County capabilities enable. The County has expanded upon the definition of SoGR provided at the beginning of this document with the notion of driving its asset investment strategies around keeping its most important assets in good condition, improve the condition of its most important assets that are in bad condition, and generally catch up improving the condition of the rest of the assets. The County selected SoGR because it is a proven strategy, of high

performing physical infrastructure organizations; SoGR enables organizations to be more strategic, proactive, more cost effective, and achieve better infrastructure performance over time. In the immediate future, SoGR translates for the County to keep its most important assets a SoGR condition of Good and strive for keeping and getting the rest of its asset portfolio in a SoGR condition of Fair or better. Once achieved and sustained, this goal can be raised to a higher level.

Asset owners of each of the County's five major asset classes may strive for higher condition levels such as Satisfactory, or Excellent. Pursuing SoGR will involve some growing pains as it requires to shift from addressing any asset in Poor condition first to focusing on SoGR. Inherently, some lower priority assets may be allowed to fail, most ideally in a predictive manner and timing, while the organization shifts to pursuing and achieving a SoGR. In the long run, this will be most cost efficient for this public infrastructure and deliver the best service to the County's citizens.

SoGR is also well aligned with the desires of the County and its citizens because it is consistent with many elements of the Countywide Strategic Plan and the Countywide AM Policy. SoGR also aligns with core principles of the County, such as low cost and quality of service; it also pursues trust through transparency as AM capabilities and metrics become further matured to organize and communicate information about the SoGR of the County's assets and subsequent progress. Some of the intents expressed by the AM Policy that can be achieved through the pursuit of SoGR include:

- Improve communication, coordination, and collaborative decision-making across the asset portfolio.
- Become more data-driven and science-based, resulting in more defensible, clear, and transparent justification for infrastructure needs, priorities, strategies, and decisions with internal and external stakeholders.
- Become more best practices-based in AM for better benefits, such as:
    - Maintain the asset portfolio at the highest service level for the lowest lifecycle cost.
    - Mature AM capabilities across strategy, people, process, technology, and performance to better accomplish goals and realize benefits.
    - Prioritize and optimize asset renewal to begin closing the funding gap and reach a more strategic, proactive, cost-saving position with predictive maintenance to avoid a costly 'worst-first' reactive approach.
    - Become more performance-driven through asset service level risk analyses.
    - Implement a standardized, repeatable, and best practices-based framework to streamline AM.
    - Strategically innovate by digitizing and automating where possible.
    - Improve and maintain asset data quality for better asset tracking and control.
    - Roadmap capability improvements and accomplish them to shift to be more proactive, efficient, and effective.
    - Strategically mature towards the best practice philosophies of SoGR, Reliability Centered Maintenance (RCM), cross-asset optimization, and Multi-Objective Decision Analysis (MODA), and Multi-Criteria Analysis (MCA) at an extent most useful to the County and as the maturity of its AM capabilities are able.
    - Pursue measuring, monitoring, reporting, and continuously improving its performance of AM.

SoGR is a guiding beacon. If it is pursued and attained from the condition and performance perspectives, then many other aspects of AM are falling into place. In its infancy at organizations, condition is often the sole factor focused upon in SoGR. As the County's AM

capabilities mature, its SoGR philosophy can also begin to incorporate more additional considerations relating to performance into its SoGR.

Business Rules

The Countywide AM Policy recognizes that Committee will conduct an AM workshop at least annually to collaborate, achieve consensus on cross-asset optimization, and subsequently recommend asset planning budgets in at least near-term years.

Implementation of scalable business rules for AM across the County organization is important. These have been scaled particular to this agency, this asset class, and this asset class's asset owners, and the current level of maturity of existing AM capabilities of these. These are also driven by the perspectives of the Countywide AM Policy.

TAMPs should be updated at least every 5 years, and more frequently as an organization's AM capabilities mature to accommodate more frequent updates to information and, hence, subsequent analyses. Annual updates are useful to assist with the County's annual budgeting cycle to reflect asset updates and the AM analyses about them such as triggers for maintenance or replacement, changes in service levels, new services or needs that may require assets to be modified or developed, and considerations in the budgeting and prioritization process and their associate scenarios, alternatives, and recommended courses of action. As AM capabilities mature, business rules are expected to become more refined.

Matrix offers the following guidance for developing business rules to ensure consistency, efficiency, and effectiveness across a diverse inventory of infrastructure assets and operation. Especially the setup of the Countywide AM Program and its TAMPs particularly help to address many of these.

1. Standardized Maintenance Procedures: Develop and document standardized procedures for conducting routine maintenance tasks such as inspections, repairs, and preventive maintenance. Ensure that these procedures apply to the various types of assets in the portfolio and can be easily scaled up or down based on asset complexity and usage.

2. Asset Data Administration: Infrastructure asset inventories and condition assessments should be conducted at the desktop and/or in the field at routine intervals, the timing of which depends on in which of the County's five major asset classes the asset is. Updates to asset inventory, condition, and other data should be reviewed and updated if necessary as part of the work order response.

3. Asset Prioritization Framework: Establish a framework for prioritizing maintenance and replacement activities based on factors such as asset condition, consequence, safety risk, and budget constraints. This use of data-driven decision-making enables the effective allocation of resources and addresses high-priority needs first. This TAMP has established the initial version of this framework. In this case, assets were assigned a consequence score that aids in prioritizing the assets within the model.

4. Performance Metrics and KPIs: Define key performance indicators (KPIs) and benchmarks to monitor the performance of assets, maintenance activities, and service delivery. Track metrics such as asset use time, maintenance backlog, customer request response times, and customer

satisfaction to assess performance and identify areas for improvement. The Countywide AM Program has established the initial version of these for this framework.

5. **Compliance and Regulatory Standards:** Ensure compliance with applicable regulatory requirements, industry standards, and best AM and maintenance practices. Establish protocols for documenting compliance activities, conducting audits, and promptly addressing non-compliance issues.

6. **Budget Allocation Guidelines:** Develop budget allocation and resource planning guidelines based on asset lifecycle needs, maintenance priorities, and strategic objectives. Consider factors such as asset age, condition assessment data, usage patterns, cost, and funding availability when determining budget allocations for maintenance and replacement.

7. **Risk Management Protocols:** Define risk management protocols for identifying, assessing, and mitigating risks associated with asset maintenance and recapitalization activities. Establish procedures for conducting risk assessments, implementing control measures, and monitoring risk exposure to minimize liabilities and ensure safety. The TAMPs have built upon and further matured the framework for this.

Business rules above and the approach framework below guide asset owners and County leadership through integration and prioritization of requirements. They also codify a logical, defensible, transparent, and repeatable process for developing and approving annual infrastructure investments and projected future funding needs. These are subsequently leveraged to and from the SAMP and TAMPs.

Approach Framework

The AM Program, including this SAMP, are based in particular on the ISO 55000 series of standards on AM, the International Infrastructure Management Manual (IIMM), the Institute of Asset Management (IAM), and other key standards, best practices, cases, experience, adjacent regulatory requirements, and the County's unique case. The SAMP and the overall Countywide AM Program have been setup to

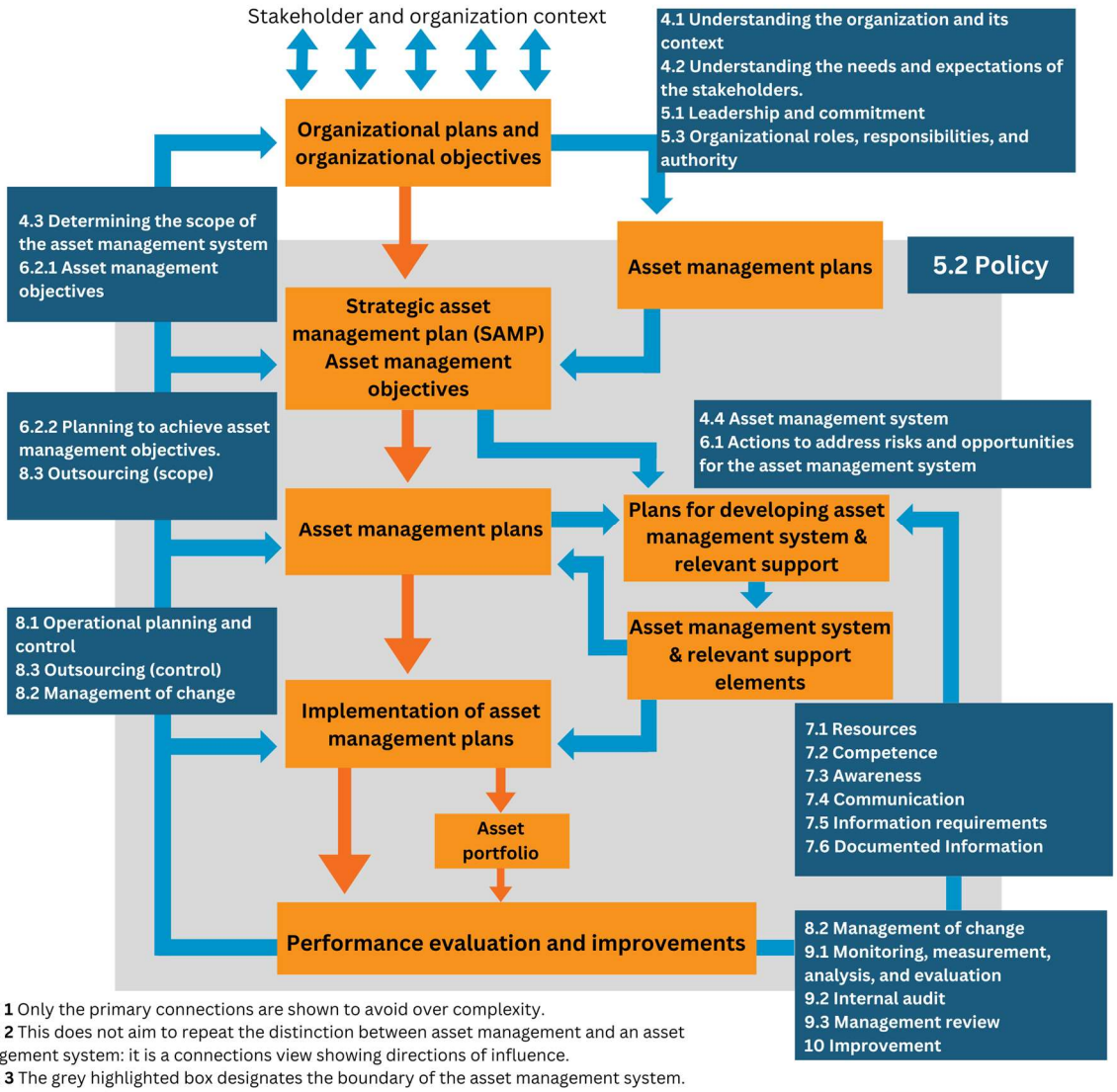
steer the County towards AM best practices models desired by the County that are further on the maturity continuum of AM capabilities and benefits. The Matrix Asset Management Framework (MAMF) has been utilized as an approach that integrates and aligns key AM aspects into a proven and practical consistent application of the resources mentioned above to formulate the Countywide AM Program. It is also a simplified distillation of these many resources around which to frame development, discussions, and execution.

- *Strategy* – Includes visioning, identification of high priority principles, communications, and organizational structures and capabilities.
- *People* – Considers the multiple roles, responsibilities, and enablement of human capital.
- *Process* – Examines procedures, workflows, and interfaces among process elements.
- *Technology* – Recognizing that information management is at the heart of AM strategies, this looks at the needs and abilities of software, data, and how these are leveraged.
- *Performance* – Considers measuring, monitoring, reporting, and communicating performance.

The MAMF is a the key organizational elements structured in a manner conducive to many business practices, including AM.

The relational diagram from IAM shows the practices, system, and functional relationship between the AM elements in the establishment of the Countywide AM Program. It shows how the framework of elements of the system of the Countywide AM Program fit together.

The figure below shows the relationship between the key elements of an asset management system, together with the related clauses in ISO 55001.



NOTE 1 Only the primary connections are shown to avoid over complexity.
NOTE 2 This does not aim to repeat the distinction between asset management and an asset management system: it is a connections view showing directions of influence.
NOTE 3 The grey highlighted box designates the boundary of the asset management system.

Relationship between key elemets of an asset management system adapted from ISO 55001:2014

The Tactical Asset Management Plans (TAMP) for each of the five major asset classes are supported by the information of the AM system. The AM system is also leveraged in evaluating the effectiveness of the TAMPs over time.

Strategy

Strategy sets direction and provides empowerment of the roles within an organization. Countywide AM strategy is driven by:

- County Strategic Plan
- Countywide AM Policy

- This SAMP
- Updates as needed to these per routinely occurring reviews thereof

People

The People category of the MAMF regards roles and responsibilities involved in the Countywide AM Program. At a high level, the following are involved with the AM Policy, SAMP, and preparing and updating the TAMPs of the five major asset classes.
Roles and responsibilities for acting on this policy include:

- County Administrator and Deputy County Administrator - Responsible for preparing, updating, implementing, and enforcing the policy; articulating organizational values and defining priorities to implement this policy; approving the policy, priorities, and resources to implement the policy; allocating asset funding through multi-year plans. The Deputy County Administrator or her delegate chairs the Countywide AM Committee.
- Board of County Commissioners – Responsible for providing final direction on approving policy, priorities, and resources to implement the policy, and allocating asset funding through the budgeting process.
- Countywide Asset Management Committee - Responsible for leading the implementation and adoption of AM and its policy across the departments of the five major asset classes and within their divisions and work groups, collaborating and considering cross-asset trade-offs, and allocating appropriate resources to the implementation of the AM Policy, SAMP, TAMPs, and Countywide AM capabilities improvements. The Committee is responsible for integrating investment needs forecasts of the disparate asset classes to produce an annual County infrastructure investment plan and related courses of action (COA). Exceptions to model and requirements/portfolios experiencing extenuating circumstances should be discussed and adjusted or added to the program in line with judgment and leader discretion. The following County teams have representation on this committee: Administration, Financial Services, and Digital, Strategy, and Technology Departments; and the Facilities, Fleet, Parks, Stormwater, and Transportation asset class teams.
- Asset Class Owners - Responsible for applying risk framework to their portfolio/assets and determining factors used to calculate consequence and probability of failure scores. In doing this they are responsible for defining scoring scales; defining LoS and corresponding, KPIs, maintaining asset data about condition, age, material, capacity, and other key asset attributes; following AM best practices; executing AM workflows for their asset class, and continuous improvement of AM practices. They will use risk framework to develop prioritized list of prioritized investment needs forecasts for their portfolio and supply these to the County's Countywide AM Committee and annual budgeting process.
- All roles that are responsible for AM activities at the County are responsible for implementing the policy, acting upon the SAMP, and preparing and implementing the TAMPs.

More specifically, DPW has already proceeded with creating AM roles to lead AM in this department, to support them with cross-utilized staff across AM and other key needs such as GIS and data management, and to identify AM roles within the department's teams, as reflected in the DPW Asset Team table. Defining and summarizing the responsibilities associated with these roles will be an important next step.

Asset Teams comprise individuals in leadership and operational positions who play key roles in the lifecycle of the applicable assets. These cross-functional teams, along with the Asset Management Office, actively monitor the assets and contribute to the planning efforts associated with them.				
ASSETS			ASSET TEAM	
Parent	Child	Grandchild	ENGINEERING	HIGHWAY
Roadways	Paved		Const Services Mgr	Urban Superintendent
		Intersections	Const Svc Pavement Eng	Asphalt Foreman
	Gravel			Urban Superintendent
		Intersections		Urban Blades Foreman
				Rural Superintendent
				Rural Blades Foreman
Bridges	Deck		Const Services Mgr	Gen Maint Superintendent
		Joints	Const Services Bridge En	Bridge Team Lead
	Substructure		Const Services Bridge Insp	
	Superstructure			
Stormwater	Culverts		Stormwater Manager	Gen Maint Superintendent
	Inlets		Stormwater Engineer	Rural Superintendent
	Outfalls		Stormwater Coordinator	Rural Drainage Foreman
	Basins/Ponds			Urban Drainage Foreman
	Walls			Stormwater Team Lead
	Crosspans			
	Curb & Gutter			
	Channels			
	Junctions			
	Rivershed			
	Watershed			
	Weather Sensors			
Traffic	Supports	Signs	Traffic Engineer	Gen Maint Superintendent
		Signals	Transportation Planner	Traffic Foreman
		Lighting		
	Signal Controllers			
	Traffic Counts			
	Striping			
Barricade	Guardrails			Gen Maint Superintendent
	Fences			Gen Maint Foreman
	Cattleguards			
	Barriers			
Multimodal	Sidewalks		Const Services Mgr	Gen Maint Superintendent
	Ped Ramps		Const Services Engineer	
	Bike Routes			
	Markings			
	Shelters			
	Park & Rides			
ROW	ROW	Plats	Asset Systems Supervisor	
		Deeds	Inspections Supervisor	
		Easements	Survey Manager	

DPW's AM roles and teams serve as examples of an AM organizational structure that the other major asset classes can consider adopting and adapting to their AM. Similar roles and responsibilities and descriptions can be identified and formulated for the other asset departments. These will be useful in the mapping of their workflows and processes and enable, at least at the department level, for common terminology referring to these to be more commonly used.

Process

ISO 55000 defines a "process" as a set of interrelated or interacting activities which transforms inputs into outputs. AM process includes the workflows of AM and the roles and information systems that perform them. Standing up the Countywide AM Program with its SAMP and TAMP frameworks has also established new processes both at the Countywide level and within the five major asset classes' departments that support the Countywide AM Program. These processes

are described within them. Refining and standardizing these going forward in subsequent generations to the first one will allow for streamlined repeatability of them. Mapping the processes and processes related to them is helpful. Mapping the processes helps to make stakeholders aware of the steps and their sequence in the process, the roles and responsibilities in the process, achieve consensus for refinements in the process, and serve as reference while performing the process. Understanding the touch points of processes with one another also enables clearer understanding and better coordination among the processes.

The Countywide infrastructure asset funding process is summarized by the Countywide AM Policy. The Committee will conduct a countywide asset management workshop each year to collaborate, achieve consensus on cross-asset optimization, and subsequently recommend asset planning budgets in near-term years; longer forecasts will be considered as the County's AM capabilities are matured and depending on analysis needs. Asset teams will present projected funding levels for their respective programs (department budgets, outside agency support, grants, etc.). Each asset class team will present their asset priority models outlining how funding scenarios affect performance measures and other key factors (i.e., risk, consequence, etc.) as the County's AM capabilities are matured. At least three models are expected to be considered:

a. A current funding level.
b. A funding scenario necessary to meet performance measure targets.
c. A recommended target scenario (if different from the previous two).

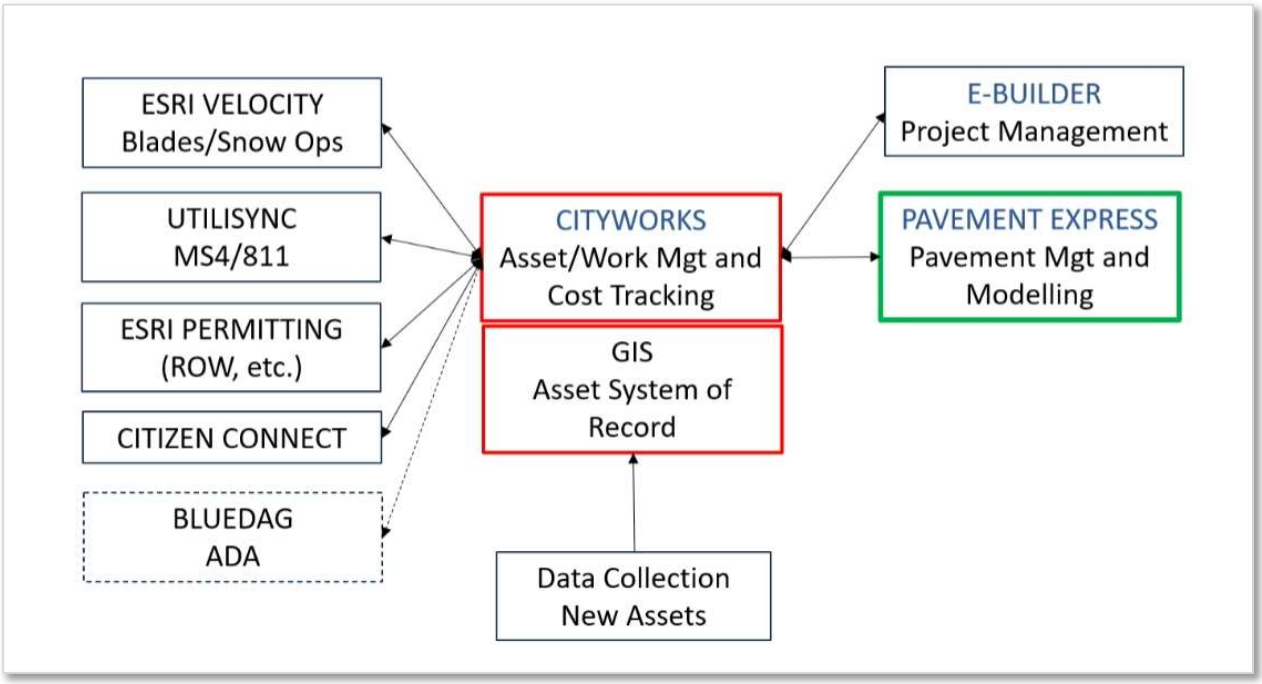
Technology

The asset classes' department utilize a variety of software that supports AM within those asset classes and the Countywide AM effort. Facilities utilizes an e-mail customer request service, ServiceNow for work orders, historical asset financial records from JD Edwards, some GIS and CAD, a combination of spreadsheets, and other records.

Fleet uses the following software in support of its AM:

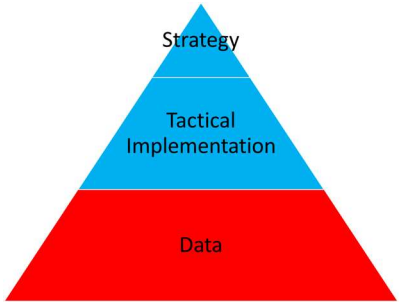
- In 2021, Fleet implemented AssetWorks, a primary system for logging and tracking asset inventory and maintenance.
- JD Edwards (JDE) Financial Information System (FIS)
- E.J. Ward Fuel View: fuel consumption tracking for relevant inventory
- Samsara: GPS tracking of inventory and mileage calculations
- Capital Asset Management System (CAMS): accountability and management tool currently being implemented into Fleet operations

DPW has this mapped its software that supports AM for its transportation and stormwater assets.



Data

Good asset data is a key foundation and significant ongoing effort of AM. It requires consistently sustained investment, time, and maintenance. To maintain and ensure the accuracy of data, a comprehensive, multi-faceted approach must be adopted. This includes implementation of rules which establish clear guidelines and stakeholders for data collection, entry, and maintenance updates of the asset data. Asset data policy should also outline and schedule regular audits and quality to identify and rectify any inaccuracies or inconsistencies in the data.



Key characteristics of data quality include aspects such as completeness, consistency, accuracy and precision, uniqueness, timeliness and currency, validity, format, relationality, interoperability, accessibility, and useability. Good data is critical in ensuring effective communication and transparency to the community. The County's asset data quality is good for pavement, bridge, and to an extent fleet assets. Fleet assets data is expected to improve over time through the course of condition documentation in work orders. Facilities asset data has a good start,but needs better depth and breadth. Facilities, parks, and stormwater assets need best practices-based asset inventories and condition assessments. Conducting these would be best during the seasons in which no snow is on the ground, especially for parks and stormwater assets.

Performance Accountabilities & KPIs

Accountability is at the core of the County's Strategic Plan. The County's dashboard of strategic performance indicators and measures helps to keep the management of assets on track and accountable. The metrics of the accountability dashboard can be further refined and automated going forward. Additionally, metrics can be added for the progress of enhancing AM capabilities, such as the percentage of assets inventoried and condition assessed, and the pursuit of organizational strategies

around AM such as pursuing and progressing on a SoGR of the County's five major asset classes. As AM capabilities are matured at the County, especially processes, data, technology, and LoS and their KPIs, these can become more quantitative and better measured and reported. At the present, continuing setup of prior steps of fundamental AM capabilities is of best value to the County.

Key Performance Indicators (KPIs). Some were established prior to the setup of the Countywide AM Program, and many have been established as part of the program. The ones pertaining to each of the five major asset classes are included in the TAMPs.

Performance Review Schedule. Much of the performance monitoring framework, especially at higher levels of the County is already structured. However, it needs to be supported and supplied by more mature fundamental AM capabilities. Reviewing performance annually is a present appropriate approach. This can currently be measured, at least qualitatively, by progress on funding the investment needs forecasts in the TAMPs, pursuing AM improvements per the AM capabilities improvements roadmap, and accomplish Strategic Planning objectives, and watching the condition of the County's asset portfolio improve over time.

Reporting on Achievements and Challenges. One of the main ways in which to identify achievements and challenges are to consider the progress made by the establishment of the Countywide AM and its framework through the course of this project. Also considering the amount of existing AM capabilities prior to the start of this project and after exhibits the achievements and challenges. Key Objectives and Performance Indicators of the Countywide AM Program and this project have been reviewed among the Countywide AM Committee and the Strategy Department in terms of the extent of attaining Objective One in the Strategic Plan with a framework and script forward provided through the deliverables and model for the Countywide AM Program.

Communication Plan. This has been established in the course of setting up the Countywide AM program. Additionally, a communications section is included in this SAMP.

Feedback Mechanisms. Feedback mechanisms are provided through the course of the TAMP investment needs forecasts annual budgeting process, and considering how effective the County is at pursuing a SoGR, its Countywide AM Policy, and the Strategic Plan.

Continuous Improvement Processes. Continuous improvement is discussed below. In terms of being a process, and one that is repeatable, the elements of the Countywide AM Program, especially the SAMP, TAMPs, and AM Capabilities Improvements Roadmap are key frameworks that support structured repeatability, improvement, and realized progress.

Tactical AM and Business Cases

In collaboration with the County, Matrix developed AM plans for each of the County's five major asset classes. At this agency, these are Tactical Asset Management Plans (TAMPs). These specify the activities, resources, and time scales required for assets to achieve the County's objectives, comprising the business cases at-hand for each of the five asset classes. Additional business cases may be modeled under future stages of the AM program and will be benefited by further investment in the maturation of the County's AM capabilities. The TAMPs contain specific and measurable objectives in terms of the County's for the identification of time frames and resources to be used.

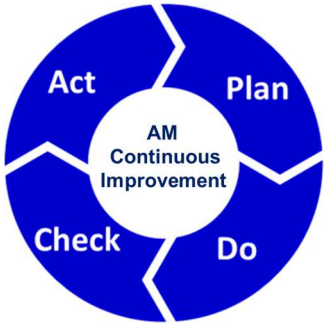
Tactical Asset Management Plans (TAMPs) for each of the County's five major asset classes are included in the Appendix. These contain select scenarios and business cases of the current state and needs of the infrastructure. One of the ultimate goals is to integrate all asset classes/portfolio using an

objective model to produce initial recommendation for annual infrastructure investment plan. Other key intents that the TAMPs support are:

- Asset visibility (inventory, condition)
- Leverage objective data to inform investments
- Target/mitigate risk
- Attain desired levels of service
- Integrate programs for full sight picture of assets and conditions
- Provide a single prioritized list to identify next most critical investment

The TAMPs apply the Countywide Strategic Plan elements and those of the SAMP to the County's five main physical infrastructure asset classes. Through the development of the TAMPs and their analysis with, County asset owners and stakeholders were guided through important decisions needed to build and recommend the preferred AM models utilized by the TAMPs.

Iteration is typically required in AM models, as it is for the ones in this AM program. In such iterative efforts, the Deming Plan Do Check Act (PDCA) Cycle is a useful construct for organizing and executing such effort and was used in the TAMPs to focus and drive towards useful initial scenario(s) and subsequent investment needs forecasts for the TAMPs and subsequently the first generation of the Countywide AM Program.



The TAMP models are capable of showing how to sustainably fund asset classes at the highest possible service level as is an intent of the County; however, current investment needs greatly outweigh historical annual budgets for the asset classes. Thus, Matrix devised recommended prioritizations and optimizations of asset investment to pursue SoGR.

The TAMP AM models address the following aspects desired by the County:

- Reactive versus Predictive Maintenance
  - Shifting the County from reactive to predictive maintenance to reduce downtime, improve performance, and extend asset life.
  - Leveraging of analytics to anticipate and prevent asset failures before they occur rather than respond to a crisis.

- Rehabilitation versus Replacement
  - Consideration of costs of rehabilitation versus replacement.
  - Consideration of comparing lifecycle costs and benefits of different options for managing the condition of assets, such as repairing, upgrading, or replacing them.
  - Creation of decision matrices based on asset criticality, performance, deterioration, demand, and environmental conditions.

- Identification of Lifecycle Costs for Critical Assets
  - Optimization of the total costs of owning and operating critical assets over their expected life.
  - Establishment of the ability to make informed decisions about asset investments and trade-offs and allocation of resources based on asset conditions and priorities.

        - The TAMP AM models are a repeatable framework to allow many scenarios, alternatives, and trade-offs to be run and considered.

- Development of AM Funding Strategies and Recommendations
    - Analyses of historical funding levels and anticipated funding gaps was performed to project the impact of multiple investment scenarios on the long-term health of each asset class. The scenario(s) presented in the current version of each TAMP were arrived at as a tailored recommendation of how to proceed given present asset investment needs, constraints, County AM capabilities including data quality, were tailored to the County's case and typically required an iterative approach driven by these to arrive at the investment needs forecasts provided in them.
    - Development of financial models that illustrate how the condition of each asset classes and the collective asset portfolio will improve or deteriorate based on different budget scenarios.
    - Leading of County stakeholders in the development of the TAMP asset investment needs forecasts to be recommended as part of a long-term financial strategy to fund the AM investment program.

- Performing a quality review of current asset condition data for each of the five major asset classes to ensure the appropriate information is included.

- Development of critical attributes and establishment of measurements and risk factors for the assets.

- Compilation of data from inventory and condition assessments and other sources to determine or derive assumptions of condition of the asset classes.

- Identification of gaps in inventory and condition assessments.

- Refinement or creation of service levels for each asset class.

- Determination of funding gaps.

- Development of lifecycle management strategies for the five major asset classes
    - Identification of best practices for managing assets through their life for the best return on investment.
    - Utilization of the AM Policy to drive maintenance or replacement of assets.

TAMP approaches are described in the TAMPs. The first step in developing a TAMP is understanding the current state of the asset portfolio. This is commonly referred to as asset visibility and can be accomplished through TAMPS specific to each asset class and reflective of implementing the SAMP's strategies via tactics with the assets. TAMPs help to accomplish this and lay the trajectory from the top at the SAMP to the bottom of each individual asset in implementing an organization's AM strategy. Complete asset visibility is focused especially on 2 factors: asset inventory and asset condition. As AM capabilities mature at the County the analyses for the TAMPs can also mature and grow in detail.

Fundamentally, AM considers key asset information, such as those listed below.

- Which assets do I have?
- Where is the asset located?
- What is it worth?
- In what condition is it, and how is it performing? How much life does it have left? What needs done with the asset to avoid its failure?
- When do we need to do it, especially compared with other competing needs?
- How much funding is needed?

Efforts were made to answer these questions to perform the analysis in the TAMPs. Presently, much of the County's asset data quality needs refinement so assumptions, proxies, and work arounds were devised for now collaboratively with the County. Further detail about gaps in existing asset data and subsequent recommendations of how to address them are included in this document.

To take the answers to these questions, realize as with many agencies that needs and when they occur greatly outweigh the available funding, and then to thus prioritize the needs against one another while considering how to optimize the performance of the agency as it relies on its infrastructure assets, a risk-based approach was utilized. This approach follows industry best practice and that reflected in the ISO 55000 Series on AM and other standards. The approach outlined below reflects these steps and shows how they have been pursued particular to this agency's case, available data and existing capabilities, needs, and intents.

This approach summary addresses how key asset attributes, such as asset cost, lifespan and lifecycle remaining, and importance have been derived for the analysis of the asset class within this document. It also addresses how risk-based prioritization was derived for the asset repair and replacement needs.

Risk

The ISO 55000 Series on AM is a key standard in the asset management sector and is commonly recognized by the County as one of the key standards around which to orient its County-wide AM efforts. This series of standards emphasizes that AM involves balancing costs, opportunities and risks, in relation to the desired performance of the assets, to achieve the organizational objectives.

Risk of Failure (RoF) is a key aspect in examining the effects of uncertainty of physical infrastructure assets on the performance of an organization accomplishing its objectives. Consistent with the ISO 55000 Series on AM, the RoF of an asset is the product of the factors of Probability of Failure (PoF) of the asset multiplied by the Consequence of Failure (CoF) of the asset. PoF is a numerical score assigned to the asset that represents how likely an asset is to fail. CoF represents the importance of the asset to the organization accomplishing its objectives.

Risk of Failure = Probability of Failure x Consequence of Failure

In this iteration of AM analysis, the asset's condition score is used for asset PoF score, as is often typical. Asset age and subsequent remaining useful life have been derived from County data if available, or estimated if not, to estimate likely asset condition if condition data is not available. Asset CoF score is estimated by a collaboration among the County and Matrix when not available in the data and is influenced by the importance of the asset in accomplishing the asset class's desired service levels; in this iteration, this estimation is often quantitative and subjective. As the County's AM capabilities mature, these scores may be refined. However, the present iteration is still valuable in establishing the framework to perform such analyses in the future and to see major trends and decision points now in the TAMPs.

Risk-Based Prioritization

The County has recognized the value, industry best practice, and its own need to perform a risk-based prioritization of asset repair and replacement needs in its TAMPs. This technique is utilized in the TAMPs and prioritizes investment to address these needs not only based on the probability that an asset will fail (presently largely determined by its condition given the County's existing AM capabilities), but also considering how consequential that asset is to the performance of the County meeting its objectives. Such a prioritization helps organizations move from a "worst-first" approach of focusing investment on the assets in the worst condition, which leads to a costly state of reactiveness and reduced performance, to a more strategic and proactive approach to investing in the most important assets first, even if they are not in as bad of condition.

Optimization

In the present edition of TAMPs, optimization is addressed by analyzing the outputs of a risk-based prioritized forecast. The forecast is then attentively interpreted, refined if necessary and a realistic way is suggested for the County to move forward in its investment spending for the asset classes over the duration of the cost forecast while improving the State of Good Repair (SoGR) of this asset class and ultimately its portfolio. Improving its SoGR will help to keep its most important assets in good condition, improve the condition of its most important assets that are in bad condition, and generally catch up improving the condition of the rest of the assets.

Countywide Rolled-Up Merged Investment Needs Forecast for the 5 Asset Classes

Matrix performed a rolled-up merge of the asset investment needs forecast across its five major asset classes. Creating this is significant for several reasons because it:

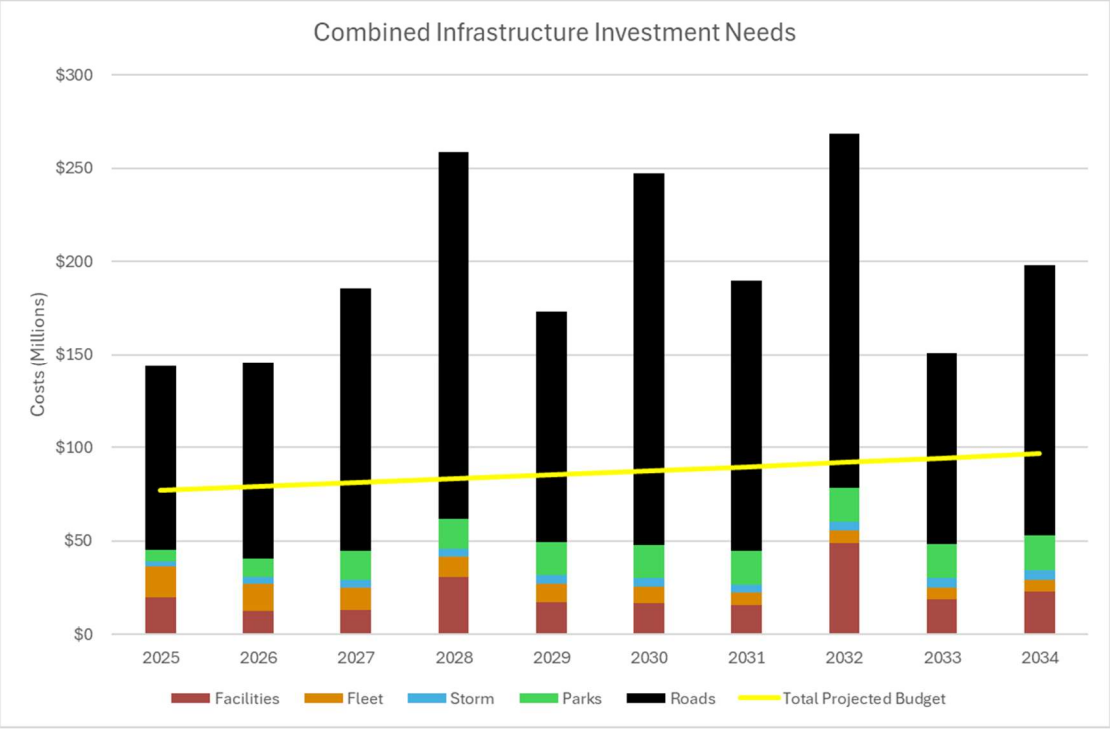
1. Provides a fundamental AM notion at the Countywide level – that of line-of-sight into the investment needs of the County's asset portfolio as a whole based on bottom-up asset and investment needs information from each of its five major asset classes.

2. Provides the top levels of the County with Countywide view of asset investment needs.

3. Enables subsequent drill downs into more finite details that drive the trends exhibited in this merged forecast are possible, as well as a variety of analyses and scenarios and eventually more advanced analytics after other Countywide AM capabilities mature, such as the ones below and others:
    a. Further SoGR analysis
    b. Cross-asset optimization
    c. Multi-Objective Decision Analysis (MODA)
    d. Multi-Criteria Analysis (MCA)

4. Shows that the TAMPs' AM models have the functionality to roll-up and merge into analyses for the entire asset portfolio as a whole based on their individual bottom-up scenarios, or to roll-down top-down driven scenarios and requirements across each of the five major asset classes. This will be of immense value to the County as it matures its AM Program further towards

industry best practices (and benefits), founded upon continuing to mature its Countywide AM capabilities.



In this merged graph as expected, transportation assets (abbreviated as “Roads” in the graph), comprise the majority of the overall investment needs. Paved roads, bridges, and fleet have generally higher asset data quality than the other assets so far.

Stormwater asset needs are at the level shown because of these assets’ relatively long lifespans and because a high number of assumptions were made to fill gaps in absent condition and installation date data. Once the County populates this data based on actual condition and remaining useful life, the forecast of stormwater asset needs is expected to change visibly. However, in this version, multiple iterations of the forecast have been performed in using default useful life values and assumed install years, further refinement of useful lives to also include additional more specific default useful life values (i.e., 50, 35 years, etc.), and taking another pass at the stormwater asset data based on County institutional knowledge and derivation of data from plats that another 11% of stormwater piping is likely at or past its typical useful life and would likely require major rehabilitation or replacement to address a likely degraded condition or change in use and operating demands of it.

The amount of investment needs projected for Parks will likely visibly change in future iterations as the condition and age of assets is also largely uncaptured so far. Investment is also needed in a best practices-based inventory and condition assessment for park assets.

The forecast of Facilities investment needs will be refined with additional asset data collection, especially an industry best practices-based inventory and condition assessment. Fleet asset data quality has been getting rapidly improved in recent years; as more actual and precise existing condition of fleet assets are documented as observed through the course of their maintenance schedule and subsequent

documentation in near-term years rather than derived assumptions largely but not solely based on age and runtime or mileage, the Fleet forecast will become better refined. Given the nature of Facilities and Fleet assets, including them being more modular than many of the other assets, and the factors above, the eventual refinements to these forecasts may be of a lesser magnitude visually.

Measurement and calculation of CoF and PoF may vary by asset class based on available data, asset characteristics, and other factors. Development of asset class specific models and factors should be coordinated through governance to ensure standardization and adherence to core risk framework; this is expected to become more formalized and enforced as the County's AM capabilities mature, especially with regards to the People, Process, and Data categories of the Matrix AM Framework mentioned earlier.

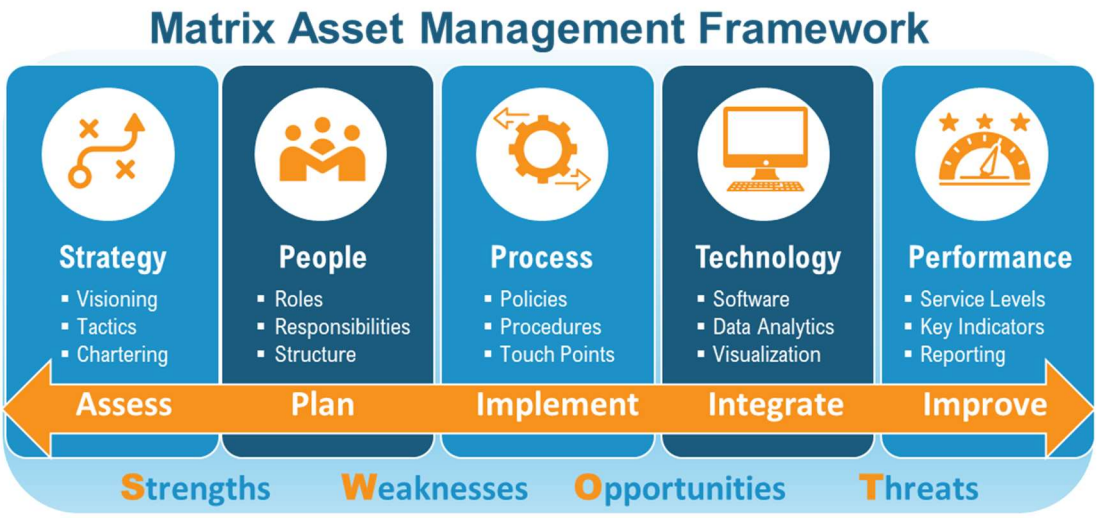
This forecast is importantly a stand-up of this capability for the County and also has the points of significance and value to the Countywide AM program now and for moving forward that mentioned above. A variety of bottom-up scenarios from the five asset classes can be reported through it, and a variety of top-down scenarios to the five asset classes can be driven through it. Overall, this merged forecast can be further refined in future iterations as the County's AM capabilities, especially asset data quality, mature.

AM Capabilities Assessment

The Countywide AM Capabilities Assessment findings are summarized in the Countywide AM Capabilities Assessment and Recommendations Roadmap.

The SAMP and the overall Countywide AM Program have been setup to steer the County towards AM best practices models desired by the County that are further on the maturity continuum of AM capabilities and benefits. Important to understand is that AM is a journey along this continuum and iterative in both capabilities and in forecasting infrastructure investment needs.

Ian assessment was performed of existing Countywide AM capabilities. This assessment has been organized around the Matrix AM Framework (MAMF) discussed earlier, which incorporates a variety of AM best practices, standards, experience, and consideration of the unique case of the County and where it wants to head with AM. The assessment considers a variety of strengths, weaknesses, opportunities, and threats (SWOT) across the MAMF's key aspects of strategy, people, process, technology, and performance. SWOT is a rapid assessment technique that can be used for evaluating a variety of situations. Strengths and weaknesses are controlled by factors internal to the entity, such as the County, and opportunities and threats are more greatly influenced as external factors. Generally, strengths and opportunities are comprised of the 'positives' of the situation, and weaknesses and threats of the 'negatives'.



Overarching AM capabilities gaps to address as first improvement steps include the following. They are numbered in terms of recommended sequence, though these efforts could overlap.

Strategy

The County has made great strides in many of the key strategies and supporting organizational elements regarding AM. From the supporting organizational perspective of the strategy category, implementing and enforcing governance of processes, data, technology, and performance reporting through internal and external communications, including the Strategic Plan Accountability Dashboard, are helpful to ensure quality and alignment of these AM efforts. Likely, the other gaps below have a more pressing need to address before this.

People

Formal definition of AM roles and responsibilities is lacking, and the individuals serving in those roles. Of note, DPW's are established via its Asset Teams Positions (Roles) spreadsheet and the roles and responsibilities of the Countywide AM Policy are defined within it. Also identify the connections and interactions necessary among the roles is lacking but could largely be addressed through formally mapping the Countywide AM processes described below.

Process

Formal documentation and mapping of most Countywide AM processes and the department AM processes that support them is generally lacking. The value in mapping them is to improve understanding of the processes, the roles and responsibilities of both people and supporting software tools, attaining consensus about these, and refining them.

Technology & Data

The County's asset data quality needs refined and is arguable the Critical Path of its AM capabilities gaps to improve. In AM, data, and the maintenance and updating of that data, is one of the largest efforts. Key characteristics of data quality include aspects such as completeness, consistency, accuracy and precision, uniqueness, timeliness and currency, validity, format, relationality, interoperability, accessibility, and useability. A significant amount of the County's existing asset data is deficient in multiple of these aspects. This deficiency generates this need for additional effort to accomplish best practices-based AM. Some County assets, such as roads and bridge have better asset data quality than

most of the other assets. The County has wisely invested in multiple AM software tools with various areas of focus within AM and closely adjacent related practices such as maintenance, finance, contracting, GIS, and others. Seasons without snow cover should be taken advantage of in a timely manner to perform the portion of data collection that is required in the field. Asset data quality and its required collection and maintenance relates to many of the key top aspects of the County Strategic Plan and the Countywide AM Policy such cost efficiency, quality service, transparency, collaboration, becoming more data-driven and defensible and others. Additionally, the implementation and integration of the variety of AM-related software should be carefully coordinated and optimized.

Performance

The County has made great strides in many of the key performance elements related to AM. This is seen in the way that it monitors performance and progress of its Strategic Plan, the portion of service levels that have previously been developed, whether or not they have been formally documented yet, and the measurement, monitoring, and reporting of AM that he has achieved so far. These aspects can be further matured. However, more fundamentally, Countywide AM capabilities and those of departments need to be further matured to enable better performance, and more meaningful measurement, monitoring, and reporting thereof. Service levels range from immature to mature depending on the department.

Continuous Improvement and Roadmap of Recommendations

The Countywide AM capabilities improvement recommendations are summarized in the Countywide AM Capabilities Assessment and Recommendations Roadmap.

Continuous Improvement

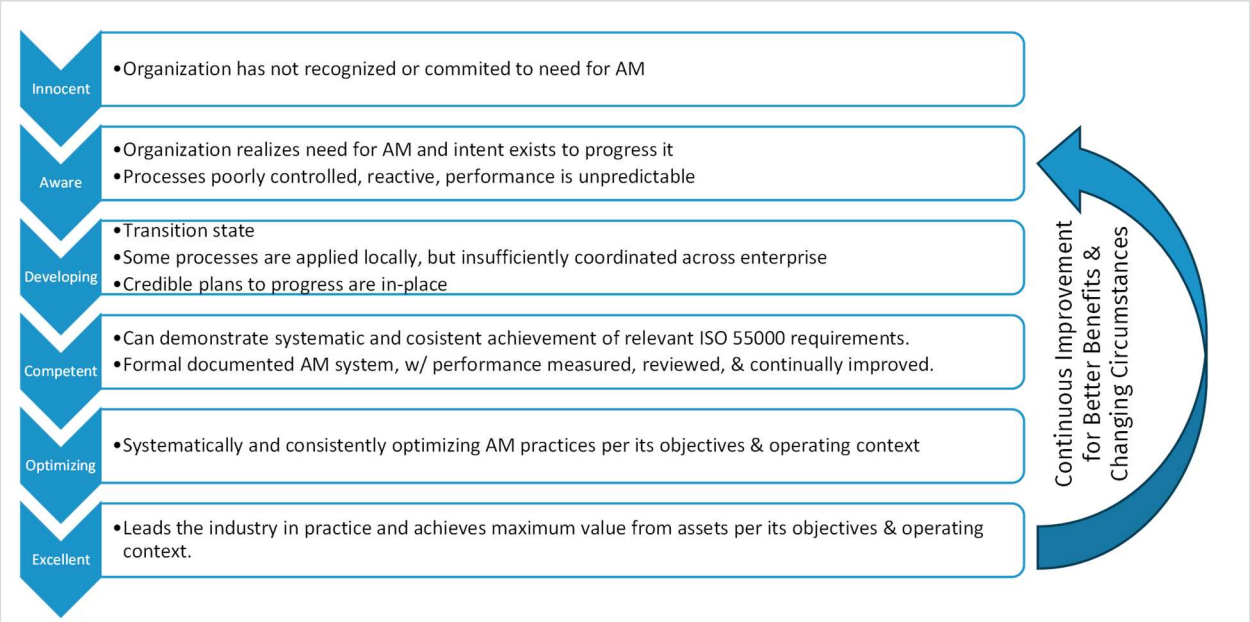
As the County has also recognized through some of its specific business objectives, regardless of the entity an important recognition by the Institute of Asset Management (IAM) is that AM is a journey of creating an AM framework, establishing the capabilities of an owner to deliver on that framework, honing those capabilities and the performance of AM as the program evolves, and further maturing AM capabilities and overall performance as strategies, people, processes, technology, and performance requirements change. Matrix has collaboratively assisted the County in establishing the foundation to accomplish the intent and objectives of this project, visions, and forthcoming trajectory to set the Countywide AM Program on a successful course forward.

The County recognizes that continuous improvement and continued compliance with best practices, standards, regulations, and legislation are a key part of its business and subsequently its AM. The County's commitment to achieving these objectives is reflected through its strategic elements above and implemented across its infrastructure assets via this policy and AM efforts. The County's commitment includes:

- Sustaining the investment in maintaining and maturing AM capabilities.
- Monitoring and reviewing the effective strengths of the County's AM and pursuing AM improvement opportunities.
- Strategically pursuing AM capabilities improvements and providing support, education, and training to achieve these greater competencies.

- Reviewing the policy and making necessary adjustments on a regular basis.

In this spirit, AM is not a one-time-then-set-down effort. It is a mindset, a culture, and an ongoing way of conducting the daily County's business. the Countywide AM documents such as data, this SAMP, the TAMPs, and others are living documents rather than static, unused ones that sit on a shelf.



Matrix serves clients throughout the entire AM journey, summarized by this AM Continuum based on Matrix's distillation of ISO 55000, IAM, and predecessor British Standards Institute PAS-55 Standard for AM.

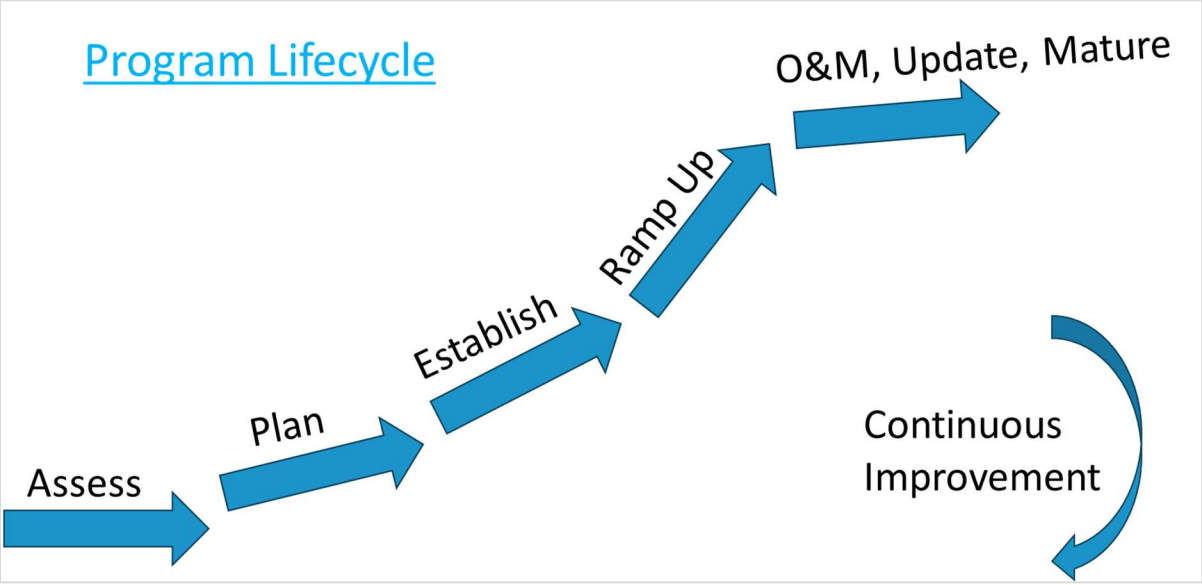
The Countywide AM Program can also be utilized to measure, monitor, and report on performance and progress regarding elements of the County's Strategic Plan that pertain to its core principles and infrastructure assets. Over time, attainment of the core principles and progress in asset performance and AM will surface and become more evident. Measuring, monitoring, and reporting these through the Strategic Plan's Accountability Dashboard or other means will be valuable for better stakeholder understanding of infrastructure asset purpose, value, needs, performance, and progress.

Recommendations Roadmap

The Countywide AM capabilities improvement recommendations are summarized in the Countywide AM Capabilities Assessment and Recommendations Roadmap.

By nature, the establishment of new business program, such as AM, has multiple steps and takes time. This is reflected in the Program Lifecycle graphic. This graphic represents the stages of a new program from inception through the future of the program. The Countywide AM Program follows these same steps. These steps are often iterative, which is also the case with this program. This first generation of the Countywide Program has progressed to a stage among "Ramp Up" and "O&M, Update, Mature". Some standing up of initial Countywide AM capabilities is still underway, such as especially asset data quality improvements and formalization of processes. However, the trajectory and framework have been

laid out to support this iterative growth process towards a more mature, best practices-based AM Program.



A helpful perspective in establishing and maturing AM programs is the notion of the Crawl-Walk-Run journey of maturing. Any program in its infancy starts with crawling, and obviously none start with running. In the County's case, some of its AM capabilities were further along this journey than others prior to this program, some were less, and multiple ones have been progressed through this establishment of the Countywide AM Program and have a supportive script through it on which to proceed via the initial framework of the Countywide AM Program and the Countywide AM Capabilities Improvements Roadmap. In this way, the Countywide AM Program will help AM at the County further shift from the 'crawl' phase of asset management, only addressing immediate needs, into the 'walk' and 'run' phases where an organization can effectively provide near- and long-range infrastructure asset investment planning with a well-defined risk framework based on ISO 55000, the MAMF, and other best practices.

Strategy

County strategic elements regarding AM are in generally good shape given the other Countywide AM capabilities gaps that it needs to improve first (i.e, especially asset data quality). Likely, the other gaps below have a more pressing need to address before this. Keeping the SAMP updated will be important as Countywide AM capabilities mature.

Also continuing to pursue the SoGR approach is highly recommended. The County selected SoGR because it is a proven strategy for over a decade of high performing physical infrastructure organizations. SoGR enables organizations to be more strategic, proactive, and thus more cost effective and have more achieve better infrastructure performance over the course of time. In the most immediate future, SoGR translates for the County to keep its most important assets a SoGR condition of Good and strive for keeping and getting the rest of its asset portfolio in a SoGR condition of Fair or better. Individual departments who are the asset owners of each of the County's five major asset classes may strive for higher condition levels for some of their assets and/or high levels further delineated classifications of condition, such as Satisfactory, or Excellent as part of their departmental AM programs for each of the five major asset classes. This is suitable for now as the asset classes that have more

mature AM capabilities, such as tracking some assets at a five-level condition rating instead of the Countywide program's simpler three-level one because the departments have different AM analysis needs and necessary focused perspectives than the Countywide program level, and vice versa, given their roles; additionally, the asset sets with more mature existing AM capabilities should continue to utilize those capabilities and not be held back in the interim while AM capabilities become establish and matured for other assets and at the Countywide level. Pursuing SoGR will involve some growing pains as it requires to shift from addressing any asset in Poor condition first to focusing on SoGR. Inherently, some lower priority assets may be allowed to fail, most ideally in a predictive manner and timing, while the organization shifts to pursuing and achieving a SoGR. In the long run, this will be most cost efficient for this public infrastructure and deliver the best service to the County's citizens.

People

More formally and completely identify roles and responsibilities, and the individuals serving in those roles. Keep the list updated, at least annually. Of note, DPW's are established via its Asset Teams Positions (Roles) spreadsheet and the roles and responsibilities of the Countywide AM Policy are defined within it. Also identify the connections and interactions necessary among the roles; this will largely be addressed through formally mapping the Countywide AM processes described below. The value in mapping roles with the processes is to improve understanding of the processes, the roles and responsibilities of both people and supporting software tools, attaining consensus about these, and refining them.

Process

Formally map key AM processes for the five major asset classes' departments such as work orders (customer requests, emergencies, scheduled preventative maintenance, reactive corrective maintenance), asset change data administration, capital improvements planning, budgeting, inspections, and others. The value in mapping them is to improve understanding of the processes, the roles and responsibilities of both people and supporting software tools, attaining consensus about these, and refining them.

Technology & Data

Large amounts of asset data quality need improved. Key characteristics of data quality include aspects such as completeness, consistency, accuracy and precision, uniqueness, timeliness and currency, validity, format, relationality, interoperability, accessibility, and useability. A significant amount of the County's existing asset data is deficient in multiple of these aspects. Better asset data quality will be best attained through best practices-based asset inventories and condition assessments that collect all necessary AM attributes to perform AM at the level of the AM capabilities of the County. Asset data quality and its required collection and maintenance relate to many of the key top aspects of the County Strategic Plan and the Countywide AM Policy such cost efficiency, quality service, transparency, collaboration, becoming more data-driven and defensible and others. Seasons without snow cover should be taken advantage of in a timely manner to perform the portion of asset data collection that is required in the field to improve asset data quality.

Performance

Performance measurement, monitoring, and reporting is in-place, but other more fundamental AM capabilities need enhanced before performance may be much more enhanced. The principal example of this is enhancing asset data quality. However, performance measurement, monitoring, and reporting may proceed with being laid out in a best practices-based manner that is conducive to as much automation as possible. This will better enable the County to focus on managing, communicating, and

making decisions regarding performance rather than spending more of its time on the labor of these activities. This adds better value to the County. The suite of AM software tools being implemented and matured will likely help in this endeavor. Less mature service levels and their corresponding key performance indicators should be matured, and more directly mapped through the CoF scoring of assets.

Critical to meeting the County's AM goals is ensuring that its infrastructure assets are proactively managed through a schedule of predictable assessments, preventative maintenance, and recapitalization. As the County continues to grow, it is essential to ensure that infrastructure assets continue to adequately serve the community and its county's functions. Maintaining the momentum towards more effective AM is crucial for any organization to remain effective and responsive to the evolving needs around them. The following activities are recommended for El Paso County's AM program to march toward greater maturity functions related to AM:

1. Disaster Recovery and Emergency Planning: Regularly update and test disaster recovery and emergency response plans related to assets, ensuring preparedness for unforeseen events.

2. Capital Investment Planning: Continuously plan and review capital investments in assets. Ensure that new investments align with long-term strategic goals and community needs.

3. Periodic Asset Reviews, Audits, and Monitoring: Conduct periodic reviews and audits of all assets across all activities to assess their condition, performance, and compliance with the standards defined in the Tactical Asset Management Plans (TAMP). This helps in identifying areas needing attention and ensures that assets continue to meet operational requirements. This could include establishing Key Performance Indicators (KPIs) within TAMPs or a risk-based scoring model within the SAMP.

4. Feedback Mechanisms: Implement systems for gathering feedback from staff, users, and other stakeholders. This feedback can provide valuable insights into how assets are used and perceived, highlighting areas for improvement. This could include community infrastructure forums or organizational working groups.

5. Staff Training and Development: Continuously invest in training and development programs for staff involved in asset management. Keeping staff updated with the latest practices, technologies, and regulatory changes is crucial for effective asset management. Organizations like the Institute of Asset Management (IAM) and BSI offer trainings to align organizations with industry best-practices.

6. Technology Upgrades and Integration: Regularly assess and integrate new technologies that can enhance asset management. This could include software for better inventory management, predictive maintenance tools, or devices for real-time monitoring.

7. Risk Management: Continuously identify, assess, and manage risks associated with assets. Update risk management strategies to address new threats and vulnerabilities. Conduct periodic Strength, Weakness, Opportunity, and Threat (SWOT) analyses across asset activities.

8. Sustainability and Environmental Assessments: Regularly evaluate the environmental impact of asset management practices and make improvements to enhance sustainability. This includes energy efficiency measures, waste reduction, and adopting greener technologies.

Major overarching recommended next steps into the mid- and long-term future are listed below. Others and greater detail are captured in the Countywide AM Improvement Recommendations Roadmap in the Appendix.

- Dashboarding, visualizations, & stakeholder websites for operational decision making and accountability
- Advanced scenario and alternatives analysis
- Asset deterioration curve establishment, analysis, refinement, and maintenance
- Multi-Objective Decision Analysis (MODA)
- Cross-Asset Optimization
- Asset field condition assessment & inventory updates
- Data maintenance
- Reliability Centered Maintenance (RCM) and failure mode analysis
- Greater leveraging of advanced technology (Drones, LiDAR, artificial intelligence, etc.) to collect data
- Spatial & tabular data maintenance
- Environmental justice, social equity & sustainability
- Continued internal and external stakeholder engagement

By implementing these recommendations, the County can effectively manage and optimize its infrastructure assets to meet its strategic and operational objectives and provide high-quality, essential services for residents and visitors, especially as the population of El Paso County continues to grow.

Referred Sources

El Paso Countywide Asset Management Policy

El Paso Countywide AM Capabilities Recommended Improvements Roadmap

El Paso Tactical Asset Management Plans (TAMPs)

Facilities TAMP

Fleet TAMP

Parks TAMP

Stormwater TAMP

Transportation TAMP