

**HILLSBOROUGH TRANSIT AUTHORITY  
POLICY MANUAL**

**1100: TRANSIT ASSET MANAGEMENT POLICY  
1100: POLICY STATEMENT**

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**1100.01 PURPOSE**

(1) The purpose of this Chapter 1100 is to establish a Transit Asset Management (TAM) Policy for Hillsborough Transit Authority (HART).

**1100.02 POLICY**

(1) HART is committed to taking a holistic approach in preserving and improving the State of Good Repair of its transportation investments by adopting and implementing the TAM Plan framework. By applying the TAM framework, HART will embark on a long-term endeavor of continual improvement that will build upon, strengthen, preserve, and improve its existing infrastructure focusing on the procurement, maintenance, rehabilitation, and replacement processes of its assets.

(2) HART's commitment to asset management responsibilities include:

- (a) complying with and satisfy all applicable FTA requirements;
- (b) performing asset management through a whole life approach, incorporating risk and performance criteria;
- (c) integrating and consistently following asset management through well-defined policies, procedures and processes;
- (d) implementing investment strategies through the development of programs and fiscally responsible institutional practices;
- (e) maintaining emphasis on preventative preservation and lower long-term cost;
- (f) evaluating asset management performance metrics on a regular basis to monitor HART's asset management maturity;
- (g) developing and improving asset management competence of our employees;
- (h) collecting, preserving, operating, and reinvesting in HART assets more cost-effectively through improved performance; and
- (i) committing to the continuous improvement of the HART Asset Management system.

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**1100.02 POLICY (cont'd)**

(3) HART's commitment to implement and advance asset management ensures its assets are maintained efficiently and effectively through procedures and policies that link the HART's strategic objectives with its investment decisions. The policy represents a comprehensive, proactive, transparent and ongoing approach geared towards managing existing and new infrastructure to maximize benefits, reduce risk and provide safe and reliable levels of service to the patrons we serve in the Hillsborough community. The TAM requirements will be documented, reviewed on an annual basis, and communicated to all HART employees.

This policy is approved by the HART Board of Directors and is effective  
on November 5, 2018

Name: Yelena Petit

Title: Clerk of the Board

Signature:  Date: 11-5-2018



Hillsborough Transit Authority (HART)

## 2018 Transit Asset Management Plan

September 28, 2018

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**Hillsborough Area Regional Transit Authority**

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(813) 384-6600 • fax (813) 384-6284 • www.goHART.org

September 21, 2018

Dr. Yvette Taylor  
U.S. Department of Transportation  
Federal Transit Administration, Region IV  
230 Peachtree Street, NW, Suite 800  
Atlanta, Georgia 30303-1512

RE: Transit Asset Management (TAM) Plan  
Self-Certification

Dear Dr. Taylor:

The Hillsborough Transit Authority (HART) is in compliance with the Transit Asset Management Rule, 49 CFR Parts 625 and has met the TAM Plan requirements by completing its own TAM Plan effective September 28, 2018.

Sincerely,

A blue ink handwritten signature, appearing to read "Jeffrey Seward", written over a horizontal line.

Jeffrey Seward  
Interim Chief Executive Officer

cc: Christopher White – Federal Transit Administration  
Cyndy Zambella – Director of Budget & Grants and  
Interim Director of Procurement  
Gayle Torres – Accountant/Fixed Assets



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### TRANSIT ASSET MANAGEMENT PLAN

On July 26, 2016, the FTA published its Transit Asset Management Final Rule (49 CFR Part 625) in accordance with the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP21; P.L. 112-141) and the Fixing America's Surface Transportation Act (FAST Act; P.L. 114-94) requiring federal formula grant recipients to develop a Transit Asset Management (TAM) Plan detailing their ongoing asset management planning process and providing accountability through reporting to the National Transit Database (NTD).

In response to this requirement, the Hillsborough Transit Authority (HART) developed the HART TAM Plan which is approved by the HART Accountable Executive.

Hereby certified.

  
Date: 9-21-18  
Jeffrey Seward  
Interim Chief Executive Officer  
Hillsborough Transit Authority (HART)

### Executive Summary

This is the Executive Summary of Hillsborough Transit Authority's (HART) Asset Management Plan (TAM Plan). This document formalizes HART's ongoing program for managing its capital assets across their whole lifecycle. Transit is a capital-intensive industry, consequently HART's service delivery depends on periodic large capital expenditures on long-life capital-intensive assets such as buildings, rolling stock, equipment, or infrastructure. The safe, reliable, cost-effective management of these assets is fundamental for the daily operations of delivering transportation services to the travelling public. The effective management of these assets across their lifecycle directly impacts the quality and performance of HART's service delivery.

#### Federal Requirements

In 2012, the U.S. Department of Transportation (US DOT) identified an \$89.8 billion State of Good Repair (SGR) backlog for the transportation industry nationally, including 40% of bus and 23% of rail transit assets. In response to this finding, when Congress enacted the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21; P.L. 112-141) it mandated the Federal Transit Administration (FTA) to develop a rule requiring transit agencies to create and maintain a TAM Plan. The requirements enacted by MAP-21 were reaffirmed when Congress passed the Fixing America's Surface Transportation Act (FAST Act; P.L. 114-94). On July 26, 2016, the FTA published its Transit Asset Management Final Rule (49 CFR Part 625) requiring federal formula grant recipients to develop a TAM Plan detailing their ongoing asset management planning process and providing accountability through annual reporting to the National Transit Database (NTD).

FTA's Final Rule defines Transit Asset Management as follows:

*"Transit asset management (TAM) means the strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their lifecycles, for the purpose of providing safe, cost-effective, and reliable public transportation."*

#### HART 2018 Transit Asset Management Plan (TAM Plan) Contents

The HART 2018 TAM Plan:

- Addresses FTA's requirements as listed in 49 CFR Parts 625, § 625.25
- Documents HART's efforts to initiate, implement, and advance asset management practices for improved lifecycle management, better maintenance practices, extended useful life, reduction of total lifecycle cost, reduced risk, as well as increased asset efficiency and performance.

This TAM Plan includes the following five elements:

- A. HART TAM Policy** – This provides the policy and procedural basis for HART's asset management approach and sets HART's TAM goals.
- B. Asset Inventory** – This reports out the current inventory of HART's assets.
- C. State of Good Repair (SGR) Methodology and Baseline SGR Condition** – This describes the planned service life for assets (their Useful Life Benchmarks), the methodology used to determine their SGR status, the current condition of HART's assets and the SGR investment backlog.
- D. SGR Analysis Lifecycle Needs** – This evaluates HART's capital need to bring all assets into SGR. The analysis identifies annual funding levels required to keep HART's asset in a SGR. It also describes capital project prioritization and near term planned projects to address SGR.

**E. TAM Implementation Program** – This provides a multi-year plan describing the strategy, actions, and their time frame, that HART will take to implement good asset management business practices and improve SGR.

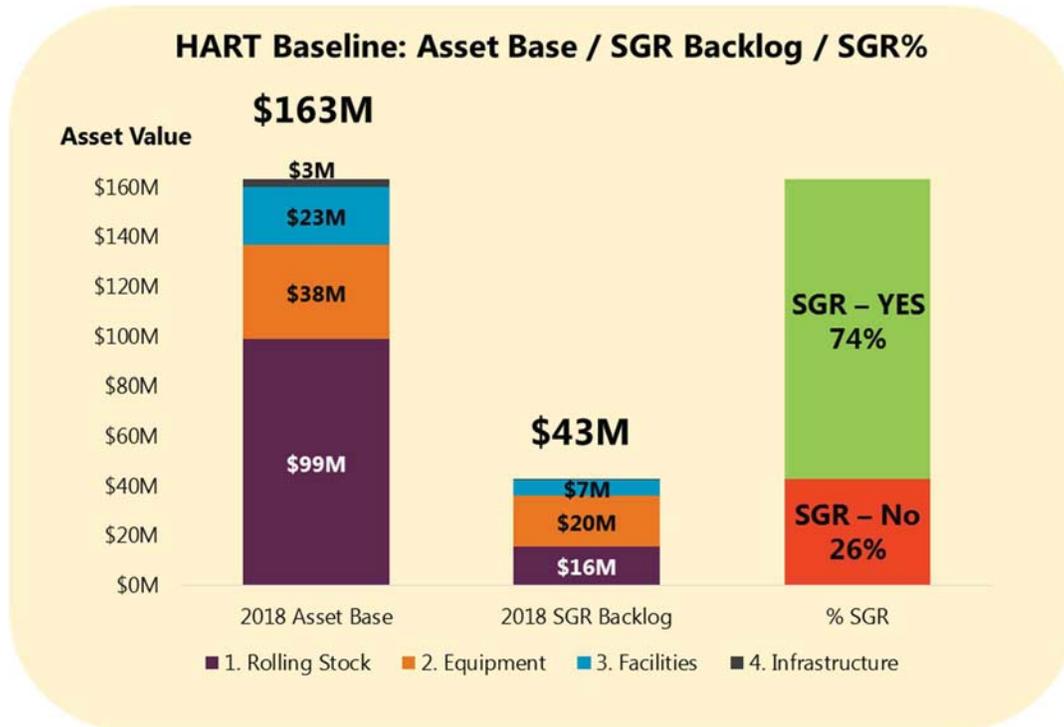
**TAM Policy**

HART adopted a TAM policy that provides direct alignment between its Mission, Strategic Plan, and the TAM Plan. The policy states HART's commitment to effective best-in-class asset management and commitment to innovate in the use of technologies to manage assets across their whole lifecycle to maintain them in a State of Good Repair.

**Inventory and State of Good Repair (SGR) Baseline**

HART's current capital asset inventory is grouped into the four categories (1) Rolling Stock, (2) Equipment, (3) Facilities, and (4) Infrastructure. The total value of capital included in this TAM Plan is \$163 million (in 2018 dollars). Rolling stock (which is all revenue vehicles) is the largest asset category and represents approximately 61% of HART's asset base by value.

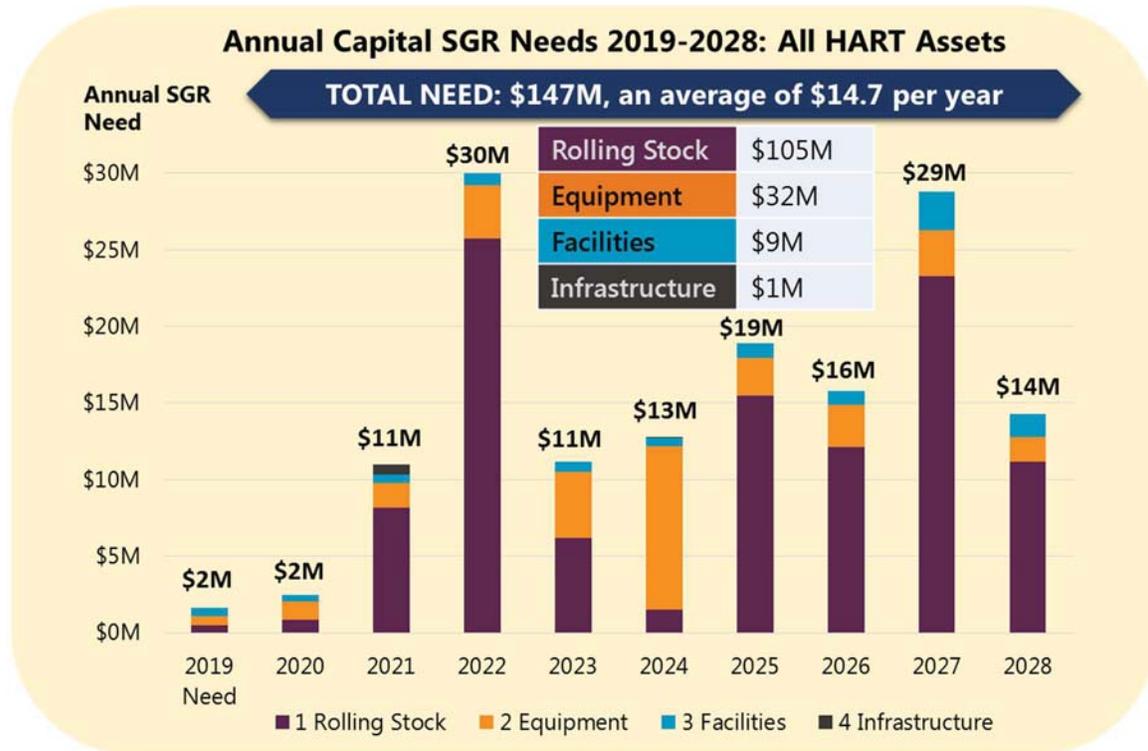
74% of HART's capital asset inventory, by dollar value, is in SGR and operates at a full level of performance. About 26% is not in SGR. These assets can still perform safely, due to increased maintenance efforts, and may experience higher failure rates and diminishing performance. From a technical and commercial standpoint, it is suboptimal to operate assets not in SGR. The 2018 SGR backlog valued at \$43 million is shown below.



**Future Life Cycle SGR Capital Needs**

Over the next ten years, many of HART's assets will reach the end of their useful lives and need to be replaced (some will even be replaced multiple times). The TAM Plan estimates the dollar value HART will need to invest into these replacements and refers to this as future capital SGR need.

From 2019 through 2028, HART SGR will have about \$147 million in SGR needs. The replacement need fluctuates from year to year and can be as low as \$2 million or as high as \$30 million, as shown in the illustration below.



Combining the 2018 SGR backlog of \$43 million with the 10-year SGR needs of \$147 million results in a total SGR need of \$190 million, or about \$19 million per year.

### Funding SGR Needs

The TAM Plan SGR analysis is based on estimating the funds available to address SGR needs over the next ten years. The estimate is an annual average funding of \$8.5 million (a total of \$93.2 million from 2018 through 2028). This funding level estimate is based on past expenditures applied to SGR and today’s annual funding.

Based on the above total SGR need of \$190 million, the TAM Plan identifies an SGR funding gap of about \$97 million over the 10-year period.

As input into the capital planning process, the TAM Plan conducts investment scenario analysis to evaluate how alternative funding levels will affect the SGR backlog.

The scenarios evaluated are:

1. **Continuation of the Current SGR Funding Level.** Under this scenario the investment backlog increases to \$103 million in 2028 (from \$43 million today) and the asset SGR backlog would increase to 47% (from 26% today).
2. **No increase in the SGR Backlog.** Under this scenario, the 2018 SGR backlog is held constant. This would require a funding level of \$13 million per year, on average. SGR would remain at today’s level of 26%.

3. **Eliminating the SGR Backlog and Addressing all Annual SGR Needs.** This scenario would require about \$17 million per year, on average and all assets would be in SGR. <sup>1</sup>



HART’s current assets cannot be kept or brought to SGR with current funding levels. The performance and funding gap will need to be managed through risk-based investment prioritization and by implementing programs to increase asset efficiency, useful life, and optimization of available funding.

**TAM Plan Implementation**

The HART 2018 TAM Plan includes strategies and implementing actions for maintaining and building on the process developed to prepare this plan. The figure below details the strategies and packages of implementing actions over a 48+ month period. The TAM program team has developed these actions across various departments enhancing already existing business practices, and also addressing annual reporting needs to FTA.

<sup>1</sup> HART is currently investigating alternatives to replace the current obsolete farebox and revenue collection system but has not determined the final technology and time of implementation. Consequently, at this point the \$2 million remains in the investment/SGR backlog.



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# 1. Introduction

This document describes HART's Transit Asset Management Plan (TAM Plan). The TAM Plan results from the initial asset management planning process that HART established to address the federal requirements and to provide the basis for improving asset management practices within the agency.

To prepare the TAM Plan and for ongoing asset management HART has initiated:

- Policy and organizational responsibilities for implementing, managing, and improving the agency's asset management process
- Ongoing processes for maintaining an asset registry and asset inventory
- Performance objectives, measures, and indicators of state of good repair (SGR) for each asset class across its lifecycle
- Procedures for monitoring and reporting the SGR baseline and backlog
- Analytical capabilities to estimate future SGR needs over a ten-year TAM Plan horizon
- Procedures for evaluating and prioritizing capital projects to address SGR needs that consider funding availability
- Prioritized SGR needs.

HART underwent considerable organizational learning to implement the federal TAM requirements and assign ongoing responsibilities. Through the development of this TAM Plan, HART has established an Implementation Program, which is the foundation for stabilizing and maintaining the ongoing processes developed to prepare the TAM Plan. This will meet National Transit Database (NTD) reporting requirements and enable the ongoing implementation of the TAM Plan by providing better data for capital program management and project-decision making.

The Implementation Program is organized around four strategies and various implementing actions that stabilize and institutionalize the newly established processes to improve HART's asset management capabilities.

## 1.1. Federal Requirements

The Moving Ahead for Progress in the 21st Century Act (MAP-21) required the development of rules to establish a system to monitor and manage the nation's public transportation assets to improve safety and increase reliability and performance, and to establish performance measures. The Fixing America's Surface Transportation (FAST) Act reaffirmed this requirement. On July 26, 2016, the Federal Transit Administration (FTA) published the Transit Asset Management (TAM) Final Rule. The purpose of the Final Rule is to help achieve and maintain a SGR for the nation's public transportation assets.

FTA's rule defines Transit Asset Management as follows:<sup>2</sup>

*"Transit asset management (TAM) means the strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their lifecycles, for the purpose of providing safe, cost-effective, and reliable public transportation."*

<sup>2</sup> 49 CFR Parts 625, § 625.5 (FTA Transit Asset Management Final Rule), July 26, 2016

In more detail the TAM Final Rule:

- Defines "state of good repair"
- Requires grantees to develop a TAM Plan
- Establishes performance measures
- Establishes National Transit Database (NTD) annual reporting requirements
- Requires FTA to provide technical assistance.
- In its "Frequently Asked Questions" FTA provides the following guidance for developing a TAM Plan:

*"All transit agencies that own, operate, or manage capital assets used in the provision of public transportation and receive federal financial assistance under 49 U.S.C. Chapter 53 either as recipients or subrecipients must develop a TAM Plan. A TAM Plan is a tool that will aid transit providers in:*

- *Assessing the current condition of its capital assets*
- *Determining what the condition and performance of its assets should be (if they are not already in a state of good repair)*
- *Identifying the unacceptable risks, including safety risks, in continuing to use an asset that is not in a state of good repair*
- *Deciding how to best balance and prioritize reasonably anticipated funds (revenues from all sources) towards improving asset condition and achieving a sufficient level of performance within those means*

*TAM Plans must include at a minimum an asset inventory, condition assessments of inventoried assets, and a prioritized list of investments to improve the state of good repair of their capital assets."*

### 1.2. Federal Transit Asset Management Reporting Requirements

HART is required to report the following information annually to the NTD:

- (1) Targets must be set annually for the performance of HART's assets and submitted to the NTD as part of the annual data submission. Each asset category has its own performance measure by which to set targets. Those targets relevant to HART's asset classes are:
  - Rolling Stock: percentage of revenue vehicles exceeding useful life benchmark (ULB)
  - Equipment: percentage of nonrevenue service vehicles exceeding ULB
  - Facilities: percentage of facilities rated under 3.0 on the Transit Economic Requirements Model (TERM) scale
- (2) Condition assessments and performance results for vehicles and facilities
- (3) A narrative report on changes in transit system conditions and the progress toward achieving previous performance targets.

HART's fiscal year begins on October 1<sup>st</sup> of each year. Table 1-1 shows the NTD reporting requirements for agencies with fiscal year beginning in October.

**Table 1-1: NTD Reporting Requirements**

REPORTING REQUIREMENTS	TIMING
<ul style="list-style-type: none"> <li>• Report FY17 asset inventory module (AIM) data to NTD</li> <li>• Submit targets for FY18 to NTD (optional)</li> </ul>	January 2018
<ul style="list-style-type: none"> <li>• Complete compliant TAM Plan</li> <li>• Share TAM Plan with planning partners</li> </ul>	October 2018
<ul style="list-style-type: none"> <li>• Report FY18 AIM data to NTD (1st required)</li> <li>• Submit targets for FY19 to NTD (1st required)</li> </ul>	January 2019
<ul style="list-style-type: none"> <li>• Report FY19 AIM data to NTD</li> <li>• Submit targets for FY20 to NTD</li> <li>• Submit narrative report to NTD (1st required)</li> </ul>	January 2020
<ul style="list-style-type: none"> <li>• Report FY20 AIM data to NTD</li> <li>• Submit targets for FY21 to NTD</li> <li>• Submit narrative report to NTD</li> </ul>	January 2021
<ul style="list-style-type: none"> <li>• Complete compliant TAM Plan</li> <li>• Share TAM Plan with planning partners</li> </ul>	October 2022

**1.3. How HART Addresses the Federal Requirements**

This TAM Plan addresses each of the nine required elements in the TAM Final Rule. Table 1-2 provides the FTA TAM compliance checklist<sup>3</sup> and details where and how in this TAM Plan HART addresses each requirement.

**Table 1-2: FTA TAM Plan Compliance Checklist**

REQUIRED TAM PLAN ELEMENTS	STATUS
<b>1. Do I have a TAM plan that covers a four year period?</b>	✓ TAM Plan has ten-year planning horizon.
<b>2. Was the TAM plan updated within the last four years?</b>	✓ This is the first TAM Plan. The TAM Plan has ten-year planning horizon.
<b>3. Do I have a TAM plan that includes all of the required elements?</b>	
a. An asset inventory for all assets used in the provision of public transportation, including those owned by third parties?	✓ <b>Chapter 3</b> Asset Inventory summarizes the inventory and details the asset inventory maintained in HART'S SGR database established during development of the TAM Plan.
b. A condition assessment of all assets in my asset inventory for which I have direct capital responsibility?	✓ <b>Chapter 4</b> Asset Condition describes and reports the baseline condition and SGR backlog of HART'S assets. This reports out of the SGR database which maintains this data for all capital assets HART is responsible for.
c. An investment prioritization that:	✓ <b>Chapter 5</b> State of Good Repair Analysis reports the prioritization of capital investments at the asset

<sup>3</sup>[https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/regulations-and-guidance/asset-management/55371/compliancechecklistfy2018\\_0.pdf](https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/regulations-and-guidance/asset-management/55371/compliancechecklistfy2018_0.pdf)

## HART Transit Asset Management Plan

<ul style="list-style-type: none"> <li>• Ranks projects to improve or manage the state of good repair over the horizon period</li> <li>• Includes all capital assets for which I have direct capital responsibility, and</li> <li>• Is at the asset class level?</li> </ul>	<p>class level. The SGR database provides the criticality and performance criteria used in the rankings.</p>
<p>d. Did I document the analytical processes and decision support tools used in developing my TAM plan?</p>	<p>✓ <b>Chapters 5</b> also documents the SGR database and the use of TERM Lite as a decision support tool used to develop the TAM Plan.</p>
<p><b>4. Do I have documentation that I calculated performance for:</b></p> <p><u>Equipment</u> (non-revenue service vehicles, support-service and maintenance vehicles equipment): the percentage of those vehicles that have either met or exceeded their ULB for all assets for which I have direct capital responsibility.</p> <p><u>Rolling Stock</u> the percentage of revenue vehicles by vehicle type that have either met or exceeded their ULB for all assets for which I have direct capital responsibility.</p> <p><u>Infrastructure</u> (rail fixed-guideway, track, signals, and systems): the percentage of track segments with performance restrictions for all assets for which I have direct capital responsibility.</p> <p><u>Facilities</u>: the percentage of facilities within an asset group rated below condition 3 on the TERM scale for all assets for which I have direct capital responsibility.</p>	<p>✓ HART establishes Performance Measures and Targets for all Asset Classes and associated systems/subsystems in the Asset Inventory.</p> <p>All the required performance measures are based on the TERM scale.</p> <p>The performance measures and their baseline values are reported in Chapter 4 Section 4-3.</p>
<p><b>5. Do I have documentation that I set performance targets annually to project the following fiscal year for:</b></p> <ul style="list-style-type: none"> <li>• Equipment</li> <li>• Rolling Stock</li> <li>• Infrastructure</li> <li>• Facilities</li> </ul>	<p>✓ <b>Chapter 4</b> Documents annual target setting process.</p>
<p><b>6. Did I make my TAM plan, any supporting records or documents, performance targets, investment strategies, and the annual condition assessment report available to the State and/or MPO that provides my funding?</b></p>	<p>✓ The TAM Plan is delivered upon certification to FDOT and the MPO.</p> <p>Annual condition assessment is reported to FDOT and the MPO along with submission to FTA.</p>
<p><b>7. Did I create a group plan for participants that meets the associated requirements?</b></p>	<p>Not applicable to Tier I agencies</p>
<p><b>8. Does your tier I TAM plan include all of the required elements?</b></p>	
<p>a. Documentation of a TAM and SGR policy?</p>	<p>✓ <b>Chapter 2</b> Asset Policy and Strategy documents HART's TAM policy and goals.</p>
<p>b. An implementation strategy that outlines a plan to achieve its asset management goals?</p> <p>c. A written description of the key TAM activities that you intend to engage in over the TAM plan horizon period?</p> <p>d. A summary or list of the resources, including personnel that the recipient needs to develop and carry out the TAM plan?</p> <p>e. An outline of how I will monitor, update, and evaluate, as needed, its TAM plan and related business practices, to ensure the continuous improvement of its TAM practices?</p>	<p>✓ <b>Chapter 6</b> Implementation Strategy documents the TAM implementation program and details the roles and responsibilities, annual activities, and ongoing resources to be applied.</p>

The FTA Transit Asset Management System Rule lays out specific requirements that HART is responding to within this report. The TAM Plan elements are described and cross-referenced in Table 1-3 to the report sections where the elements are covered.

**Table 1-3: FTA TAM Plan Contents Requirements**

FTA TAM PLAN REQUIREMENTS	DESCRIPTION	TAM PLAN CHAPTER
<b>Asset Inventory</b>	Register of capital assets and information about those assets	3.2 and 3.3
<b>Condition Assessment</b>	Asset condition ratings for vehicles and facilities for the purpose of monitoring and predicting asset performance	4
<b>Decision Support Tool</b>	Methodology for prioritizing project based on condition and objective criteria	5
<b>Prioritized Investments</b>	Prioritized list of projects to manage or achieve the SGR of capital assets	5.6
<b>TAM and SGR Policy</b>	Executive-level direction for transit asset management; the actions that support implementation of the TAM policy	2
<b>Implementation Strategy</b>	Operational actions to achieve TAM goals and policies	6.2
<b>Key Annual Activities</b>	Actions required to implement the TAM Plan over the next several years	6.3
<b>Identification of Resources</b>	Summary of resources required to develop and carry out the TAM Plan	6.3
<b>Evaluation Plan</b>	Outline of how the TAM Plan and related business practices will be monitored, updated, and evaluated to ensure continuous improvement	6.3

#### 1.4. HART’s Objectives for the TAM Plan and Ongoing Process

The preparation of this TAM Plan provides HART with the foundation for improving its asset management capabilities and implementing ongoing data-driven asset management procedures. This will in turn deliver value for HART’s customers and the communities within its service area.

HART’s objective for the TAM Plan is to develop a business model, the supporting information, and program of best practices that will enable HART to use the condition of its assets to guide the optimal prioritization of funding so that its assets are maintained and operated in a State of Good Repair subject to its fiscal constraints.

The TAM Plan itself is a snapshot in time providing the first set of results and plan that applies the asset management processes developed and described herein.

This TAM Plan assists HART in:

- Improving the management of its assets
- Improving transparency and accountability
- Optimizing capital investment decision-making
- Implementing more data-driven capital planning and maintenance decisions
- Increasing asset reliability through improved performance measures
- Reducing safety risks.

As the TAM Plan process matures it will provide HART with the necessary information to communicate the importance of good asset management to its employees, customers, and other stakeholders. The information will be used to communicate the business benefits and money saved over the asset lifecycle by improving asset management.

### 1.5. TAM Plan Organization

In addition to this first chapter, the HART TAM Plan is organized as follows:

#### **Chapter 2: Asset Policy and Strategy**

Chapter 2 describes HART's TAM policy and strategy. The policy and strategy provide the authority and procedural basis for TAM Plan implementation. The policy sets HART's overall goals for asset management and the strategy to accomplish it. This ensures alignment and a clear "line of sight" from HART's mission and strategic plan to the TAM Plan.

#### **Chapter 3: Asset Inventory**

Chapter 3 describes the structure of HART's asset register and summarizes the current asset inventory. It summarizes data from the asset inventory and asset hierarchy established for the ongoing TAM Plan process. The inventory is maintained currently as HART's SGR database. The inventory is the registry of data about the asset and includes its assigned criticality.

#### **Chapter 4: Asset Condition**

Chapter 4 summarizes HART's baseline asset conditions and SGR backlog. The chapter lists the approach to asset performance and condition used by HART for each asset class. The performance measures and ULBs are listed for each asset class. Condition is reported and documented using the TERM scale. The chapter reports out of the condition measures captured in the HART SGR database in terms of 1) baseline performance against the 2018 Performance Targets reported to NTD and 2) HART's SGR backlog.

#### **Chapter 5: State of Good Repair Analysis**

Chapter 5 describes the analytical process used to evaluate recurring annual SGR needs and analyze HART's future SGR capital needs over a ten-year timeframe. The chapter describes how the TERM lite model is used in conjunction with this analysis as the Decision Support Tool to consider these needs and support capital planning analysis. The chapter details capital program plans and projects, that are under varied stages of implementation, that will impact SGR needs and the future level of funding that is likely available to meet SGR needs.

The resulting process for how HART is selecting prioritized investments based on funding levels anticipated in the future is described. The outcome in terms of prioritized investments and projects is also described.

### Chapter 6: Implementation Program

Chapter 6 details the ongoing process and organizational development required to stabilize and maintain the process developed to prepare HART's first TAM Plan. This is the implementation program and identifies organizational roles, responsibilities, annual activities, and ongoing resources to be applied. Additionally, the HART TAM Plan process identifies a multi-year strategy for improving asset management capabilities as part of an annually reviewed and updated continuous improvement process.

### Appendices and Supporting Documents and resources

Supporting documents with additional details are referenced throughout this TAM Plan. They are listed below and can be found in the TAM Plan appendices.

Appendices:

1. FTA Approval for ULB of 11 years for "Chillers"
2. Safety & Criticality Scores
3. Asset Management Information Systems Assessment

Additional documentation not part of this TAM Plan report:

1. HART asset register and SGR database with all assets included in the SGR analysis, acquisition/replacement cost, useful life benchmark (ULB), and asset safety and criticality scores.
2. Detailed facility condition scores for all assessed facilities.

## 2. Asset Management Policy and Strategy

The TAM Plan establishes HART’s overarching asset management policy and goals. The asset management policy directly advances HART’s vision and mission and guides how goals are accomplished.

The purpose of the TAM policy is a top-down communication by HART’s leadership to its employees, business partners, and customers of the agency's commitment to effective best-in-class asset management and the continual improvement of asset management processes.

The TAM policy advances HART’s vision and mission:

HART’s Vision:

**“HART invites, inspires and implements sustainable and innovative transportation.”**

HART’s Mission:

**“HART takes people to the places that enhance their lives.”**

The HART Transit Asset Management Policy was approved by HART executives and is currently up for adoption by the HART Board of Directors, and reads as follows (Figure 2-1):

Figure 2-1: HART Asset Management Policy



**Hillsborough Area Regional Transit Authority**  
1201 E. 7th Avenue • Tampa, Florida 33605  
(813) 384-6600 • fax (813) 384-6284 • www.goHART.org



## HILLSBOROUGH TRANSIT AUTHORITY TRANSPORTATION ASSET MANAGEMENT POLICY

Hillsborough Transit Authority (HART) is committed to taking a holistic approach in preserving and improving the State of Good Repair of its transportation investments by adopting and implementing the Transportation Asset Management Plan (TAMP) framework. By applying the TAM framework, the HART will embark on a long-term endeavor of continual improvement that will build upon, strengthen, preserve and improve its existing infrastructure focusing on the procurement, maintenance, rehabilitation and replacement processes of its assets.

HART's commitment to asset management responsibilities include:

- Comply with and satisfy all applicable FTA requirements
- Perform asset management through a whole life approach, incorporating risk and performance criteria
- Integration and consistency of asset management through well-defined policies, procedures and processes
- Implement investment strategies through the development of programs and fiscally responsible institutional practices
- Emphasis on preventative preservation and lower long-term cost
- Evaluate asset management performance metrics on a regular basis to monitor HART's asset management maturity
- Develop and improve asset management competence of our employees
- Collect, preserve, operate, and reinvest in HART assets more cost-effectively through improved performance
- Commitment to the continual improvement of the HART Asset Management system

HART's commitment to implement and advance asset management ensures its assets are maintained efficiently and effectively through procedures and policies that link the HART's strategic objectives with its investment decisions. The policy represents a comprehensive, proactive, transparent and ongoing approach geared towards managing existing and new infrastructure to maximize benefits, reduce risk and provide safe and reliable levels of service to the patrons we serve in the Hillsborough community.

This document will be documented, reviewed on an annual basis, and communicated to all HART employees. This policy will be available to the public via the HART website.



Jeffrey Seward, ICEO



Ruthie Reyes-Burckard, COO



Kenyatta Lee, CAO, ICoS

HART has set five goals for its asset management, summarized in Table 2-1 below:

**Table 2-1: HART Asset Management Goals**

GOALS	GOAL DESCRIPTION
<b>Goal 1</b>	Take a holistic asset management approach for improved lifecycle management and maintenance practices to extend asset useful lives, reduce lifecycle cost, improve asset performance and safety.
<b>Goal 2</b>	Develop tools and systems supporting fact-based decision-making and increased transparency.
<b>Goal 3</b>	Promote an agency-wide asset management culture through better communication and training, and investment in tools and technology.
<b>Goal 4</b>	Make asset management a long-term continuous improvement process to increase HART's SGR at sustainable levels.
<b>Goal 5</b>	Meet FTA asset management compliance requirements.

HART determined the organizational responsibility for the asset management policies, procedures, systems, and a continuous improvement processes across three levels.

- Level 1: Executive leadership with the Chief Executive Officer as TAM Accountable Executive as well as the other members of HART's Management Team providing overall strategic direction determined by the TAM policy.
- Level 2: HART has created a "TAM Core Team" which is comprised of a TAM Representative, a TAM Program Manager, and five team members. The TAM Representative is the link to the executive leadership and oversees the program manager and the team. The program manager<sup>4</sup> will lead HART's TAM program, the Core Team as well as the Designated Staff (see Level 3 below). The Core Team members are a systems and data analytics specialist (management systems administrator) and heads of key departments.
- Level 3: For the actual implementation of good asset management business practices a working group with "HART Designated Staff" from technical and administrative departments.

The more detailed organizational structure is discussed in Chapter 6.

<sup>4</sup> Currently an open position which HART plans to fill within the next six to twelve months.

### 3. Asset Inventory

The HART TAM Plan establishes an ongoing process for maintaining the agency's asset inventory. The inventory is intended to become the "single source of truth" for assets owned and managed by HART. The following are important components of HART's asset inventory.

- **Asset Register.** The inventory is the asset register, which is a listing of all the assets that HART owns or has capital responsibility for.
- **Asset Hierarchy.** The inventory is organized into an asset hierarchy that allows alignment with the NTD and includes the "adult-child" relationships between asset categories, groups, assets, and sub-assets/components that HART applied. In the asset hierarchy, each asset is organized into the applicable components and subcomponents (systems and subsystems).
- **Inventory Attributes.** For each asset in the register, the inventory record describes the asset's fixed characteristics, for example, acquisition date and cost, and physical characteristics. These data items are referred to in the HART TAM Plan process as the attributes of the asset.
- **Asset Criticality.** The inventory records the criticality of each asset. Through the TAM Plan, HART establishes and applies asset criticality criteria to assign a criticality score to each asset. This criticality attribute helps HART understand the impact of asset failures and supports the prioritization of investment decisions.

HART's TAM Plan distinguishes between asset inventory and asset condition or performance (addressed in Chapter 4). For this TAM Plan, the inventory and the associated condition data are collected and maintained in an Excel-based application referred to as the HART SGR Database.

#### 3.1. HART Service Area and Modes

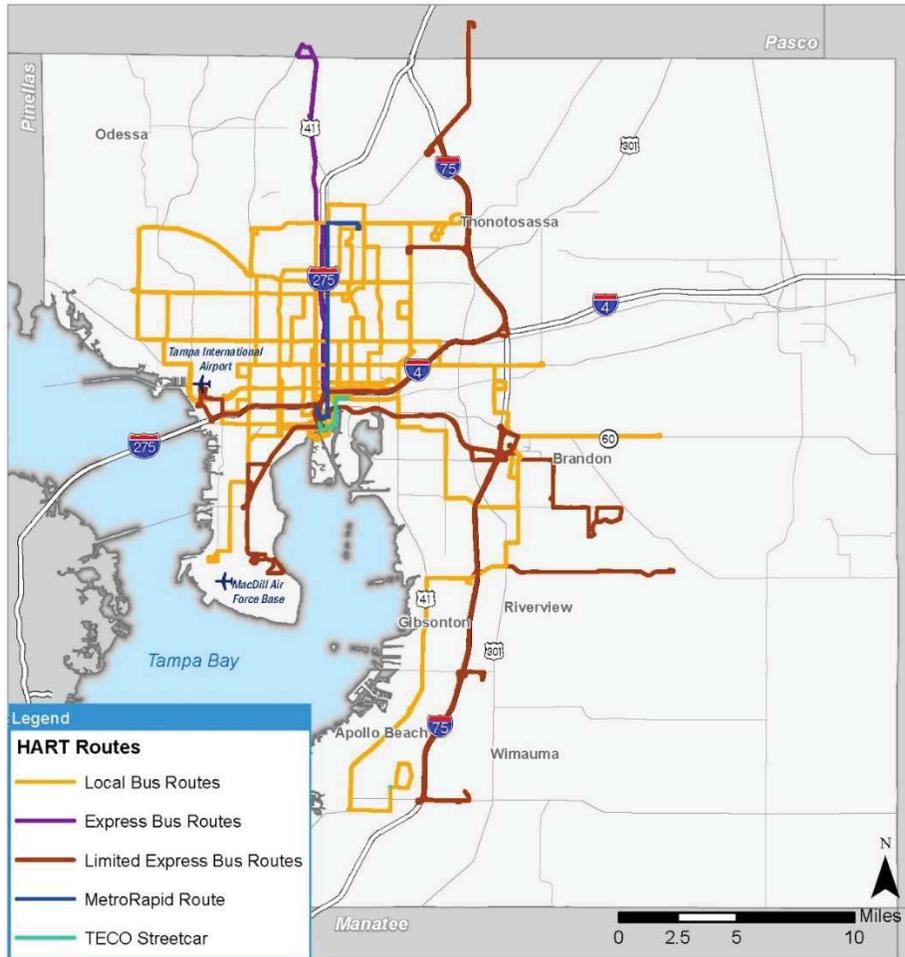
This section provides an overview of HART's service area and the transportation modes used to deliver service. It is the cost-effective performance of HART's assets over their lifecycle in delivering these services that is the subject of this TAM Plan. To provide transportation services, HART uses an array of different capital assets in the categories of Rolling Stock, Equipment, Facilities, and Infrastructure.

HART is responsible for providing public transportation within Hillsborough County, Florida. HART's service area is 250 square miles and serves 52% of the population within the county. The majority of fixed-route bus service is within Tampa, HART's service area also extends to limited areas of the unincorporated areas of the county outside of the urbanized area.

HART operates a total of 43 routes, as shown in Figure 3-1. In 2016, HART provided 14.1 million passenger trips on fixed local, express, limited express, and Metro Rapid routes. Additionally, 93,411 and 158,090 additional passenger trips were provided in 2016 via HART's flex routes and paratransit service, respectively.

HART also operates a streetcar service known as the Tampa Electric Company (TECO) Line Streetcar. The service extends 2.7 miles and links Ybor City, Channelside, and downtown Tampa.

Figure 3-1: HART Service Area and Routes



### 3.2. Current HART Asset Inventory

HART’s asset inventory is a systematic register of all capital assets which HART owns, operates, or has direct capital responsibility for. The HART inventory organizes assets into an asset hierarchy following the organizational structure HART uses to manage and maintains its assets. The asset hierarchy is also structured to enable NTD reporting.

In determining the structure of its asset hierarchy, HART’s goal was to identify the optimal lowest hierarchy level necessary to capture asset attributes, collect cost for maintenance, repairs, and operations, and develop performance metrics. This is also referred to as the “maintenance managed item” or smallest subdivision of an asset inventory composed as a nested hierarchy. HART’s asset hierarchy will be modified over time to respond to continuous improvements.

#### Asset Hierarchy Overview

HART’s capital asset inventory is divided into four categories: Rolling Stock, Equipment, Facilities, and Infrastructure. The four categories are broken down into multiple asset classes following the logic of the asset hierarchy. Figure 3-2 shows the category breakdown used throughout the TAM Plan process for asset

categories and asset levels 1 and 2.<sup>5</sup> The asset hierarchy position is an asset register attribute associated with every asset in HART’s inventory.

**Figure 3-2: HART Asset Category Breakdown**

Asset Category	Level 1	Level 2
<b>1 Rolling Stock</b>	1.1 Rolling Stock, Motorbus	1.1.1 Rolling Stock, Motorbus, CNG 1.1.2 Rolling Stock, Motorbus, Diesel
	1.2 Rolling Stock, Cutaway	
	1.3 Rolling Stock, Automobile	
	1.4 Rolling Stock, Streetcar	
<b>2 Equipment</b>	2.1 Equipment, Non-Revenue Vehicles	2.1.1 Equipment, Non-Revenue Vehicles, Automobile 2.1.2 Equipment, Non-Revenue Vehicles, Van 2.1.3 Equipment, Non-Revenue Vehicles, SUV
	2.2 Equipment, Bus Equipment	
	2.3 Equipment, Streetcar	
	2.4 Equipment, Systems	
	2.5 Equipment, Furniture	
<b>3 Facilities</b>	3.1 Facilities, Admin/Maintenance	3.1.1 Facilities, Admin/Maintenance, Administrative 3.1.2 Facilities, Admin/Maintenance, Maintenance 3.1.3 Facilities, Admin/Maintenance, Admin & Maintenance
	3.2 Facilities, Passenger Facilities	3.2.1 Facilities, Passenger Facilities, Bus Stops 3.2.2 Facilities, Passenger Facilities, Transit/Transfer Centers
	3.3 Facilities, Parking Facilities	
<b>4 Infrastructure</b>	4.1 Track Elements	
	4.2 Power & Signal Elements	

The development and ongoing maintenance of the asset hierarchy and inventory provide the basis for the ongoing asset inventory process established by this TAM Plan.

HART used three main sources to assemble the asset inventory:

1. HART’s fixed-asset accounting register
2. Asset condition assessment reports
3. Manual inventory taking

<sup>5</sup> The asset hierarchy consists of up to four levels below the asset category.

**Inventory Attributes**

The following inventory attributes are maintained in the fixed-asset accounting register that also feed into the TAM Plan asset inventory:

Asset Class ID	Serial Number
Structure ID	Model Number
Physical Location ID	Acquisition Cost
Extended Asset Description	Net Book Value
Asset ID	Date Added
Asset Description	Type

**Asset Counts**

The following data and information in Table 3-1 is reported out of the HART TAM Plan asset inventory. The numbering system in each table is the one used in the asset hierarchy.

**Table 3-1: HART TAM Asset Base County Overview**

ASSET CLASS	NUMBER OF ASSETS
1.1 Rolling Stock, Motorbus	167
1.2 Cutaway	46
1.3 Rolling Stock, Automobile	31
1.4 Rolling Stock, Streetcar	10
2.1 Non-Revenue Vehicles	67
2.2 Equipment, Bus Equipment	100
2.3 Equipment, Streetcar Equipment	4
2.4 Equipment, Systems	1,626
2.5 Equipment, Furniture	11
3.1 Facilities, Admin/Maintenance	190
3.2. Facilities, Passenger Facilities	905
3.3 Facilities, Parking Facilities	22
4.1 Infrastructure, Track Elements	1
4.2 Infrastructure, Power & Signal Elements	4
<b>TOTAL</b>	<b>3,184</b>

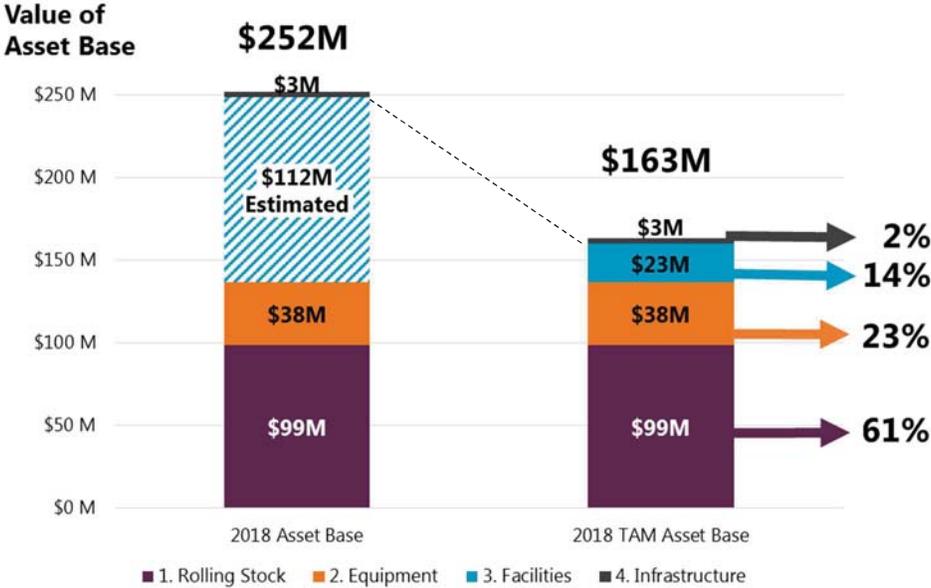
**Asset Base Value**

HART’s total value of assets included in the TAM Plan is \$252 million, in 2018 dollars. Only the value of Facility assets that were available in HART’s fixed asset register (bus stop shelters) or evaluated in the facility condition assessment discussed further in Chapter 4 are included in the TAM plan. Therefore, the value of Facility assets that were subject to analysis and evaluation in the TAM plan only value about \$23 million. This represents the value of assets that were either available in HART’s fixed asset accounting or represent replacement values from HART’s facility condition assessment. This study only provided values for assets

that were replaced in the 10-year horizon between 2018 and 2028. The value of assets that were not due for replacement were not provided.<sup>6</sup>

However, the total Facilities asset value was estimated to be approximately \$112 million. Figure 3-3 shows the distribution of the asset base value by asset class.

**Figure 3-3: HART 2018 Asset Base**



All further analyses herein are based on the 2018 TAM asset base value of \$163 million.

**Rolling Stock**

Revenue Vehicles that provide public transportation services transporting passengers are included in the Rolling Stock asset category; non-revenue and other support vehicles are included under the equipment asset category. HART does not operate any third-party rolling stock assets.

HART’s fixed-route fleet consists of 40’ diesel buses, 40’ CNG (compressed natural gas) buses, and electric streetcars. The paratransit fleet consists of wheelchair accessible vehicles (VPG MV-1), Champion cutaway vans, and Chevrolet cutaway vans. Paratransit vehicles are also heavily used, accumulating about 170,000 miles (or more) over their typical useful life of four years.

HART also operates nine modern replica double-truck Birney cars and one replica open-bench "Breezer" built by the Gomaco Trolley Company in Ida Grove, Iowa in the early 2000. Mileage is not tracked with these vehicles.

Table 3-2 summarizes HART’s Rolling Stock assets.

<sup>6</sup> See details on page 25.

**Table 3-2: Rolling Stock Assets, FY2018**

ASSET CLASS	NUMBER OF ASSETS	TOTAL VALUE [2018]	AVERAGE AGE [YEARS]	AVERAGE ANNUAL MILEAGE
1.1 Motorbus	167	\$81.14M	4.9	52,839
1.1.1 CNG	56	\$28.91M	1.9	
1.1.2 Diesel	111	\$52.23M	7.8	
1.2 Cutaway	46	\$4.71M	3.8	41,753
1.3 Automobile	31	\$1.96M	2.7	45,943
1.4 Streetcar	10	\$10.96M	16.5	N/A
<b>TOTAL</b>	<b>254</b>	<b>\$98.77M</b>	<b>N/A</b>	<b>N/A</b>

*Source of asset inventory information for all HART rolling stock assets: HART fixed asset accounting system compiled in SGR database*

HART’s Rolling Stock assets have a replacement value of about \$99 million (in 2018 dollars). Which represents by far the largest asset group with 61% of the asset value base used in this TAM Plan.

**Equipment**

The equipment evaluated in this TAM Plan include all non-revenue service vehicles and any agency-owned equipment with an acquisition cost of \$10,000 or more. This also includes groups of assets that have low individual unit value that add up to \$10,000 or more when combined.

The equipment asset category is divided into two asset classes:

1. Non-revenue vehicles
2. Non-vehicle equipment

HART’s Equipment assets have a total replacement value of about \$38 million (in 2018 dollars), including \$2 million for non-revenue vehicle equipment (see Table 3-3). Tables 3-4 and 3-5 provide a further breakdown of the non-vehicle equipment assets summarized in Table 3-4.

*Non-Revenue Vehicles*

Non-revenue vehicles are used primarily to support maintenance and repair work, supervisory work, or for the delivery of materials, equipment, or tools. HART operates 67 non-revenue vans, SUVs, cars, and trucks. Of these, 26 are used by maintenance staff, 26 are used for administrative purposes, and 15 are used by operations staff. HART does not use any third-party non-revenue service vehicles.

Table 3-3 summarizes HART’s non-revenue vehicle assets totaling nearly \$2 million.

**Table 3-3: Non-Revenue Vehicle Assets, FY2018**

ASSET CLASS	NUMBER OF ASSETS	TOTAL VALUE [2018]	AVERAGE AGE [YEARS]	AVERAGE ANNUAL MILEAGE
2.1.1 Automobile	44	\$1.24M	7.5	15,638
2.1.2 Van	6	\$0.15M	10.5	10,181
2.1.3 SUV	17	\$0.38M	6.8	8,365
<b>TOTAL</b>	<b>67</b>	<b>\$1.78M</b>	<b>N/A</b>	<b>N/A</b>

*Source of asset inventory information for all HART non-revenue vehicle assets: HART fixed asset accounting system compiled in SGR database*

*Non-Vehicle Equipment*

The non-vehicle Equipment asset class is comprised of four asset groups: bus equipment, streetcar equipment, systems, and furniture. These assets total \$36 million, as shown in Table 3-4.

**Table 3-4: Non-Vehicle Equipment Assets**

ASSET CLASS	NUMBER OF ASSETS	TOTAL VALUE [2018]	AVERAGE AGE [YEARS]
2.2 Bus Equipment	100	\$7.21M	10.4
2.3 Streetcar Equipment	4	\$0.17M	13.8
2.4 Systems	1,626	\$28.19M	6.9
2.5 Furniture	11	\$0.77M	6.6
<b>TOTAL</b>	<b>1,741</b>	<b>\$36.34M</b>	<b>N/A</b>

*Source of asset inventory information for all HART non-vehicle equipment assets: HART fixed asset accounting system compiled in SGR database*

Bus or Streetcar Equipment are assets directly related to the vehicles, mainly assets either on the vehicles or in the workshops to support preventive maintenance and repairs. A summary of this equipment is provided in Table 3-5.

**Table 3-5: Bus and Streetcar Equipment Assets**

ASSET	NUMBER OF ASSETS	TOTAL VALUE [2018]
CNG - STATION EQUIPMENT	23	\$2.93M
BUS LIFTS	27	\$1.53M
FUEL LANE UPGRADED	1	\$0.78M
GENERATORS	2	\$0.38M
MISC EQUIPMENT	10	\$0.36M
SPRAY PAINT BOOTH	2	\$0.30M
FLUID DISPENSING SYSTEM	1	\$0.19M
CATERPILLAR FORKLIFT	3	\$0.14M
TRAMWAY REFUELING SYSTEM (ISLAND)	2	\$0.09M
BUS WASHER	1	\$0.08M
LOT SWEEPER ATLV 4300	2	\$0.07M
SWEEPER/SCRUBBER-CAPTOR (9042)	1	\$0.07M
CONVEY SYS/HOIST & CRANES-2 TON	1	\$0.06M
AIR COMPRESSORS	5	\$0.06M
TRAMWAY FUELING SYSTEM	1	\$0.04M
EXHAUST REMOVAL SYSTEM	1	\$0.04M
STORAGE TANK	7	\$0.04M
TRASH COMPACTOR-40 CUBIC YDS	1	\$0.03M
CLARK FORKLIFT	1	\$0.03M
WASTE OIL TANKS-BALCRANK	1	\$0.03M
DUAL MOUNT CHARGE STATION	1	\$0.02M
TRAILER (9043)	1	\$0.02M
FLOOR SCRUBBER-WALK-BEHIND	2	\$0.02M
PRESSURE WASHER	1	\$0.02M
ROBINAIR RECOVERY/RECYCLER	3	\$0.02M
PARTS WASHER	3	\$0.02M
<b>TOTAL</b>	<b>104</b>	<b>\$7.38M</b>

*Systems*

For the purposes of the TAM Plan, Systems assets are hardware and software assets that are utilized in the operations of providing public transportation services. These assets make up a majority of the asset inventory within the Equipment category. There are over 1,600 items with a total value of \$28 million. Due to the high number of assets and asset value, HART elected not to define the asset by a value of \$50,000 or more, as suggested by FTA, but to include assets with a value of \$10,000 or more.

This asset class includes:

- Software
- Radios
- Phone system
- Network equipment
- Audio visual equipment
- Intelligent Transportation Systems (ITS)
- Automatic Passenger Counting (APC) systems
- Revenue collection equipment

A full list of non-vehicle equipment assets can be found in Table 3-6.

**Table 3-6: System Assets**

SYSTEMS ASSETS	NUMBER OF ASSETS	TOTAL VALUE [2018]
NETWORK EQUIPMENT	1,133	\$4.62M
GPS	14	\$3.51M
MISC. SOFTWARE	88	\$3.32M
TRIBRIDGE/MAXIMUS ERP IMPLEMENTATION	1	\$3.12M
ITS PROJECT MANUALS	1	\$2.58M
TICKET VENDING MACHINES	33	\$1.81M
MOBILE RADIOS	13	\$1.67M
FAREBOXES	212	\$1.58M
PHONE SYSTEM	37	\$1.28M
TRIP PLANNING SOFTWARE	4	\$1.21M
223 MONOCHROME SCREENS	1	\$0.92M
280' RADIO TOWER	1	\$0.58M
INSTALL CNTRL MONITR SYS	1	\$0.52M
AV EQUIPMENT	43	\$0.31M
CAD/AVL SOFTWARE	1	\$0.28M
GFI SYSTEM	21	\$0.24M
72 PASSENGER COUNTERS-FR	1	\$0.20M
OTHER SYSTEMS	4	\$0.19M
CHANGE MACHINES	7	\$0.07M
POINT OF SALE SYSTEM	5	\$0.06M
APC	1	\$0.04M
NICECALL FOCUS III	1	\$0.03M
COMM SERV ANALYZER	1	\$0.03M
BUS IN A BOX	1	\$0.02M
UHF ANTENNA 9DB GAIN	1	\$0.003M
<b>TOTAL</b>	<b>1,626</b>	<b>\$28.19M</b>

All Equipment assets account for about 23% of the TAM Plan asset value base.

**Facilities**

Facilities are defined as any structure used to support public transportation services that HART owns or has a direct capital responsibility for. Facilities used and owned or operated by HART include: administrative buildings, maintenance buildings, and passenger facilities. Except for the bus stop assets, HART’s fixed-asset accounting register does not capture the other facility assets at the same level of detail as the Rolling Stock and Equipment assets. HART chose to collect facility asset inventory information from various asset condition assessment reports developed by an external consultant. However, these assessments only captured assets in need of replacement over the next 10 years.

Table 3-7 summarizes HART’s Facility assets totaling approximately \$23 million<sup>7</sup>.

**Table 3-7: Facility Assets<sup>8</sup>**

ASSET CLASS	NUMBER OF ASSETS	TOTAL VALUE [2018]	AVERAGE AGE [YEARS]
3.1.1 Administrative	55	\$2.21M	12.7
3.1.2 Maintenance	25	\$0.23M	22.2
3.1.3 Admin & Maintenance	110	\$0.93M	9.9
3.2.1 Bus Stop Shelters	568	\$17.16M	11.0
3.2.2 Transit/Transfer Centers	337	\$2.36M	11.0
3.3 Parking Facilities	22	\$0.32M	11.1
<b>TOTAL</b>	<b>1,117</b>	<b>\$23.22M</b>	<b>N/A</b>

*Source of asset inventory information for all HART facility assets: Based on HART’s fixed-asset accounting register (bus stop shelters) as well as manual inventory taking with focus on assets that are in need for replacement in the reporting period.*

For more refined estimates, HART will need to perform a more detailed assessment based on updated inventory taking of all facility assets (discussed further in Chapter 6 as part of HART’s TAM implementation program).

HART uses two main facilities for administrative and maintenance purposes: the HART operations campus and Ybor administrative building (which also houses the streetcar maintenance operations).

*The HART Operations Campus*

The HART operations campus is located at 4305 E. 21st Ave., Tampa, FL 33605. This campus was purchased in 1982 and includes 98,960 square feet of building space. Figure 3-4 provides an aerial of the property.

<sup>7</sup> Total value only represents capital need and does not represent a complete facility inventory

<sup>8</sup> Facilities identified to be included in the TAM Plan

**Figure 3-4: HART Operations & Administrative Campus**



In addition to parking lots used to house revenue and non-revenue vehicles and employee/visitor parking, key facilities at the 21<sup>st</sup> Ave campus include:

1. Preventative maintenance building
2. Heavy maintenance building
3. Administration building
4. Procurement Annex.

#### *HART Ybor Facility*

Additional administrative offices and the streetcar maintenance facility are housed in the Ybor building at 1201 E. 7<sup>th</sup> Avenue, Tampa, FL 33605. An aerial of this facility, which was constructed in 2003 and includes 33,764 square feet, is shown in Figure 3-5.

The Ybor facility is owned by the City of Tampa and leased to HART. It was included in the TAM Plan because HART is responsible for maintaining the building, including providing major capital refurbishments, with the last project as recent as 2016.

Figure 3-5: HART Ybor Administration and Streetcar Building



*Passenger Facilities*

In addition to its Operations & Administrative Campus and Ybor Facility, HART owns bus stop shelters, transfer centers, and park-and-ride lots. The transfer centers and park-and-ride lots are summarized in Table 3-8.

**Table 3-8: HART Passenger Facilities**

Facility Name	Year Built	Size [sq. ft.]
Marion Transit Center; 1211 N Marion St., Tampa, FL 33602	2003	10,500
Hidden River Park n' Ride Lot; 8790 Hidden River Pkwy., Tampa, FL 33637	2003	137,150*
NetPark Transfer Center; 5003 N. 56th St., Tampa, FL 33610	2007	1,040
Northwest Transfer Center; 8951 W. Waters Ave., Tampa, FL 33615	2008	1,040
South County Transfer Center; SR 674 at US 301, Wimauma, FL 33598	2007	70,000*
Temple Terrace City Hall; 11300 N. 56 <sup>th</sup> St., Temple Terrace, FL 33617	1996	39,800*
Westshore Plaza; 250 Westshore Plaza, Tampa, FL 33609	1998	10,670
Yukon Transfer Center; 400 E. Yukon St., Tampa, FL 33604	1988	5,700
West Tampa Transfer Center; 4201 N. Himes Ave., Tampa, FL 33607	2007	1,040
University Area Transit Center; 13110 N. 27th St., Tampa, FL 33612	2000	1,200

\*: Parking lot

As shown in Table 3-7 above, HART has 568 assets for bus stop shelters totaling approximately \$17 million<sup>9</sup>, of which many are equipped with shelters and solar lighting, as pictured in Figure 3-6.

<sup>9</sup> HART has approximately 2,175 bus stops. The TAM plan includes the assets listed in the fixed accounting register.

**Figure 3-6: HART Bus Stop Shelters**



Based on available data, the current facility replacement values (design, construction, demolition, but without real estate) can only be estimated. Table 3-9 provides an estimated order-of-magnitude value for all HART Facility assets. To provide more detailed estimates, HART will need to perform a more comprehensive assessment based on updated inventory taking of all facility assets (see also TAMP implementation plan). As previously mentioned, only the value of Facility assets that were available in HART’s fixed asset register (bus stop shelters) or evaluated in the facility condition assessment discussed further in Chapter 4 are included in the TAM plan, which total approximately \$23 million.

**Table 3-9: 2018 Facility Replacement Values (General Estimate)**

Admin/Maintenance Facilities			
	Value	Sqft.	\$/Sqft.
<b>21st Ave</b>			
HM Bldg.	\$30,199,001	57,000	\$529.81
PM Bldg.	\$7,841,144	14,800	\$529.81
Admin	\$13,245,176	25,000	\$529.81
Annex2	\$0		\$529.81
Annex3	\$0		\$529.81
Site	\$5,000,000		
	<b>\$56,285,322</b>		
<b>Ybor</b>	<b>\$ 17,903,240</b>	33,792	\$ 529.81
<b>TOTAL</b>	<b>\$ 74,188,561</b>		
Transfer Centers			
		Sqft.	\$/Sqft.
Marion Transit Center	\$5,562,974	10,500	\$529.81
Hidden River	\$6,907,500	138,150	\$50.00 No Building
NetPark Transfer Center	\$593,384	1,120	\$529.81
Northwest Transfer Center	\$550,999	1,040	\$529.81
Westshore Plaza	\$533,500	10,670	\$50.00 No Building
Yukon Transfer Center	\$3,019,900	5,700	\$529.81
West Tampa Transfer Center	\$550,999	1,040	\$529.81
University Area Transit Center	\$635,768	1,200	\$529.81
Westshore Plaza	\$533,500	10,670	\$50.00 No Building
Temple Terrace City Hall	\$1,990,000	39,800	\$50.00 No Building
<b>Transfer Centers</b>	<b>\$20,878,525</b>		
Bus Stop Shelters			
Facilities, Passenger Facilities, Bus Stop Shelters			
<b>Valuation</b>	<b>\$17,158,670</b>	Actual Asset Values	
Total Facility Value			
	<b>Value</b>		
<b>Admin/maintenance</b>	\$74,188,561		
<b>Transfer Centers</b>	\$20,878,525		
<b>Bus Stop Shelters</b>	\$17,158,670		
<b>TOTAL</b>	<b>\$112,225,756</b>		

**Infrastructure**

HART infrastructure assets are the streetcar assets mainly located at the Ybor facility. Table 3-10 summarizes the streetcar infrastructure assets included in the TAM Plan:

**Table 3-10: Streetcar Assets Included in TAM Plan**

ASSET CLASS	NUMBER OF ASSETS	TOTAL VALUE [2018]	AVERAGE AGE [YEARS]
4.1 Track Elements	1	\$0.63M	17.0
4.2 Power & Signal Elements	4	\$2.46M	14.8
<b>TOTAL</b>	<b>5</b>	<b>\$3.09M</b>	<b>N/A</b>

*Source of asset inventory information for all HART infrastructure assets: HART's fixed-asset accounting register does not capture individual infrastructure assets. To include the above assets in the TAM Plan, HART performed a manual inventory taking as well as estimating the historic acquisition cost.*

Infrastructure assets have a replacement value of about \$3 million (in 2018 dollars).

Infrastructure assets that are part of HART's transit system but have not been included in the TAM Plan are:

1. Off-property streetcar infrastructure assets
2. Assets on the Marion Transitway

The off-property streetcar infrastructure assets, such as the remaining miles of track and catenary, two substations, and passenger stations have not been considered as part of HART's asset inventory due to responsibilities determined in the "Streetcar Tri-Party Agreement" between HART, the City of Tampa, and the Tampa Historic Streetcar Inc. (THSI) and the "Operator's Agreement for the TECO Line Streetcar System" between HART and THSI. The operator's agreement specifically states that "This Agreement shall not address major repairs, replacement, or improvement of the capital assets of the Streetcar System...".<sup>10</sup> However, HART decided to review historic documents to clarify its responsibilities for any streetcar system assets, including any lifecycle management activities such as condition assessments, NTD reporting, etc. Any adjustments, if required, will be addressed in future TAM Plan updates.

HART also operates the Marion Transitway located on Marion Street between Tyler Street and Whiting Street in downtown Tampa. It is exclusively for bus traffic during the periods of 6 AM to 7 PM, Monday through Friday, and open to all traffic all other times. The transitway has the following features:

- 14 stops/passenger stations
- 10 intersection crossings (8 signalized)
- CSX crossing (at Polk Street)
- 13 kiosks
- One art piece with a clock at Kennedy Boulevard

While HART is responsible for the day-to-day maintenance of the transitway, it does not plan or pay for capital repairs, replacements, or refurbishments; however, HART is currently investigating together with

<sup>10</sup> Operator agreement for the TECO Streetcar System, page 5

relevant stakeholders to verify and adjust, if needed, HART's exact responsibility of the streetcar and transitway assets and how to define the interface with the other stakeholders regarding the overall life cycle management of these assets. Any adjustments will be addressed in future TAM Plan updates.

### 3.3. Planned Inventory Changes

In addition to HART's existing assets, the TAM Plan analysis considers impacts on inventory of new projects that HART plans to add within the next 10 years.

- HART is planning to replace and expand its heavy maintenance building located at the 21<sup>st</sup> Avenue campus. This project is planned to be implemented in three phases, starting in 2019 and ending in 2021, and will cost approximately \$42 million. This project is not included in the TAM Plan as funding and financing at the time of the plan development have not been finalized.
- Beginning in 2019, HART plans to replace its CAD/AVL system. The system replacement is expected to cost approximately \$5.5 million, and HART has secured dedicated funding for this project. This replacement is not included in the SGR need and funding plan.

Both of these planned projects are accounted for in the TAM Plan as projects that will address SGR needs. They have been already prioritized and work is underway to implement them.

### 3.4. Asset Criticality

Asset Criticality is considered in the TAM Plan as the relative risk of a negative impact to the safe, reliable delivery of service arising from the failure of an asset. This provides the basis for a risk-based approach to asset management.

The HART TAM Plan establishes and applies a method for assigning a criticality rating on a 1 through 5 scale to each asset. For asset management purposes, asset criticality is addressed as the relative risk to the accomplishment of HART's mission arising from the failure of an asset from whatever cause.

HART asset criticality has two considerations:

1. **Safety Impact:** One score measuring impact of asset failure that can cause injury, death, damage or loss of equipment or property, or damage to the environment.
2. **Asset Criticality:** Aggregate score is computed based on asset failure causing:
  - a. **A Financial Impact:** Increased cost or loss in revenue arising from an asset failure.
  - b. **An Impact on Service Efficiency:** Duration of service outage caused by asset failure.
  - c. **An Impact on Mission Importance:** Impact to carrying out the agency's mission: *HART takes people to the places that enhance their lives*, and how it will affect HART's reputation with the public.

All asset classes were evaluated based on these two elements. In some cases, the scoring was applied to individual assets if there was reason to apply higher criticality scores than at the asset class level. For example, within the Systems asset class, server equipment was given a higher Safety score than printers.

The rating scales for the safety and criticality scoring are listed in Table 3-11 below.

**Table 3-11: Rating Scale for Asset Criticality**

Element	Scale					Weights
	1	2	3	4	5	
<b>Impact on Safety</b>	No Impact	Minor Impact	Minor Injury	Moderate Injury	Major Injury or Death	N/A
<b>Financial Impact (Increased Cost/Loss of Revenue)</b>	< \$100K	\$100K - \$500K	> \$500K - \$2M	> \$2M - \$5 M	> \$5M	45%
<b>Impact on Service</b>	Up to 1 Day	2-7 Days	1-2 Weeks	2-4 Weeks	> 4 Weeks	35%
<b>Impact on Agency Mission</b>	No Impact	Minor, Only Short-Term Impact	Minor Impact	Moderate Impact	Major, also Long-Term Impact	10%

## 4. SGR Methodology and Asset Condition

The TAM Plan establishes an ongoing procedure for measuring, monitoring and evaluating SGR. This chapter:

- Describes the SGR methodology which includes the performance and condition measures that are used to measure SGR
- Reports current conditions of HART's assets when this methodology is applied

The condition data described in this chapter are maintained in the SGR database as condition and performance data attributes.

### 4.1. SGR Methodology

The FTA definition for SGR as used for the TAM Plan is:

*"State of Good Repair (SGR) means the condition in which a capital asset is able to operate at a full level of performance."<sup>11</sup>*

To operationalize this through the TAM Plan process, HART sets the:

1. Asset's Useful Life Benchmark (ULB). FTA defines the Useful Life Benchmark (ULB) as *"...the expected lifecycle or the acceptable period of use in service for a capital asset, as determined by a transit provider, or the default benchmark provided by the FTA"<sup>12</sup>.*

The TAM Plan process starting from FTA guidelines refined these to be specific to the service area and its operating environment.

<sup>11</sup> 49 CFR Parts 625, § 625.5 (FTA Transit Asset Management Final Rule), July 26, 2016

<sup>12</sup> 49 CFR Parts 625, § 625.5 (FTA Transit Asset Management Final Rule), July 26, 2016

2. Asset condition measurement approach for each asset class. For each approach used condition is measured by applying a condition rating scale. The TAM Plan uses the TERM asset condition rating scale with a rating scale value of "1" representing "poor condition" to "5" representing "excellent condition".

### Determining Useful Life Benchmarks

The TAM Plan establishes ULBs for SGR management that reflect HART's operating environment and lifecycle management practices. HART staff determined these ULBs for its assets through a combination of workshops and reviewing various documents and tools published by FTA. In these workshops, HART staff developing the TAM Plan met with department representatives responsible for HART's assets to understand the historical and current decision-making policies of each department related to asset replacement and how typical ULBs are determined. This included capturing asset life-extending measures, such as bus mid-life overhauls, are being implemented.

During these discussions, FTA sources for typical or default ULB functioned as example or reference points, which include:<sup>13</sup>

- Default Useful Life Benchmark (ULB) Cheat Sheet<sup>14</sup>
- ULB default values used in the TERM Lite Inventory Publisher<sup>15</sup>
- Guidance on FTA's Asset Management FAQ-pages
- Award Management Requirements Circular 5010.1E and Program Circulars

The resulting adopted TAM Plan ULBs reflect HART's operating environment and lifecycle management practices.

### Asset Condition and Rating Scale

The FTA TERM asset condition rating scale is an integer value rating scale from 1 representing "poor condition" (the value "0" can be applied to non-functioning assets) to 5 representing "excellent condition," as illustrated in Figure 4-1.

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<sup>13</sup> Where appropriate, HART deviated from these guidance documents if FTA had previously approved other ULBs. For example, HART received approval from FTA to use an 11-year ULB for chillers as opposed to using the standard ULB of 30 years (see Appendix 2). The shorter ULB is justified due to the hot Florida climate resulting in higher usage and the high air salt content leading to accelerated deterioration of the external compressor, condenser, evaporator, and expansion valves.

<sup>14</sup> 2017 Asset Inventory Module Reporting Manual, Page 53

<sup>15</sup> <https://www.transit.dot.gov/TAM/TERMLite>

**Figure 4-1: Condition Rating Scale (Consistent with TERM)**



Ratings of 1 and 2 are considered not in SGR where the asset’s performance is somewhat impaired. Ratings of 3 and above present asset conditions in a SGR such that assets achieve full performance levels.

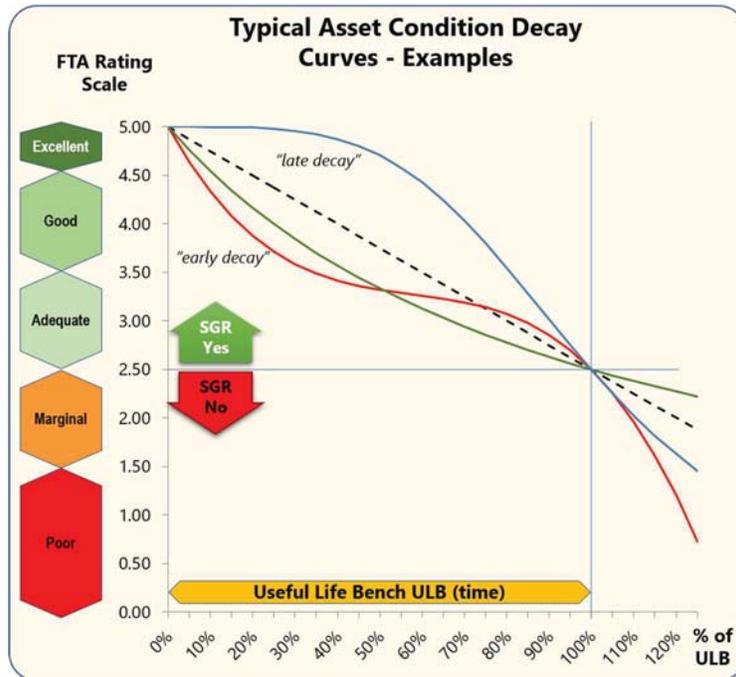
Asset condition ratings are often not based on integer values, but rather score values with one decimal place which allows for better representation of actual condition values along asset-specific condition decay curves, or to aggregate scores across multiple facility assets to one score for a whole building. Ultimately, all condition ratings at the highest level are rounded to full integer values when reported to FTA.

The most common approaches to asset condition assessments are:

1. **Age based** – A new asset is rated at “5” on the condition rating scale with decreasing rating value until it reaches its ULB at a rating of 2.5 (or rounded to 3). Assets older than their ULB have condition ratings below 2.5 and are considered not in SGR.
2. **Usage based** – Analogous to age-based condition measurements, the condition determining factor is asset usage (e.g., measured in hours performed or miles run).
3. **Condition based** – Asset condition ratings are developed by assessing the condition of the assets, usually through onsite visual and/or physical assessments during routine inspection or maintenance work or as separate condition assessment effort. The likelihood of moving from one condition state to another in the future years is then used to determine future SGR need.

Figure 4-2 illustrates the concept of applying specific decay curves over the lifetime of an asset (and beyond), indicating an asset condition score at any point in time. In this model, an asset condition of 2.5 (rounded to 3) presents a condition in SGR, the minimal condition threshold be considered in SGR.

Figure 4-2: Asset Condition Decay Curves



The shape of the decay curve differs between asset types. Early decay curves are typical for assets such as buses or light rail vehicles. Software products, for example, normally do not follow typical deterioration patterns, as they can become obsolete due to new product updates or technology developments. Late or very late decay curves better represent the decreasing condition and approaching end of a software’s lifetime.

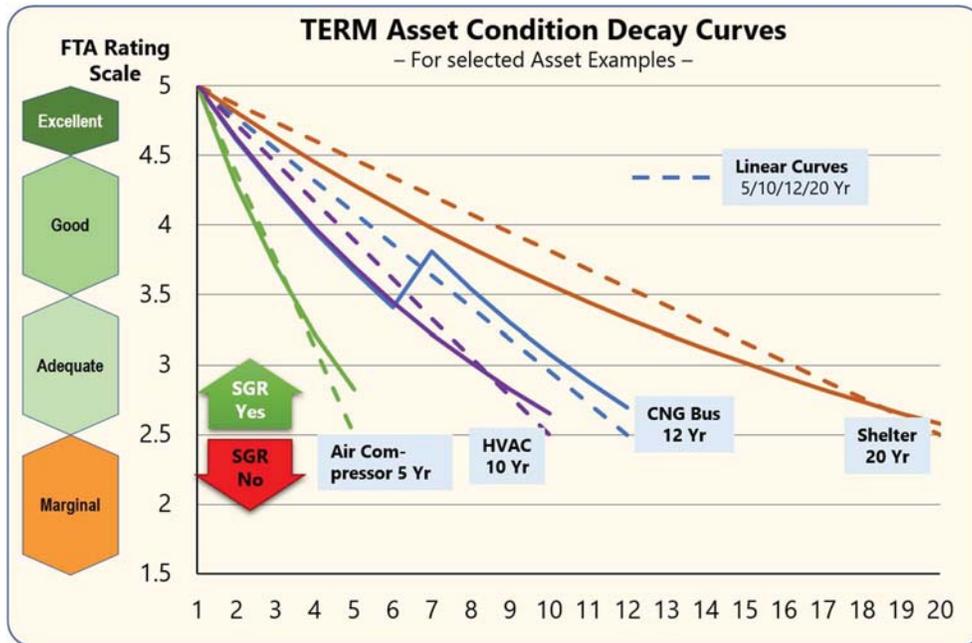
Asset-specific decay curves allow HART to predict an asset’s future condition and indicates when to replace assets before the performance decreases to non-SGR levels. A longer-term asset management goal for HART is to use decay curves to measure delayed asset deterioration through improved inspection/maintenance or operating practices. This would lead to longer ULBs and cost savings.

**Use of the TERM Lite Model**

The HART TAM Plan uses the FTA’s TERM Lite model for decision support. This model primarily uses established decay curves for various asset classes, some of which are based on data collected in empirical studies.<sup>16</sup> These asset decay curves are used to forecast the asset’s condition annually over time, even beyond the asset’s useful life assumption. Figure 4-3 illustrates TERM decay curves for selected assets, including a linear asset decay curve as a reference point.

<sup>16</sup> FTA Research on Decay Curves Between 1998 and 2006, Asset Conditions Decay over Time: 40 Foot Buses SGR Spline - Bus (High/Avg/Low PM), also referenced in "Forecasting Asset Conditions with Decay Curves", April 16, 2012, 9th National Conference on Transportation Asset Management San Diego, California

Figure 4-3: Asset Condition Decay Curves



For example, the asset condition decay curve for the CNG bus shows an increase in condition ratings in Year 7 as a result of the vehicle’s mid-life overhaul that replaces the engine and transmission, costing approximately \$50,000 to \$60,000 per vehicle. As discussed later in this chapter, HART buses have, on average, accumulated 320,000 miles by this point. This mid-life overhaul allows HART to continue operating the buses for another 300,000 to 400,000 miles before the vehicle must be replaced.

An asset’s condition primarily deteriorates over time due to usage, but other factors, such as environmental impacts (e.g., salt, rain/water, sun, road conditions, etc.), operating parameters (e.g., topography of service areas, vehicles speed during service, acceleration/braking patterns, etc.) or quality/frequency of maintenance and repairs also can affect its condition.

While the TERM decay curves offer a good approximation of an asset’s useful life, specific circumstances, such as high air salt content or high vehicle mileage, affect HART’s assets. Therefore, HART’s goal is to routinely inspect its assets in the future to better determine asset-specific decay curves over time. This will allow HART to estimate condition ratings and forecast optimal replacement times for its various assets.

**HART ULB and Condition Assessment Summary**

In summary, the ULB and condition assessment method for the key asset classes or for individual assets is provided in Table 4-1.

**Table 4-1: Overview of TAM Plan Asset Useful Life Benchmarks**

ASSET CLASS	ULB [YEARS]	CONDITION ASSESSMENT
1.1. Rolling Stock, Motorbus	12	Age/Usage*
1.2 Rolling Stock, Cutaway	4	Age/Usage*
1.3 Rolling Stock, Automobile	4	Age/Usage*
1.4 Rolling Stock, Streetcar	25	Age/Usage*
2.1 Equipment, Non-Revenue Vehicles	4	Age/Usage*
2.2 Equipment, Bus Equipment	5/20/25	Age
2.3 Equipment, Streetcar Equipment	5/20	Age
2.4 Equipment, Systems		
CAD/AVL/GPS	10	Age
ITS	10/15	Age
Phones	10	Age
Software	3/5/10/15	Age
Network Equipment	10	Age
Farebox	15	Age
Point-Of-Sale System	12	Age
APC	10	Age
3.1 Facilities, Admin/Maintenance		
Site	40	Age/Condition
Structure	50	Age/Condition
Exterior	10/15/25/40	Age/Condition
Systems	10/50	Age/Condition
3.2.1 Facilities, Passenger Facilities, Bus Stops	20/40	Age/Condition
3.2.2 Facilities, Passenger Facilities, Transit/Transfer Centers		
Site	40	Age/Condition
Structure	50	Age/Condition
Exterior	10/50	Age/Condition
Systems	10/50	Age/Condition
Interior	50	Age/Condition
3.3 Facilities, Parking Facilities	20/40/50	Age/Condition
4.1 Infrastructure, Track Elements	40	Age/Condition
4.2 Infrastructure, Power & Signal Elements	5/15/20/30	Age/Condition

**4.2. State of Good Repair and Condition Assessment Baseline**

This section reports HART’s SGR baseline, in total and by asset group, applying the SGR methodology previously described. The condition assessment baseline is the 2018 investment/SGR backlog. This section also provides HART’s asset performance measures in response to FTA’s reporting requirements.

The SGR baseline uses dollar values to measure SGR vs. non-SGR for HART’s asset base. For some assets that form a homogeneous asset group (e.g. buses), it is appropriate to also indicate the number of assets in SGR; however, for many other asset groups, the number of assets can be misleading. For example, IT systems or facility assets have asset values that can range from a few thousand to many hundreds of thousands of dollars. In this case, the amount of assets in SGR may not reflect the true need for replacements.

**HART SGR Baseline**

HART’s asset base inventory, described in Chapter 3 and valued at \$163 million, was assessed for its condition applying the TERM condition rating scale. Overall, condition ratings indicate that 26% of HART’s assets (in 2018 dollars) are currently not in a SGR. Figure 4-4 shows the distribution of condition ratings across all of HART’s assets.

**Figure 4-4: HART 2018 State of Good Repair Status - \$163 million Asset Base**

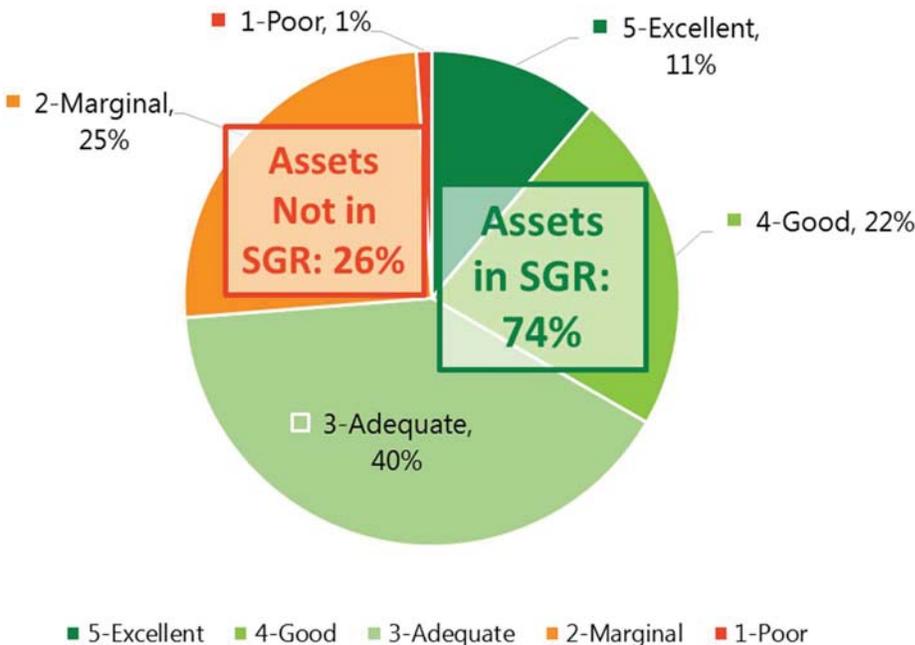
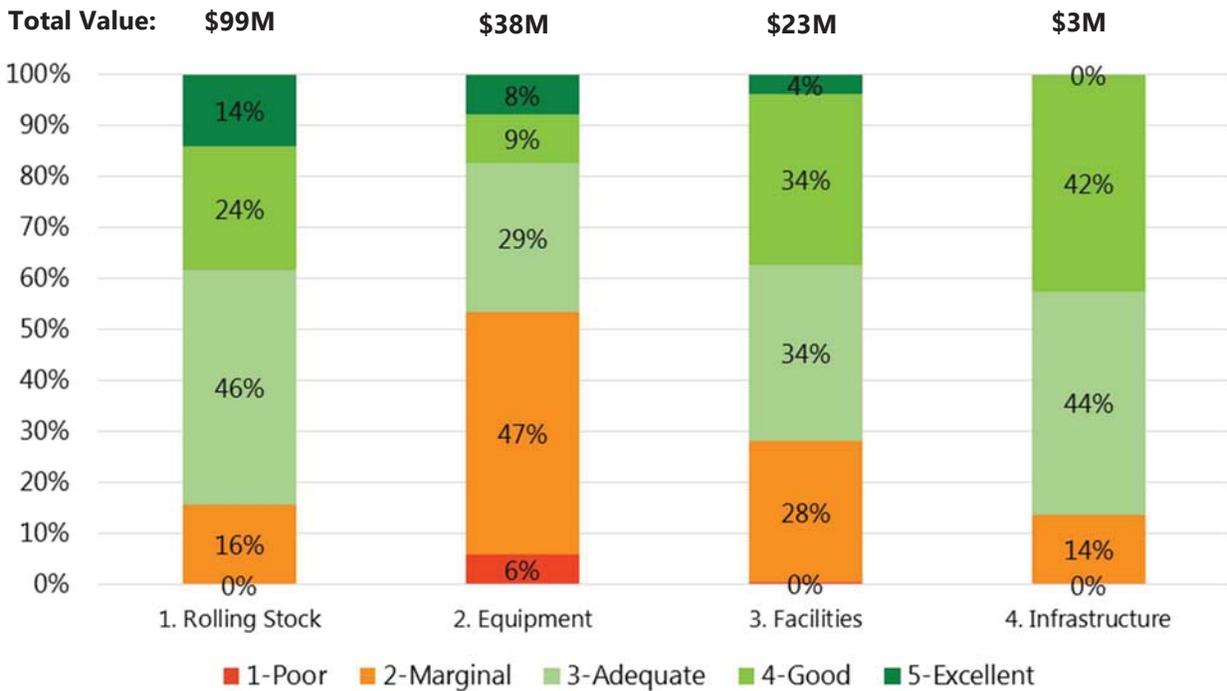


Figure 4-5 shows the condition rating distributions for the four asset categories. It should be noted that the condition scores for Rolling Stock, Equipment, Infrastructure, and bus stops under the Facility asset category were calculated based on TERM decay curves. Condition scores for the other Facility assets are based on the physical condition assessments performed by an outside consultant.

Figure 4-5: Asset Condition by Asset Category (by Asset 2018 Value)



Each asset category and its SGR status are described further below.

*Rolling Stock*

The condition assessment methodology for Rolling Stock assets is based on the ULB and the age of the asset. The TERM decay curves are used to determine future condition. The percentages of Rolling Stock in a SGR by asset value are shown in Table 4-2. In total, 84% of Rolling Stock, which represents the largest asset group by dollar value, are in a SGR.

Table 4-2: Percent of Rolling Stock in SGR, 2018 (by Asset Value)

ASSET CLASS	TOTAL	SGR	NON-SGR	% SGR BY ASSET VALUE
1.1 Motorbus	\$81.14M	\$70.34M	\$10.80M	87%
1.1.1 CNG	\$28.91M	\$28.91M	\$0.00M	100%
1.1.2 Diesel	\$52.23M	\$41.43M	\$10.80M	79%
1.2 Cutaway	\$4.71M	\$0.65M	\$4.05M	14%
1.3 Automobile	\$1.96M	\$1.28M	\$0.69M	65%
1.4 Streetcar	\$10.96M	\$10.96M	\$0.00M	100%
<b>TOTAL</b>	<b>\$98.77M</b>	<b>\$83.22M</b>	<b>\$15.55M</b>	<b>84%</b>

*Source of asset inventory information for all HART Revenue Vehicle assets: HART fixed asset accounting system compiled in SGR database*

### Rolling Stock Asset Performance

The ULB used for these assets are as follows:

- Motorbuses: 12 years
- Cutaways/Automobiles: 4 years
- Streetcars: 25 years

Due to its large service area, HART's revenue vehicles quickly accumulate mileage, particularly the HART bus fleet. HART buses have, on average, accumulated 320,000 miles by Year 7. A mid-life overhaul performed around this point allows HART to continue operating the buses for another 300,000 to 400,000 miles before the vehicle must be replaced. After 12 years (the assumed useful life) the average mileage for a motorbus is more than 630,000 miles. At this mileage, the second engine and transmission from the mid-life overhaul have typically exhausted their component ULB and need to be replaced.

From a cost perspective, investing \$55,000 to replace these parts is not justified since other vehicle components may not last another 300,000 miles and will need to be replaced well prior to the engine and transmission. Therefore, from a system and a commercial perspective it is not justified to further the service life of the bus. However, implementing improved maintenance methodologies may allow HART to improve the assets' performance and extend the ULB.

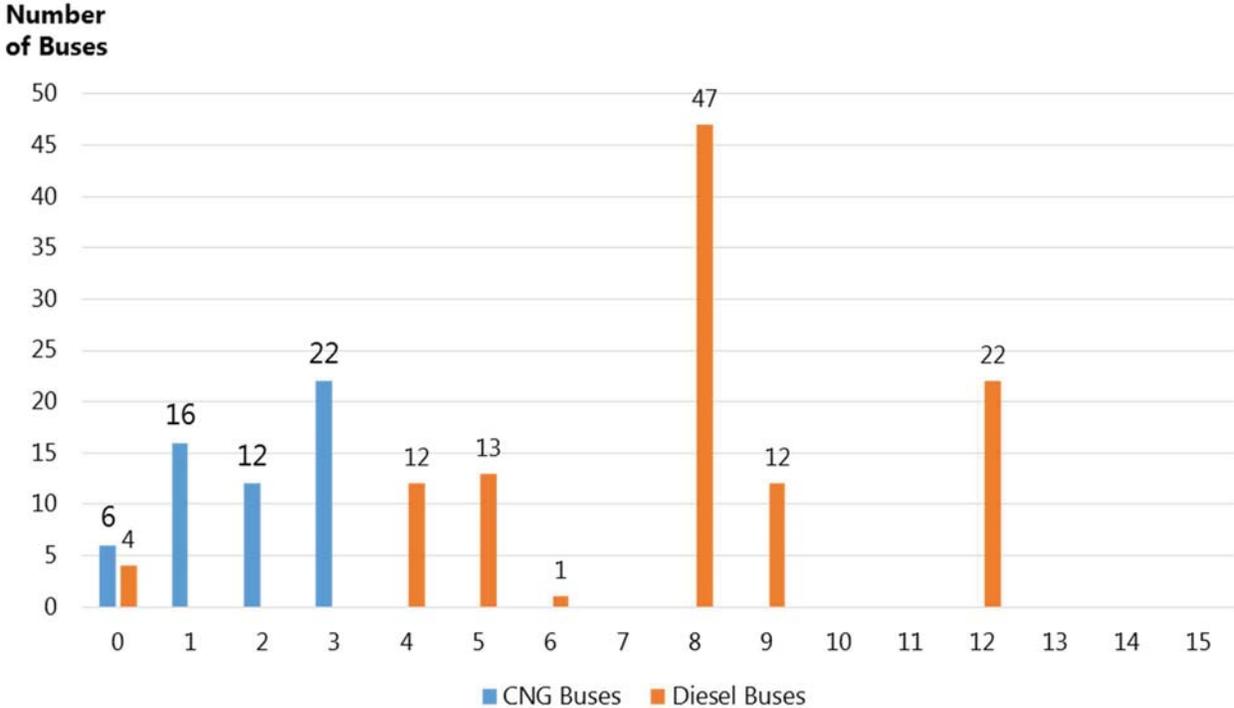
### Rolling Stock Age Distribution

The age distribution of HART's diesel and CNG buses is shown in Figure 4-6. There is a fairly even distribution of diesel and CNG buses purchased within the last five years; however, there is a significant number of diesel buses eight years or older that will need to be replaced in about four years when the buses have reached their useful life limit. A significant investment is expected in that year unless HART can spread the replacements over multiple years by replacing poor performers and/or high mileage buses first and more reliable and/or low mileage vehicles later. At a HART-typical bus fleet size of around 167 buses and a 12-year ULB assumption, it would require HART to replace about 14 buses each year to achieve an even age distribution<sup>17</sup>. Any annual replacement amount below 14 would, over time, lead to an over aging fleet.

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<sup>17</sup> A 12-year ULB is equivalent to an 8.3 percent replacement cycle of the asset base every year. E.g. a 14-year (10-year) ULB would require an annual replacement of the asset base at the 7.2 percent (10 percent). This shows what impact changing the ULB has on the replacement need of an asset every year.

Figure 4-6: Rolling Stock Age Distribution, 2018



Equipment

SGR for Equipment assets are based on the ULB, the age of the asset, and the TERM decay curve. The percentages of Equipment assets in a SGR by asset value are shown in Table 4-3.

Table 4-3: Percent of Equipment Assets in SGR (by Asset Value)

ASSET CLASS	TOTAL	SGR	NON-SGR	% SGR BY ASSET VALUE
2.1.1 Automobile	\$1.24M	\$0.29M	\$0.95M	23%
2.1.2 Van	\$0.15M	\$0.00M	\$0.15M	0%
2.1.3 SUV	\$0.38M	\$0.06M	\$0.32M	16%
2.2 Bus Equipment	\$7.21M	\$5.94M	\$1.27M	82%
2.3 Streetcar Equipment	\$0.17M	\$0.03M	\$0.14M	17%
2.4 Systems	\$28.19M	\$11.18M	\$17.01M	40%
2.5 Furniture	\$0.77M	\$0.26M	\$0.50M	35%
<b>TOTAL</b>	<b>\$38.12M</b>	<b>\$17.77M</b>	<b>\$20.35M</b>	<b>47%</b>

Source of asset inventory information for all HART Equipment assets: HART fixed asset accounting system compiled in SGR database

Overall, approximately 47% of Equipment assets are in a SGR. The ULB used for these assets are as follows:

- Non-Revenue Vehicles: 4 years
- Bus/Streetcar Equipment: between 5 and 25 years (depending on asset)
- Systems: between 3 and 15 years (depending on asset)
- Furniture: between 5 and 10 years (depending on asset)

The Systems asset group accounts for most of this asset class in terms of dollar value (equating to nearly 75% of the total Equipment asset value); however, only 40% of the Systems assets are in a SGR and lowers the overall percentage of Equipment assets in SGR. The asset replacement will need to focus on those Systems assets that are needed for passenger operations as well as critical systems infrastructure and software.

### *Facilities*

HART used two methods for the facility condition assessment:

1. Visual condition inspection of the physical conditions of most assets at HART's 21<sup>st</sup> Avenue and Ybor facilities was conducted by a contractor between October 2017 and April 2018. The applied rating scale in conformance with ASTM E2018-15 was converted to the FTA TERM rating scale which is further described in more detail in Table 4-4.
2. Bus stop facilities were assessed using ULBs and TERM decay curves to estimate the assets' condition.

During the on-site condition assessment, the contractor used a condition rating scale in general conformance with ASTM E2018-15. For the purpose of using these ratings for the TAM Plan the scale was converted to the FTA TERM scale, as described in Table 4-4.

**Table 4-4: Facility Condition Assessment Rating Scale**

HART Scale (used by contractor)	FTA Scale	HART Scale Conversion to FTA Scale	State of Good Repair YES / NO
(5 = excellent), not used		Not used	<b>State of Good Repair - YES</b>
4 = Good (In working condition and does not require immediate or short-term repairs)	5= excellent	4.25	
3 = Satisfactory (In working condition, but may require some minor immediate or short-term repairs)	4 = good	3.5	
2 = Fair (In working condition, but may require immediate or short-term repairs)	3 = adequate	2.75	
1 = Poor* (Not in working condition or requires immediate or short-term repairs)	2 = marginal	2	<b>State of Good Repair - NO</b>
	1 = poor		
	0		

\*: Only a score of "1" is describing an asset condition not in a State of Good Repair (per HART contractor for the condition assessment)

For each asset group subject to the visual inspection an aggregate condition score was calculated following FTA guidance document "TAM Facility Performance Measure Reporting Guidebook"<sup>18</sup>. Alternative 1 "Weighted Average Condition" was applied using the following deviating approach as asset replacement cost were not available.

1. Asset component level: An overall rating is calculated by weighting each sub-component using subjective weights reflecting the relative importance of the sub-component.
2. Building level: An overall rating is calculated by weighting each component using subjective weights reflecting the relative importance of the component (shown in Table 4-5).

<sup>18</sup> <https://www.transit.dot.gov/regulations-and-guidance/asset-management/tam-facility-performance-measure-reporting-guidebook>

**Table 4-5: Facility Asset Structure**

CODE	CATEGORY	WEIGHTS	SUB-CATEGORY
A.	Site	5%	Irrigation
			Fencing/Gates
			Signage
			Walkways/Steps
			Masonry Hardscape
			Hand Rails
			Domestic Water Lines
			Grounds
			Storm Drainage System
B.	Structure	40%	Foundation
			Floor
			Wall
			Column
C.	Exterior	25%	Roof
			Walls
			Windows
			Stairs
			Doors
D.	Systems	20%	Electrical
			Fire Protection
			Elevators
			Plumbing
			HVAC
E.	Interior	10%	Floors
			Walls
			Ceilings
			Doors
			Windows

The heavy maintenance building on the 21<sup>st</sup> Ave campus was not included in the condition assessment and no asset inventory was developed<sup>19</sup>. This is due to HART’s plan to replace the whole building within the next three to five years (or when funding/financing is available). Based on a previous assessment,<sup>20</sup> HART concluded that the building is not in a state of good repair and layout and size would not accommodate future needs. Therefore, there is a prioritized project underway to replace this facility in its entirety.

As an example, Table 4-6 describes the condition assessment results and building score calculation for the HART NetPark Transfer Center in Tampa. Each sub-component received an asset condition rating, which was then aggregated to a condition rating for each component, and ultimately for the complete building. In this case, the aggregate score is 3.1, rounded to an integer value of 3.

<sup>19</sup> Some of the HM building assets’ condition was assessed but not enough to calculate a building condition score.

<sup>20</sup> In 2016, HART assessed the viability of renovating the HM building vs. a new construction. A condition assessment revealed poor conditions of major assets (e.g. roof, fire and safety system) as well as non-compliance with ADA regulations or Florida building codes. A renovation would cost approximately \$6 million but would not extend the building’s remaining useful life of about 6 to 8 years.

**Table 4-6: Condition Assessment and Aggregate Condition Score for NetPark Transfer Center - Example-**

NetPark Transfer Center							
TAM Facility Physical Condition Assessment Inspection Report							
<b>Facility Name:</b> NetPark Transfer Center <b>Facility Address:</b> 5003 North 56th Street, Tampa, FL 33610 <b>Facility Type:</b> Transfer Center <b>Asset Information:</b> Building and Structures <b>Inspection Date:</b> 3/29/2018 <b>Name of Inspector(s):</b> ██████████							
Identification No:	Main Component	Sub-Component	Term Rating:	Description:	Component Weight	Asset Weight	Score
A.	Site		<b>2.69</b>		5%		
		Irrigation	2.75			15%	0.41
		Fencing/Gates	2.38	Repair damaged sections of fencing		15%	0.36
		Signage	2.75	Repaint metal monument sign as a maintenance item		15%	0.41
		Walkways/Steps	2.75			20%	0.55
		Grounds	2.75			5%	0.14
		Masonry	2.75			15%	0.41
		Storm Drainage System	2.75			15%	0.41
B.	Structure		<b>3.50</b>		40%		
		Foundations	3.50			40%	1.40
		Wall	3.50			30%	1.05
		Roof	3.50			30%	1.05
C.	Exterior		<b>2.74</b>		25%		
		Roof	2.90			40%	1.16
		Walls	2.75			35%	0.96
		Doors	2.45	Remove corrosion and repaint metal and roll-up doors		25%	0.61
D.	Systems		<b>2.93</b>		20%		
		Electrical	2.89	Bus shelters fluorescent fixtures. Replace discolored lens covers as a maintenance item		25%	0.72
		Fire Protection	2.75			25%	0.69
		Plumbing	3.58			25%	0.90
		HVAC	2.51			25%	0.63
E.	Interior		<b>2.68</b>		10%		
		Floors	2.75			30%	0.83
		Walls	2.75	Interior paint beyond its useful life. Repaint		30%	0.83
		Ceilings	2.38	Repair damaged drywall in men's public restroom		20%	0.48
		Doors	2.75			20%	0.55
<b>Overall Building Score</b>					<b>100%</b>		<b>3.1</b>
<b>Rounded Building Score</b>					<b>3</b>		

Table 4-7 presents the aggregate facility condition ratings for HART’s administrative/maintenance facilities and passenger/parking facilities. The weighting method applied to calculate the aggregate score is based on the facility size (in square footage) in absence of facility replacement cost. As shown in this table, all buildings subject to the Facility assessments represent 94% of HART’s facilities (by number of buildings) and about 86% of the square footage of all facilities. Overall, the assessed facilities scored at a 3 “adequate” (rounded) based on the TERM scale (see also Section 4.3 referencing HART’s asset performance measures).

## Table 4-7: HART Facility Condition Assessment Summary

HART TAM Facility Condition Assessment Inspection Report Summary



Period of Assessment: October 2017 to April 2018

Facility	Overall Building TERM Score	Rounded Building TERM Score	Size (sqft.)
<b>Administration Facilities</b>			
Admin Building (21st Ave)	3.4	3.0	25,000
Procurement Annex (21st Ave)	3.2	3.0	2,160
Administration Facilities, Weighted Average*	3.4	<b>3.0</b>	
<b>Administrative/Maintenance Facilities</b>			
Ybor Streetcar & Admin Facility	3.1	3.0	33,764
Admin/Maintenance Facilities Average	3.1	<b>3.0</b>	
<b>Maintenance Facilities</b>			
Preventive Maintenance (21st Ave)	3.2	3.0	14,800
HM Building (21st Ave)	Not Assessed		57,000
Maintenance Facilities Average	3.2	<b>3.0</b>	
<b>Transit Asset Management Performance Measures: Maintenance and Administrative Facilities</b>			
<i>Percent of Facilities rated below "3" on the TERM Condition Scale:</i>		<b>0%</b>	
<b>Passenger Facilities</b>			
Marion Transit Center	3.1	3.0	10,500
Hidden River**	2.6	3.0	137,150
NetPark Transfer Center	3.1	3.0	1,040
Northwest Transfer Center	3.1	3.0	1,040
South County Transfer Center	2.9	3.0	70,000
Temple Terrace City Hall	3.0	3.0	39,800
Westshore Plaza	2.8	3.0	10,670
Yukon Transfer Center	3.1	3.0	5,700
West Tampa Transfer Center	3.0	3.0	1,040
University Area Transit Center	2.8	3.0	1,200
Passenger Facilities, Weighted Average*	2.76	<b>3.0</b>	
<b>Transit Asset Management Performance Measures: Passenger Facilities</b>			
<i>Percent of Facilities rated below "3" on the TERM Condition Scale:</i>		<b>0%</b>	
<b>Total Facility Size</b>			<b>410,864</b>
<b>% Sqft. Assessed:</b>			<b>86%</b>
<b>% Facilities Assessed:</b>			<b>94%</b>

\*: Weighted with squarefootage

\*\*: Park'n Ride lot

<b>Transit Asset Management Performance Measures</b>	
Percent of Facilities rated below "3" on the TERM Condition Scale:	
Passenger / Parking Facilities	<b>0%</b>
Administrative / Maintenance Facilities	<b>0%</b>

Bus Stop Shelter Assets Performance

The SGR for HART’s bus stop shelters are based on the ULB, the age of the asset, and the TERM decay curve. The percentage of bus stop shelter assets in a SGR are shown in Table 4-8.

**Table 4-8: Percent of Bus Stop Facility Assets in SGR (by Asset Value)**

ASSET CLASS	TOTAL	SGR	NON-SGR	% SGR BY ASSET VALUE
3.2.1 Bus Stop Shelters	\$17.16M	\$11.70M	\$5.46M	68%

*Source of asset inventory information for all HART bus stop assets: HART fixed asset accounting system compiled in SGR database*

*Infrastructure*

SGR for Infrastructure assets are based on the ULB, the age of the asset, and the TERM decay curves. The percentage of Infrastructure assets in a SGR by asset are shown in Table 4-9.

**Table 4-9: Percent of Infrastructure Assets in SGR (by Asset Value)**

ASSET CLASS	TOTAL	SGR	NON-SGR	% SGR BY ASSET VALUE
4.1 Track Elements	\$0.63M	\$0.63M	\$0.00M	100%
4.2 Power & Signal Elements	\$2.46M	\$2.03M	\$0.42M	83%
<b>TOTAL</b>	<b>\$3.09M</b>	<b>\$2.66M</b>	<b>\$0.42M</b>	<b>86%</b>

*Source of asset inventory information for all HART infrastructure assets: HART fixed asset accounting system compiled in SGR database*

The TECO Line Streetcar System was opened in 2002, so the main infrastructure assets are still relatively young, compared to the typically long ULBs for such assets.

**4.3. Asset Performance against HART 2018 Targets**

The TAM Rule requires that transit agencies establish SGR performance measures and targets for Rolling Stock, Non-Revenue Vehicles, Facilities, and Infrastructure assets by asset class. The requirement for each category is listed below:

- **Rolling Stock** – Percentage of revenue vehicles that have met or exceeded their ULB (by vehicle type)
- **Equipment** – Percentage of service vehicles that have met or exceeded their ULB (by vehicle type)
- **Facilities** – Percentage of facilities rated below 3 on the TERM condition scale (by passenger/parking and administrative/maintenance facilities)
- **Infrastructure** – Percent of track segments under performance restrictions

Table 4-10 shows the percentage of HART’s assets that have met or exceeded their ULB for each asset class compared to their goals for 2018. The SGR actuals for Rolling Stock are based on the ULB developed by HART as explained previously. For Facility assets, the actuals are based on the TERM rating calculated during the condition assessment.

**Table 4-10: HART 2018 SGR Performance Measures vs. Actuals**

Asset Category	Performance Measure	HART 2018 Goals	HART 2018 Actuals
<b>Rolling Stock</b>	<b>Percent of revenue vehicles that have met or exceeded their ULB (by vehicle type)</b>		
	Buses	12%	13%
	Cutaway	12%	80%
	Automobile	12%	39%
	Streetcar vehicles	0%	0%
<b>Equipment</b>	<b>Percent of non-revenue vehicles that have met or exceeded their ULB (by vehicle type)</b>		
	Automobile	5%	77%
	Trucks, rubber tire vehicles (Vans)	5%	100%
	Trucks, rubber tire vehicles (SUVs)	5%	82%
<b>Facilities</b>	<b>Percent of facilities rated below 3 on the TERM condition scale (by passenger/parking and administrative/maintenance facilities)</b>		
	Passenger/Parking Facilities (only facilities that were assessed)	5%	0%
	Administrative/Maintenance Facilities (only facilities that were assessed)	5%	0%
<b>Infrastructure</b>	<b>Percent of track segments with performance restrictions =&gt; track segments not in the scope of this TAM plan</b>	N/A	N/A

Through the comprehensive effort of applying the asset management steps (inventory, condition rating, ULB, replacement values and time) towards its assets categorized into the above asset groups, HART calculated the SGR performance measures. Previously, for the purpose of reporting to FTA/NTD, the values of the performance metrics were estimated. Most striking are the deviations for smaller vehicles, both revenue and non-revenue vehicles. These vehicles are much older than the selected ULB of 4 years, but still operational (and safe) due to intense maintenance and repairs.

Due to HART’s ownership of only small streetcar track segments (only in the Ybor maintenance yard, about 1,350 ft., which is not used for revenue service) the SGR performance measure for infrastructure was not applied.

#### 4.4. Current State-of-Good-Repair Backlog

All HART assets not in a SGR represent the “investment/SGR backlog”, which is presented in FY2018 values. HART’s total investment/SGR backlog is valued at approximately \$42.86 million, with \$25.93 million in assets entering the SGR backlog in 2018 alone. The remaining \$16.93 million were up for replacement prior to FY2018. Figure 4-7 illustrates the total investment/SGR backlog value by asset category.

**Figure 4-7: 2018 Investment/SGR Backlog by Asset Category**

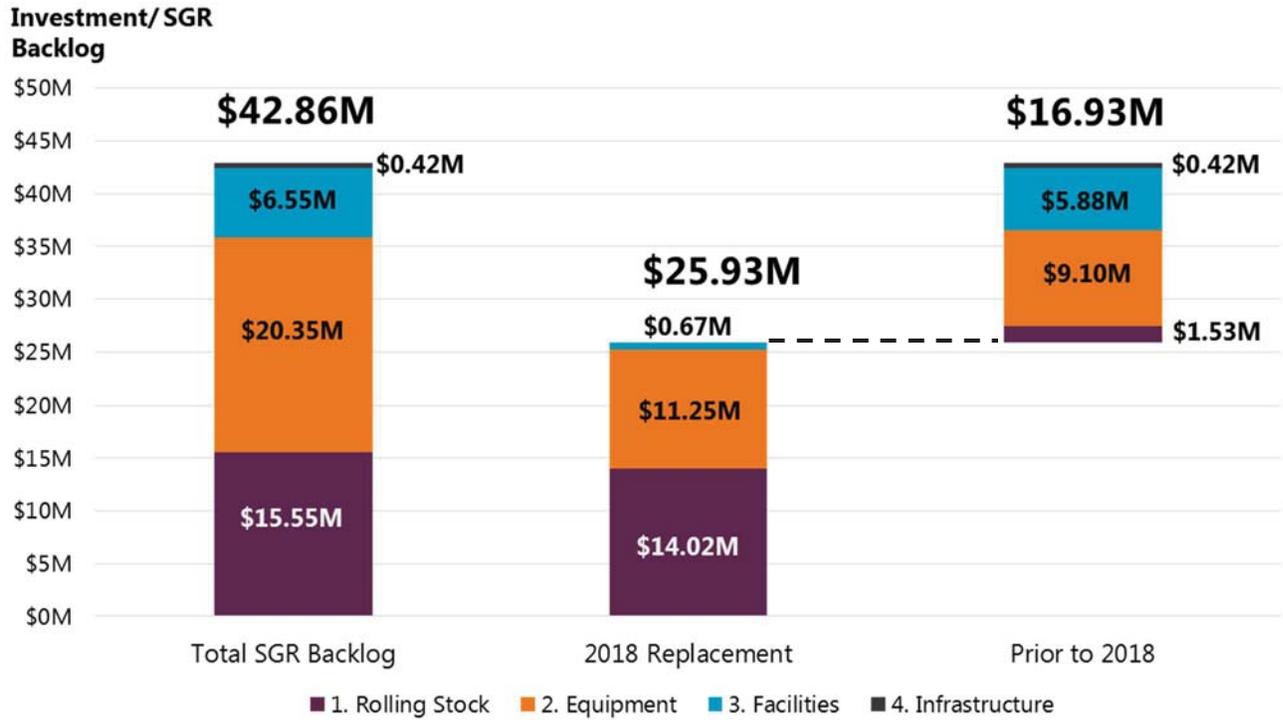


Table 4-11 details assets in the FY2018 investment/SGR backlog by asset category.

**Table 4-11: Assets not in SGR by Asset Category, 2018**

CATEGORY	ASSET	COUNT	TOTAL VALUE
1. Rolling Stock	40' GILLIG BUS	22	\$10.80M
	22 FT CHEVY VAN	9	\$3.16M
	23' CHAMPION VAN	28	\$0.90M
	2012 VPG MV-1 DELUXE	12	\$0.69M
2. Equipment (Non-Revenue Vehicles + Bus Equipment)	OTHER BUS EQUIPMENT	22	\$0.49M
	CHEVY SILVERADO	12	\$0.45M
	FORD ESCAPE	13	\$0.29M
	FLUID DISPENSING SYSTEM	1	\$0.19M
	HYDRAULIC BUS LIFTS	1	\$0.19M
	CATERPILLAR FORKLIFT	3	\$0.14M
	DODGE RAM 2500 PU	4	\$0.12M
	FORD FOCUS	9	\$0.11M
	NEDERMAN EXHAUST REELS	1	\$0.10M
	CHRYSLER SEBRING VEH 1753	4	\$0.09M
	SPRAY PAINT BOOTH	1	\$0.09M
	CHRYSLER VAN	3	\$0.09M
	BUS WASHER- FOR NON-REVENUE VEHICLES	1	\$0.08M
	LOT SWEEPER ATLV 4300	1	\$0.07M
	GMC SAVANA 2500 VAN	3	\$0.07M
	CONVEY SYS/HOIST & CRANES-2 TON	1	\$0.06M
	2010 TOYOTA PRIUS HYBRID	2	\$0.06M
	1 TON PICKUP TRUCK	1	\$0.04M
	WHITE FORD TAURUS	1	\$0.03M
	FORD EXPLORER	1	\$0.03M
2013 FORD FUSION (S) SEDAN	1	\$0.02M	
FORD RANGER VEH 1755	1	\$0.02M	

**Table 4-12: Assets not in SGR, 2018 (cont'd)**

CATEGORY	ASSET	COUNT	TOTAL VALUE
2. Equipment (Systems)	OTHER SYSTEMS	289	\$3.96M
	198 BUS-GPS/CAMERA/RECORD	1	\$3.28M
	ITS PROJECT MANUALS, TRAIN	1	\$2.58M
	TRIP PLANNING SOFTWARE	1	\$1.20M
	223 MONOCHROME SCREENS	1	\$0.92M
	FAREBOX UPGRADE	1	\$0.56M
	INSTALL CNTRL MONITR SYS	1	\$0.52M
	FURNITURE	5	\$0.50M
	223 MOBILE RADIOS	1	\$0.50M
	52 MOBILE RADIOS-NON-SUPV	1	\$0.45M
	VOICE RESPONSE SYSTEM-used w new CISCO	1	\$0.29M
	CAD/AVL VEHICLE LOCATOR SYS SOFTWARE	1	\$0.28M
	HP Z220 DESKTOP COMPUTER	1	\$0.27M
	MOBILE RADIO BASE INTERFA	1	\$0.22M
	VOICE RESPONSE SYSTEM PT2 SOFTWARE	1	\$0.21M
	SOFTWARE-ISV MODULES	1	\$0.21M
	OPS-MON DRIVER LOGIN SFTW-CAN'T TAG	1	\$0.20M
	MDC CITRIS SOFTWARE-RD SUPERVISOR SFTWR	1	\$0.18M
	PROXIMITY CHECKIN SOFTWARE FOR DRIVERS	1	\$0.17M
	APC INFRASTRUXTURE UPS-TWO BLK RACKS	1	\$0.17M
	CATALYST 3750X 48 PORT SWITCH	1	\$0.17M
	14 MOBILE RADIOS-SUPV VEH	1	\$0.16M
	TRIM MACHINE	1	\$0.14M
	APC SYMMETRA UPS UNIT	1	\$0.14M
UPGRADED FAREBOX SYSTEM	1	\$0.13M	
30 PARATRANSIT VAN GPS/ET	1	\$0.11M	
3. Facilities	TRANSITWAY BUS SHELTER	14	\$3.82M
	TRANSITWAY KIOSK	12	\$0.88M
	Other Facility Assets	98	\$0.77M
	BUS STOP SHELTER	20	\$0.43M
	Parking Lots/Driveways/Roads-Parking, Asphalt (Sealing)	6	\$0.41M
	BUS STOP SHELTER (GLASS)	3	\$0.13M
	BRITTON PLAZA SHELTER	1	\$0.11M
4. Infrastructure	Turnouts/Switches	1	\$0.41M
	Switch Machine	1	\$0.01M
<b>TOTAL</b>			<b>\$42.86M</b>

## 5. State of Good Repair Analysis – 10 Year SGR Needs

This chapter analyzes HART’s SGR needs over the ten-year TAM Plan horizon for the asset inventory. Future SGR need is determined by:

- How assets perform over time, which is the relationship between their remaining service life and their age, use, condition, and level of maintenance
- The starting backlog
- The level of funding available each year to address the backlog and maintain assets in a state of good repair

This chapter also describes HART’s annual SGR needs and predicts SGR needs over the FY2019-2028 TAM Plan horizon based on budgetary assumptions regarding available funds to address the identified SGR needs.

The chapter is organized into the following sections:

- Summary of the ten-year capital needs
- Description of the decision and prioritization process, including the prioritization criteria
- Ten-year forecast of annual SGR capital needs
- Estimates of available funding levels for SGR investments
- Evaluation of alternative ten-year SGR investment scenarios that address: available funding (funding constrained SGR investments), required funding levels to address investment/SGR backlog and annual SGR capital needs, and unconstrained funding.
- Prioritized asset classes and SGR investments by priority type

### 5.1. Summary of 10-year Capital Needs and SGR

The results and findings of the “Capital Needs and State of Good Repair” analysis can be summarized in four key statements:<sup>21</sup>

1. Capital SGR Need: Between FY2018 and FY2028, HART has a capital SGR need of \$190M to bring and keep its asset in a SGR (including the current investment/SGR backlog of \$43 million). In addition, it will need about \$5.5 million for a CAD/AVL system replacement and about \$42 million for a new heavy maintenance building.
2. Funds estimated for SGR Needs: Current funding estimates for the same planning horizon amount to \$93 million (excluding the \$5.5 million dedicated funding for the CAD/AVL system).
3. SGR investments at current funding levels: If HART invested the current funding estimate of \$93 million over the ten-year period, the investment/SGR backlog would grow to about \$103 million, lowering HART’s assets to about 47% (by asset value) in a SGR.
4. Estimated funding level to maintain or eliminate investment/SGR backlog by FY2028: On average, approximately \$13 million annually is required to maintain (no increase) the current investment/SGR backlog. If HART wanted to eliminate the backlog while keeping all assets in a SGR, this average annual funding need would increase to about \$17 million.

<sup>21</sup> These statements exclude the two projects for CAD/AVL implementation and replacement of the HM building, as referenced earlier.

**5.2. Decision Support and Prioritization Process**

HART developed a five-step process supported by the SGR baseline and analysis results to create a short and mid-term capital investment plan (prioritized investments) that also considers expected funding levels. This is an initial process that will be modified and improved over time, as needed.

The Table 5-1 below lists the key process steps.

**Table 5-1: Initial Decision Support and Prioritization Process<sup>22</sup>**

Step	Description	Comment
Step 1	Develop prioritization methodology	Currently based on weighted scoring model using asset condition, impact on safety, asset criticality (using three parameters financial impact, impact on service, impact of mission)
Step 2	Utilize TERM model to create annual and multi-year lists of prioritized investments	Initial years will use TERM prioritization, later potentially alternative approach(s)
Step 3	<ol style="list-style-type: none"> <li>1. Consolidate investment lists to capture initial multi-year and annual capital investment plan (CIP); these serve as draft suggestions</li> <li>2. Compare CIPs to available funding levels</li> </ol>	TERM outputs will be developed on annual and multi-year bases and consolidated. Include CIP suggestions from previous years.
Step 4	Review CIPs (by HART staff and leadership): <ol style="list-style-type: none"> <li>1. Review higher priority investments and “manually” lower priority rating, if appropriate</li> <li>2. Review low priority investments and “manually” elevate priority to higher levels, as appropriate</li> <li>3. Combine investments to concerted investment program to leverage synergies</li> </ol>	HART staff (with CIP responsibility) and leadership will manually review CIP drafts to account for circumstances the automated prioritization process cannot cover (e.g., overwrite TERM prioritization, combine multiple asset replacements at one facility, shifting investments across years to avoid high SGR needs in certain years)
Step 5	Develop final annual and multi-year CIP, approval if needed.	

**Decision Support Tool**

HART chose to use FTA’s Transit Economic Requirements Model (TERM), which is available as a “Lite” version to use as PC-based application. This section describes how FTA’s TERM Lite model was used to estimate HART’s capital investment needs over the ten-year TAM Plan horizon and describes the asset prioritization method used to rank assets in terms of most critical to least critical.

Per FTA’s TAM Rule, the TAM Plan should include “a description of any analytical processes or decision-support tool used to estimate capital investment needs over time and to develop the investment prioritization.”<sup>23</sup> This decision support tool is described later in this section.

It is likely HART funding will not be sufficient to replace all assets that are out of SGR each year. Therefore, HART will need to allocate available investment dollars to high priority assets.

<sup>22</sup> Details on TERM and the current prioritization model below.

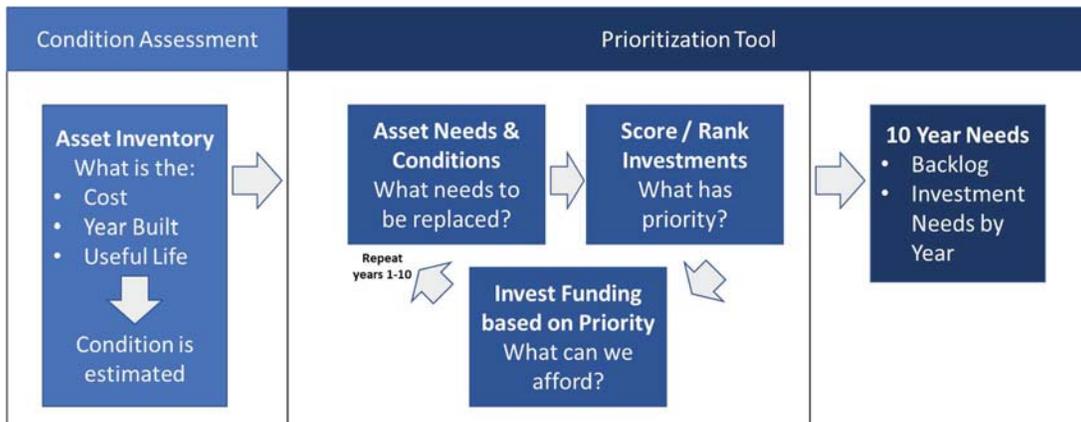
<sup>23</sup> 49 CFR § 625.25(b)(3) (FTA Transit Asset Management Final Rule), July 26, 2016

**TERM Lite Model**

TERM Lite (or TERM) is a Microsoft Access-based analysis tool provided by the FTA that relies on asset inventory data stored in HART’s asset inventory (see Chapter 3). A conceptual model of TERM Lite is depicted in Figure 5-1. TERM Lite outputs are based on inventory data, not field condition assessments. As such, the outputs are dependent on the quality and completeness of the inventory input data. This asset inventory data documents the asset type, date built, expected useful life, replacement value, rehabilitation history, and lifecycle investment requirements of assets owned and operated by HART. Based on these assumptions regarding current age, expected useful life, and other lifecycle investment requirements, the tool first assesses which assets have deferred reinvestment requirements (e.g., which assets are in service past their useful life and what level of investment is required to replace those assets). This assessment provides a measure of the size of the SGR backlog (i.e., the level of investment required to attain a complete state of good repair). Next, the tool simulates the ongoing aging of these assets over the upcoming 10-year period (FY2019-FY2028) to determine the level of investment required to replace (or rehabilitate) assets that will reach the end of their useful life over this 10-year period.

The asset’s historic acquisition costs were escalated to FY2018 values using TERM industry indices; between FY2018 and FY2028, an annual escalation rate of 3% was applied to any asset replacement or overhaul cost.

**Figure 5-1: TERM Lite Conceptual Model**



For some of the analyses presented in this TAM Plan, it is assumed that the level of future funding will be completely unlimited (i.e., funding is “unconstrained”). This allows the tool to both fully eliminate the investment/SGR backlog while also addressing all other normal replacement needs (e.g., asset replacements, rehabilitations and other minor capital needs) over the ten-year period of analysis. The key outcome of this “unconstrained” analysis are the annual dollar values needed to keep HART’s asset base in a SGR each year. This is referred to as the “SGR capital need” (or capital need). The results are presented in Chapter 5.3.

Using TERM Lite with actual or estimated funding amounts, which often are below the annual capital need, allows for the use of TERM Lite’s prioritization tool. In such “financially constrained” scenarios where there is insufficient funding to address all needs, TERM Lite helps to determine 1) which assets will and will not obtain funding over the 10-year period of analysis and 2) what is the impact of this constrained funding on the investment/SGR backlog and conditions for those assets that do not obtain any reinvestment funding. The criteria used for asset prioritization and the analysis of using estimated funding to invest into the current investment/SGR backlog and annual capital need are detailed later in this section.

Finally, the tool output includes an assessment of both current asset conditions (estimated conditions based on decay curves) and deferred investment needs, as well as a forecast of future asset conditions and needs subject to the assumed level of future funding (either unconstrained or some constrained level of reinvestment).

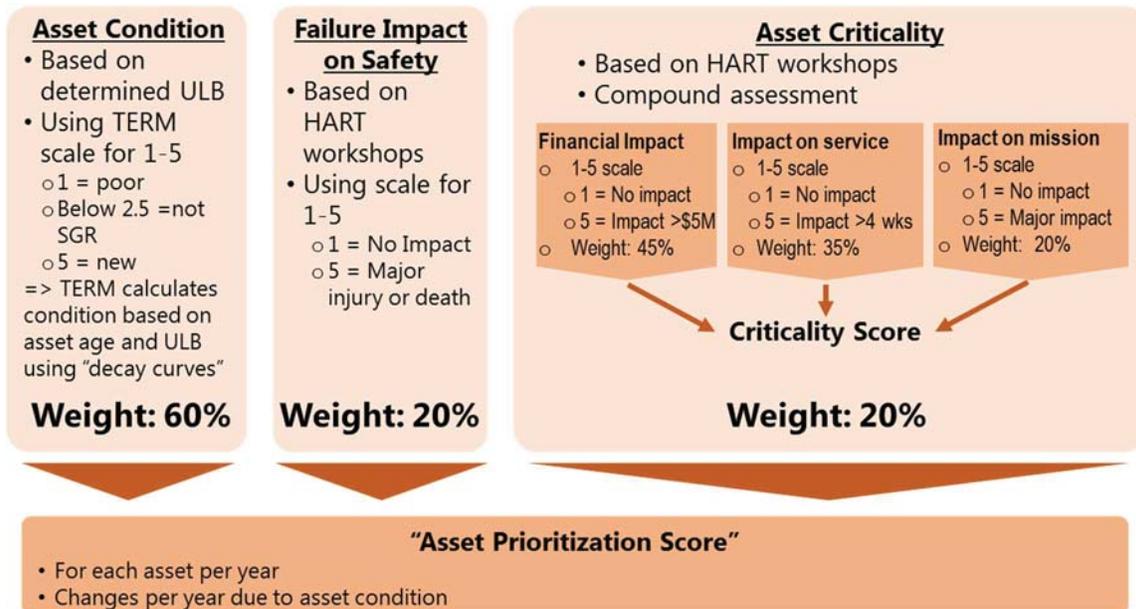
**Asset Prioritization Criteria**

HART uses TERM Lite as a decision support tool that provides input into the process through which HART determines which assets should receive investment funding. The prioritization of assets is based on three criteria (see prior reference to asset criticality in Chapter 3):

1. Asset Condition: Condition score assigned to assets in TERM Lite by age and decay curves.
2. Failure Impact on Safety: Freedom from conditions that can cause death, injury, damage or loss of equipment or property, or damage to the environment.
3. Asset Criticality
  - *Financial Impact*: Expense increase or revenue reduction arising from an asset failure.
  - *Impact on Service Efficiency*. How asset failures directly affect service delivery (time service cannot be provided)
  - *Impact on Mission Importance*: Impact to carrying out the HART’s mission: “To safely connect people to places”, and how it will affect HART’s reputation with the public

Figure 5-2 illustrates how these criteria are applied to the final prioritization score.

**Figure 5-2: Asset Prioritization Criteria<sup>24</sup>**



The asset condition score is calculated by TERM Lite using asset decay curves. HART assigned the “Failure Impact on Safety” and “Asset Criticality” scores by asset class through a series of workshops. HART staff responsible for developing the TAM Plan met with representatives from various technical departments who have the main responsibilities for HART’s assets. Table 5-2 shows the asset classes with a Safety score of a

<sup>24</sup> The full description of the assessment scale for Safety and Asset Criticality are in Appendix 3.

5 or a 4, and Table 5-3 shows which asset classes score highest in terms of Criticality based on financial, service, or mission impacts. These asset classes have a high priority independent of the age/condition.

**Table 5-2: Safety Priority Scores**

ASSET CLASS	SAFETY SCORE
Facilities, Admin/Maintenance, Building Structure	<b>5</b>
Facilities, Admin/Maintenance, Fire Protection Systems	<b>5</b>
Equipment, Bus Equipment, Lifts	<b>4</b>
Equipment, Systems, Radio Equipment, ITS	<b>4</b>
Facilities, Admin/Maintenance, Electrical Systems	<b>4</b>

**Table 5-3: Cost, Service, and Mission Criticality Priority Assets**

ASSET CLASS	COST	SERVICE	MISSION	CRITICALITY TOTAL
Facilities, Admin/Maintenance, Fire Protection Systems	5	5	4	<b>5</b>
Facilities, Admin/Maintenance, Building Structure	5	5	4	<b>4.8</b>
Equipment, Systems, Revenue Collection Unit	5	2	4	<b>3.75</b>
Equipment, Systems, Cashbox ID Computer	5	2	4	<b>3.75</b>
Rolling Stock, Motorbus, CNG	2	3	4	<b>2.75</b>
Rolling Stock, Motorbus, Diesel	2	3	4	<b>2.75</b>
Equipment, Bus Equipment, Fueling System	2	3	4	<b>2.75</b>

While every asset has constant scores for safety and asset criticality, the value for asset condition decreases over time as the asset ages. In TERM, the asset condition score approaches 2.5 as the asset’s ULB is reached, and resets to a 5-condition rating when replaced. The combined prioritization score (condition/safety/criticality) consequently changes every year due to this annual adjustment.

The TERM prioritization process, in years when available funding is less than SGR need (defined as the annual need plus backlog in that particular year), uses the prioritization scores to allocate the limited funding to highest scored asset investments.

From the criteria above, TERM calculates a priority score of 1-100 for each asset, with 1 being the lowest priority and 100 being the highest priority. Figure 5-3 illustrates an example range of priority scores TERM assigned to the assets up for replacement in FY2019. TERM selected the highest ranked assets worth \$8.8 to be replaced and brought into a SGR, which is equal to the amount of FY2019 funding anticipated to be available. The assets not selected for replacement remain not in a SGR and enter the FY2019 backlog. Assets not up for replacement are still given a score, however no action is taken.

Figure 5-3: 2019 TERM Prioritization Scores (excerpts from complete list)

ASSET NAME	PRIORITY SCORE	ACTION
Fire Protection-Fire Sprinkler System	70.00	Replace
Roofs-Built-Up	64.40	Replace
Roofs-Parapet Cap metal	64.40	Replace
Roofs-Roof Drainage Interior (Roof Drains and Pipes)	64.40	Replace
Roofs-Vents	64.40	Replace
Doors/Exterior-Motor	64.40	Replace
Floors Finish-Vinyl/Rubber Base	64.40	Replace
Wall Finish-Toilet Partitions per Stall	64.40	Replace
Doors/Interior-Metal	64.40	Replace
Wall Finish-Painting	64.40	Replace
//		
COMPLETE FAREBOX UNIT	62.49	Backlog
FAREBOX UPGRADE	62.49	Backlog
Walls-Brick Veneer	61.56	Backlog
Walls-Brownstone/Ceramic Tile	61.56	Backlog
Fire Protection-Fire Extinguishers and Cabinets	61.03	Backlog
Fire Protection-Fire Sprinkler System	61.03	Backlog
Foundations-Concrete-Shallow Spread	60.52	Backlog
Wall-Wall-Concrete Masonry Unit (CMU)	60.52	Backlog
Roof-Roof-Metal Framing/Metal Deck	60.52	Backlog
TRIM MACHINE	59.56	Backlog

### 5.3. 10-Year SGR Capital Planning Needs, FYs 2019-2028

This section discusses HART’s annual SGR Capital Needs, how HART’s available funding will affect the SGR backlog, and the annual capital funding needed to keep assets in a SGR over the ten-year period.

#### Ten-Year SGR Capital Needs

Every year certain assets reach their ULB and are no longer in a SGR. As previously noted, the annual SGR capital need is the dollar value of assets that need to be replaced in a particular year. As shown in Figure 5-4, HART’s capital SGR need fluctuates from nearly \$2 million to \$30 million between FY2019 and FY2028, for a total of \$147 million. This total also includes additional costs associated with mid-life overhauls for vehicles and certain system assets. This fluctuation is partly because age is a primary determinant of SGR needs and multiple assets are often acquired in a single year.

**Figure 5-4: Annual Capital SGR Needs, FYs 2019-2028**

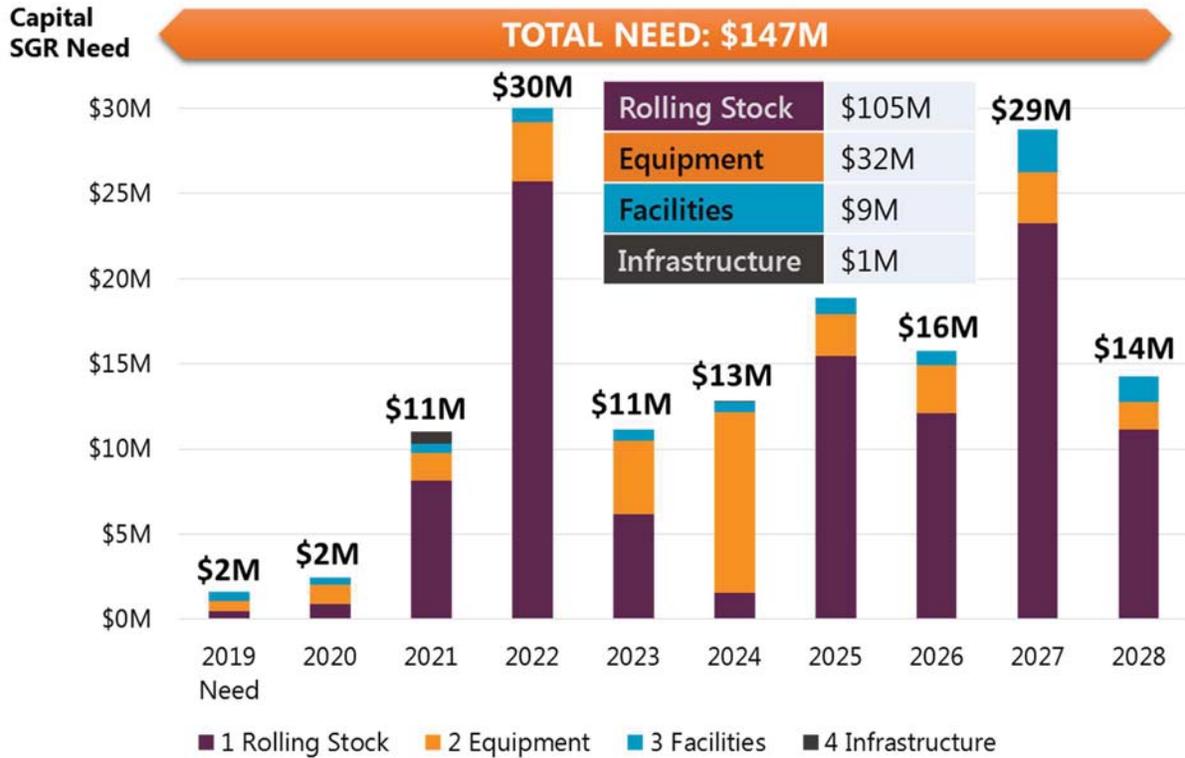
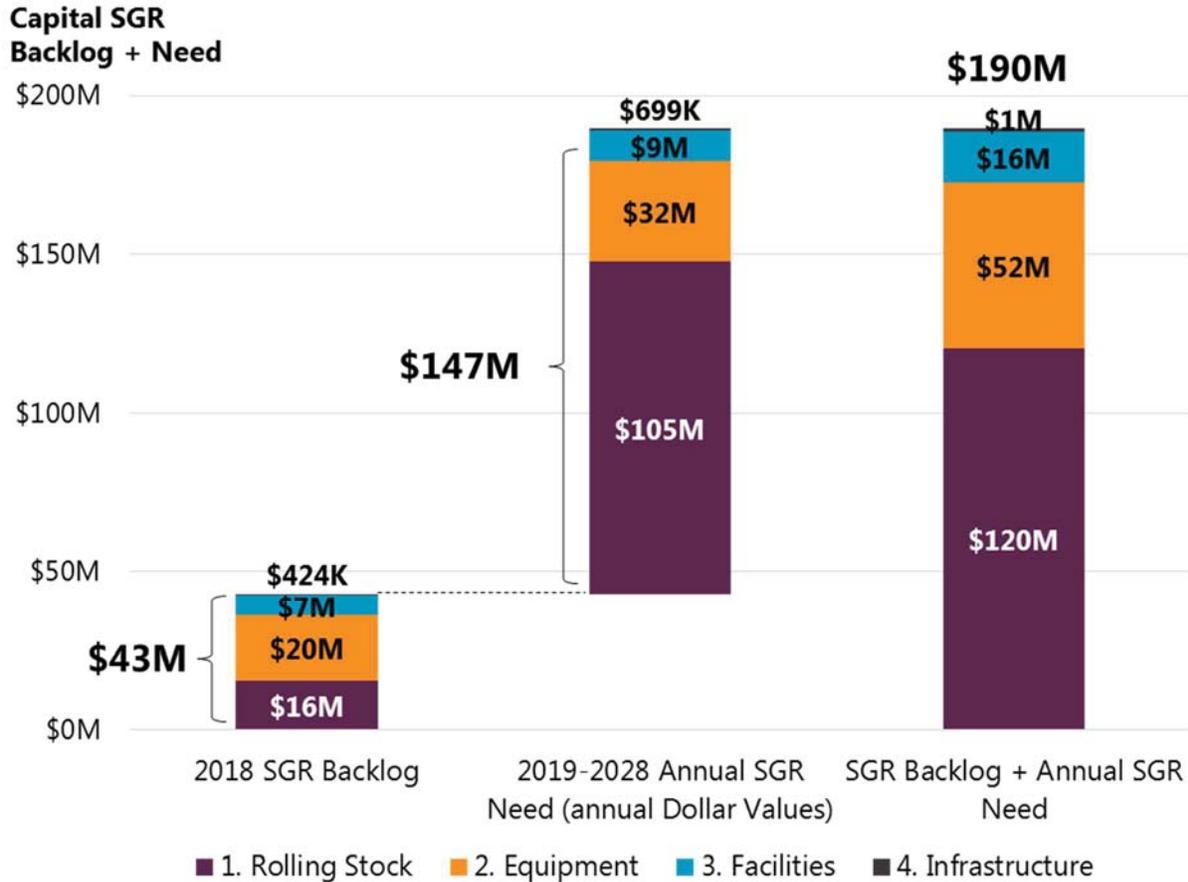


Figure 5-5 illustrates HART’s SGR backlog and annual capital need over the TAM Plan reporting period (FYs 2018–2028). This includes the FY2018 SGR backlog and the total capital need for the remaining years, FYs 2019–2028. The total need for the FYs 2018–2028 period is \$190 million.

Figure 5-5: SGR Backlog and Annual SGR Need by Asset Category, FYs 2018-2028



#### 5.4. Capital Funding Availability

The SGR analysis is undertaken by establishing a ten-year budget for addressing SGR needs. This budget is based on current and projected funding available over the next ten years to finance SGR capital needs. The ten-year funding prediction applies the sources of funds available to HART through current federal funding programs and HART revenue sources. These include:

- FTA Section 5307 "Urbanized Area" formula funds
- FTA Section 5339 "Bus and Bus Facilities" formula funds
- FTA Section 5337 "State of Good Repair" formula funds
- FTA/FHWA Surface Transportation funds
- HART Ad Valorem (property tax) revenue

Available funding is somewhat predictable for FY2018 to FY2020, for the years until FY2028 the funding levels are assumed to remain at the FY2020 level with an annual increase of 3% assumed (similar escalation assumption as with the asset replacement values).

Based on these assumptions, the total SGR funding level estimated for FYs 2018-2028 is \$93.2 million, which averages to about \$8.5 million per year (see Figure 5-6). For purpose of the TAM Plan, it is assumed that the available funding can be applied to any SGR asset.

Figure 5-6: HART’s Funding Availability, FYs 2018 to 2028



Not shown in the figure above is \$5.5 million funding beginning in 2019 that is dedicated to the implementation of a new CAD/AVL system.

Earlier in this section it was explained that HART’s SGR capital needs total \$190 million, which includes the FY2018 investment/SGR backlog plus the SGR need for each year between FY2019 and FY2028. However, estimated funding levels for this planning period amounts to only \$93 million, revealing a funding gap of about \$100 million. Consequently, it is predicted that over this reporting period that the SGR backlog will increase.

### 5.5. TAM Plan Investment Scenarios – Decision Support Analysis Results

This section describes the TAM Plan investment scenarios analyzed.

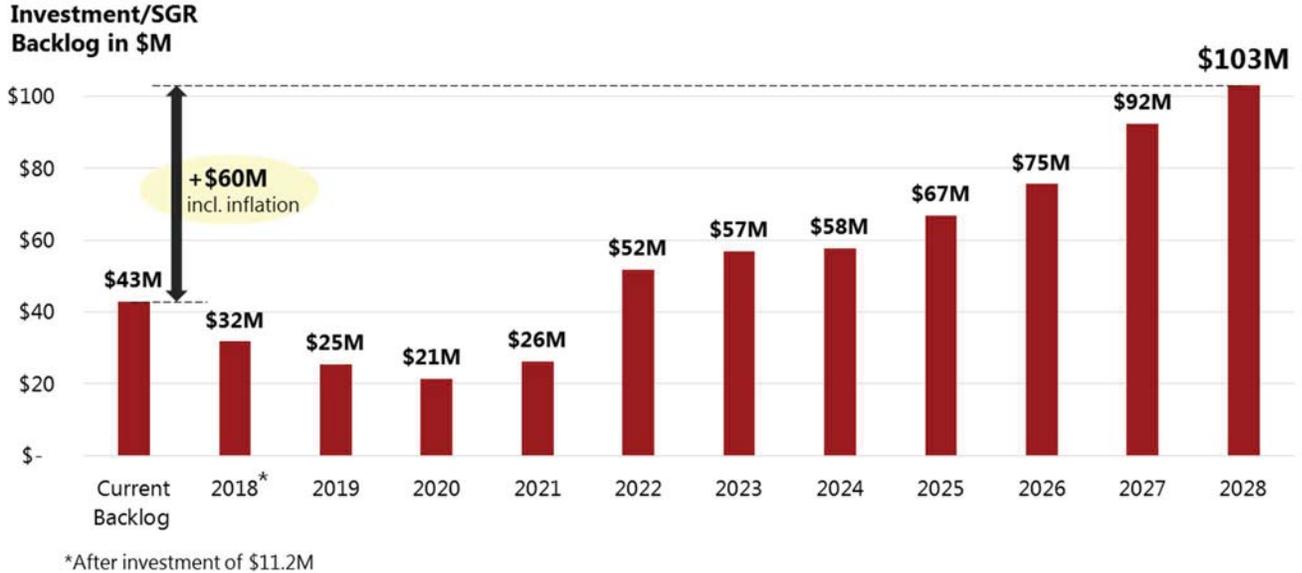
- **Scenario 1: State of Good Repair at Available Funding Levels.** The scenario evaluates the SGR based on the estimated budget available for SGR needs and the applied prioritization process.
- **Scenario 2: Required Funding to Maintain SGR Backlog.** This scenario discusses the funding required to maintain the current SGR investment backlog of \$43 million and also keep all other assets in a SGR.
- **Scenario 3: Required Funding to Eliminate Backlog and Maintain a SGR.** This scenario describes the approximate funding levels HART would need to eliminate the investment backlog by FY2028, while maintaining all assets in a SGR.

#### Scenario 1: State of Good Repair at Available Funding Levels

Over the ten-year TAM Plan horizon, HART’s investment/SGR backlog will increase due to higher capital needs than available funding. By FY2028, the backlog will reach \$103 million,<sup>25</sup> as illustrated in Figure 5-7 below.

<sup>25</sup>This investment plan was developed excluding two investments: (1) Implementation of a new CAD/AVL system at the cost of the available funding of \$5.5 million. This project will be implemented starting in 2019. (2) The replacement of the heavy maintenance (HM) building (currently 37 years old) at an anticipated cost of \$42 million. Original construction period was between 2019 and 2021. At this point funding/financing of this building replacement is not secured, consequently the timing is uncertain. The need for replacing the HM building will still be included in the list of prioritized investments.

Figure 5-7: SGR Backlog at Available SGR Need Funding Levels, FYs 2018-FY2028



Between FY2018 and FY2020, the SGR backlog is decreasing due to an annual capital need that is lower than anticipated funding levels; however, in FY2022 HART needs to replace 59 diesel and CNG buses at an estimated value of \$25 million, which far exceeds the estimated funding levels.

An increase in SGR backlog means that more assets are being operated beyond their typical useful life which likely will increase maintenance and repair costs, asset failure and/or breakdowns, the rising number of failures affecting service operations, and, worst case, the risk of not assuring safety of passengers, employees, property, or other parties.

The rise of investment/SGR backlog by FY2028 indicates an increase in the value of HART’s assets not in a SGR. Figure 5-8 shows how over the ten-year period the overall condition of the assets shifts to lower condition ratings. While in FY2018 about 26% of HART’s TAM asset base (based on dollar value) is not in a SGR, this share increases to 53% in FY2028 at the assumed SGR funding levels.

**Figure 5-8: Development of Asset Condition (% by Value), FY2018/23/28**

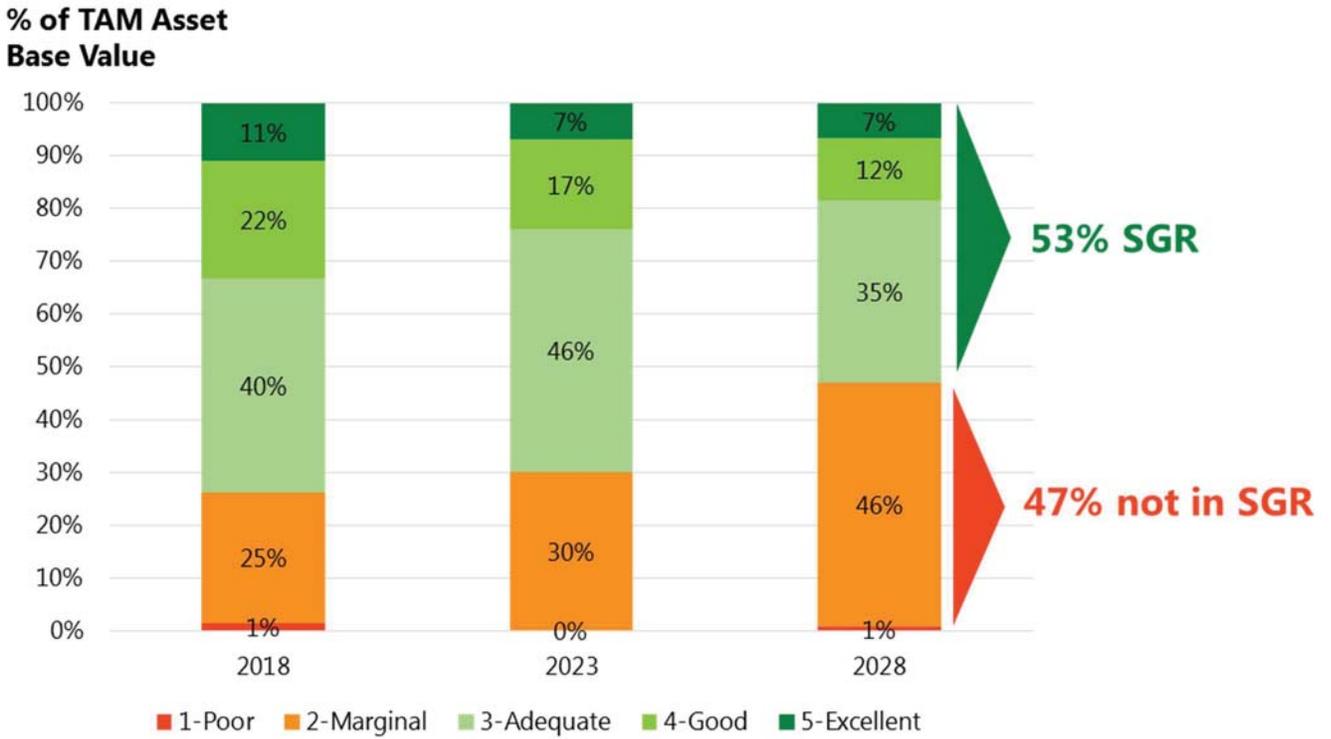
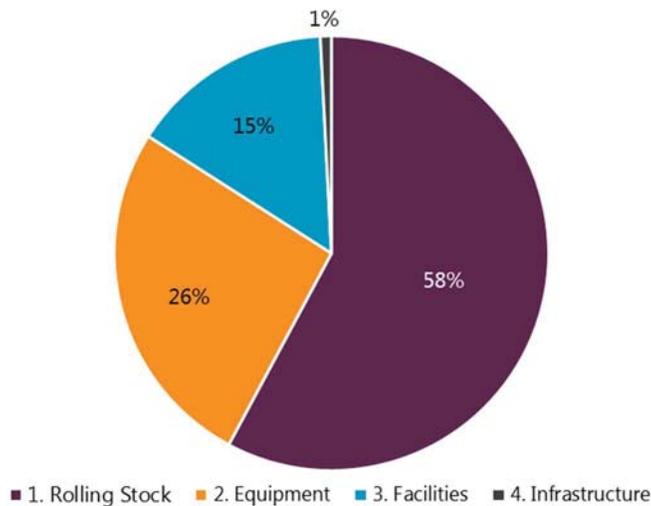


Figure 5-9 breaks down the FY2028 assets not in SGR by asset class. The majority of the assets (58%) not in SGR by FY2028 are Rolling Stock assets.

**Figure 5-9: Distribution of Assets not in SGR Across Asset Groups, FY2028**

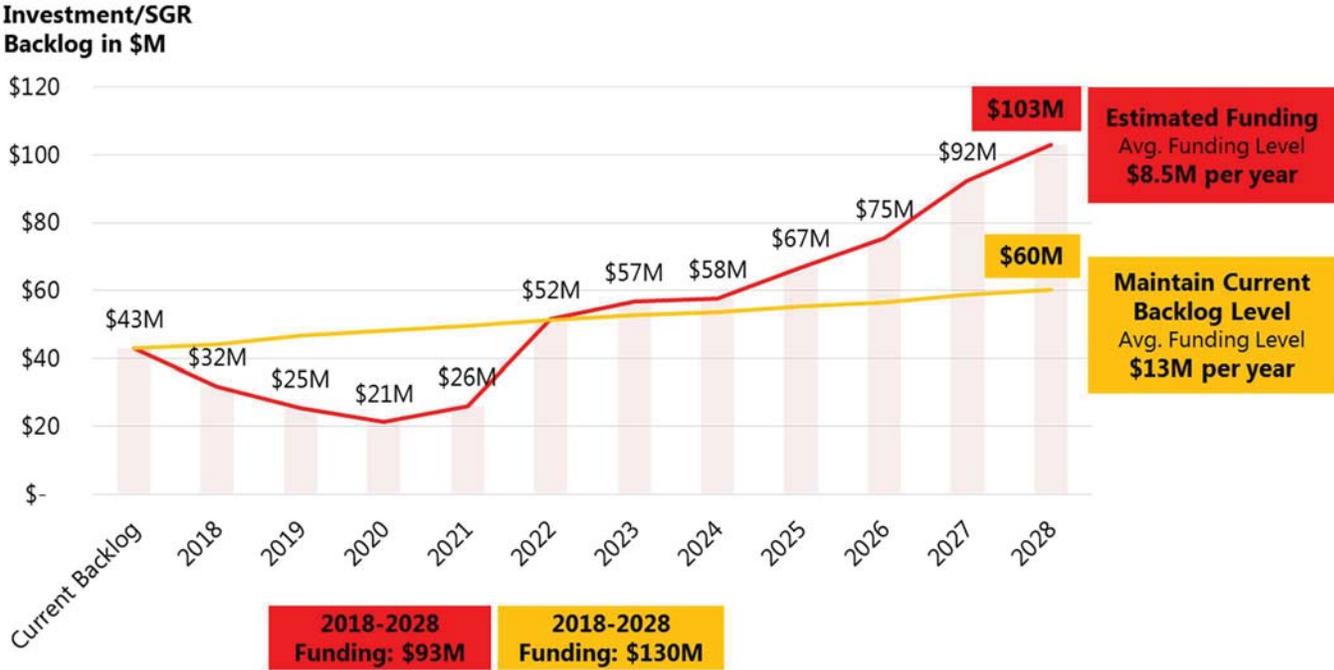


If estimated funding levels are not sufficient to address the SGR backlog and annual SGR need, the question of what funding levels are needed to, at a minimum, maintain the backlog at current levels or eliminate the backlog over time should be discussed.

**Scenario 2: Required Funding to Maintain SGR Backlog**

Figure 5-10 illustrates the annual funding required by FY2028 to maintain an investment backlog of \$43 million. As shown, by FY2028, the backlog will increase to approximately \$60 million due to inflation, and HART will need an average funding level of \$13 million per year to maintain the current backlog. Based on today’s estimated funding, this would require funding of SGR projects to increase by just over 50%.

**Figure 5-10: Funding Required to Maintain Current Backlog, FY2018-FY2028**

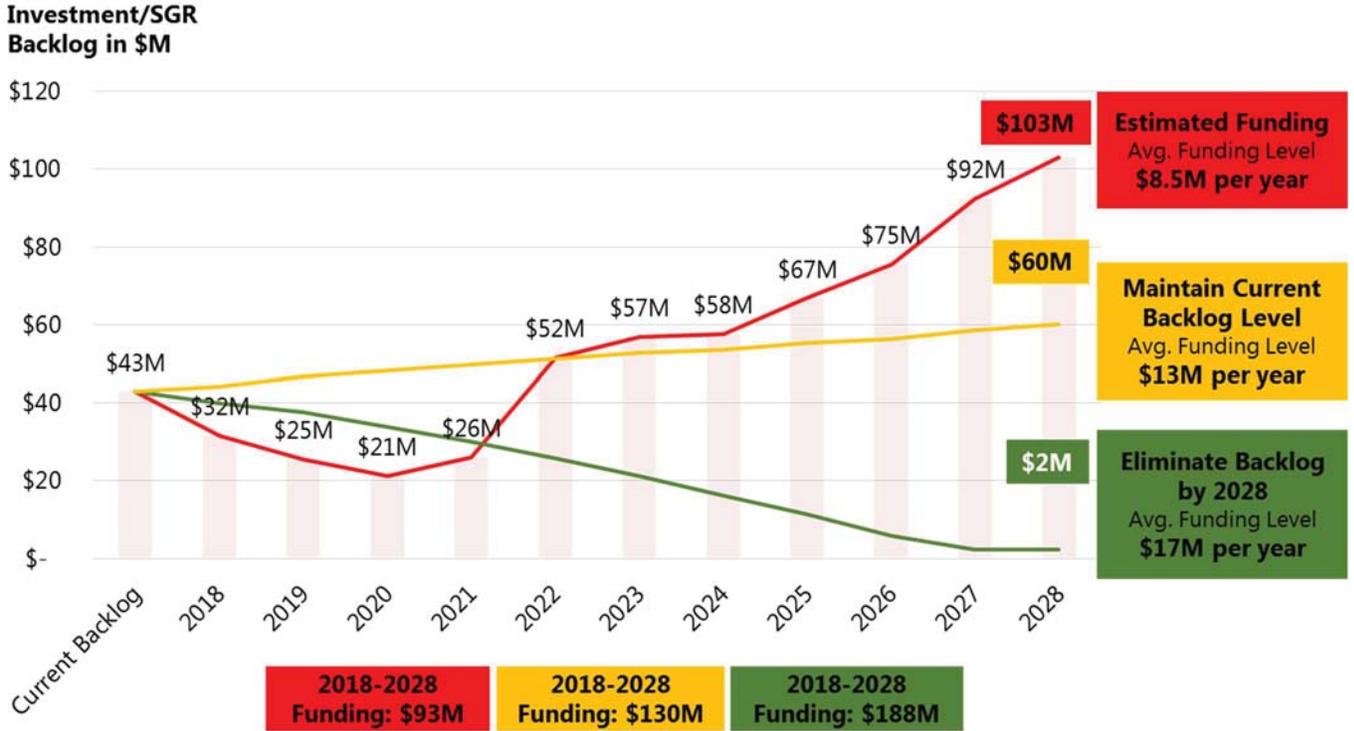


**Scenario 3: Required Funding to Eliminate Backlog and Maintain a SGR**

This scenario describes the funding levels required to eliminate HART’s investment backlog by FY2028 while also maintaining all assets in a SGR. As shown in Figure 5-11 the total funding needed over the ten-year period is \$188 million, or an annual average of \$17 million. It should be noted that the remaining \$2 million includes fareboxes that are not being replaced.<sup>26</sup> This scenario would require HART to be able to budget twice as much as the current funding amounts included in the TAM Plan.

<sup>26</sup> HART is currently investigating alternatives to replace the current overaged fareboxes but has not determined the final technology and time of implementation. Consequently, at this point it remains in the investment/SGR backlog.

Figure 5-11: Funding Required to Eliminate Backlog by FY2028



### 5.6. Prioritized Investments and Projects

To develop a prioritized list of investments asset classes are scored based on their prioritization factors (which are a composite score comprised of asset condition, impact on safety, and asset criticality, as described in Section 5.2). These scores affect how the TERM model allocates available investment funding to assets.

HART further adds to the prioritization process by examining the list of prioritized assets produced by TERM, assigning a priority type, and making manual adjustments to the list. HART will give focus to assets beyond their ULBs that are important in maintaining its operations.

HART’s prioritized investments will focus in the following asset groups:

1. Revenue Vehicles: Key to HART to perform its mission to the traveling public. This includes assets on vehicles directly related to revenue vehicle operations (i.e. revenue collection, APC system, ITS equipment, etc.)
2. Critical IT Assets: Hardware or software used to support HART’s day-to-day operations.
3. Other Assets: Assets that either are important to safety or general criticality.

Table 5-4 summarizes the prioritized list of SGR investments output from the TERM model over the next ten years (FY2019-FY2028).

**Table 5-4: SGR Investments by Priority Type, FYs 2019-2028**

YEAR	PRIORITY TYPE	ASSET DESCRIPTION	NUMBER OF ASSETS	ASSET VALUE
2019	REVENUE VEHICLES	CHAMPION VANS	25	\$2.90M
		MOBILE RADIOS	3	\$1.14M
		BUS-GPS/CAMERA/RECORD	1	\$3.38M
		APC EQUIPMENT	3	\$0.22M
		PARATRANSIT VAN GPS/ET	1	\$0.12M
		VPG MV-1 DELUXE	1	\$0.06M
	CRITICAL IT ASSETS	COMPUTER EQUIPMENT	61	\$0.75M
		SOFTWARE	6	\$0.04M
	OTHER ASSETS	MISC FACILITIES UPDATES	21	\$0.16M
		FORD ESCAPE	1	\$0.02M
2020	REVENUE VEHICLES	ITS PROJECT MANUALS	1	\$2.74M
		40' GILLIG BUS	4	\$2.10M
		BUS REHAB	3	\$1.03M
		APC SYMMETRA PX POWER MODULE	1	\$0.01M
		CHANGE MACHINE	1	\$0.004M
	CRITICAL IT ASSETS	COMPUTER EQUIPMENT	101	\$1.45M
		SOFTWARE	2	\$0.20M
	OTHER ASSETS	MISC FACILITIES UPDATES	18	\$0.09M
		FORD FUSION	1	\$0.02M
		SCISSORLFT	1	\$0.02M
2021	REVENUE VEHICLES	40' GILLIG BUS	14	\$7.51M
		VPG MV-1 DELUXE	3	\$0.23M
	CRITICAL IT ASSETS	SOFTWARE	1	\$0.03M
		COMPUTER EQUIPMENT	3	\$0.01M

**Table 5-4: SGR Investments by Priority Type, FYs 2019-2028 (Cont'd)**

YEAR	PRIORITY TYPE	ASSET DESCRIPTION	NUMBER OF ASSETS	ASSET VALUE
2022	REVENUE VEHICLES	40' GILLIG BUS	6	\$3.25M
		VPG MV-1 DELUXE	16	\$1.20M
	CRITICAL IT ASSETS	COMPUTER EQUIPMENT	493	\$1.49M
		SOFTWARE	13	\$0.85M
	OTHER ASSETS	MISC FACILITIES UPDATES	33	\$0.45M
		PORTABLE VEHICLE LIFT	5	\$0.16M
		ALTEC AERIAL TRUCK	1	\$0.14M
		FORD ESCAPE	1	\$0.10M
		2014 FORD FOCUS	1	\$0.08M
		CHANGE MACHINE	6	\$0.06M
		CHEVROLET SILVERADO	1	\$0.04M
		SECURITY SYSTEM	1	\$0.03M
		FLOOR SCRUBBER	2	\$0.03M
PORTABLE A/C UNIT		2	\$0.02M	
2023	REVENUE VEHICLES	40' GILLIG BUS	7	\$3.88M
		22 FT CHEVY 3500 VAN	9	\$1.04M
		CHAMPION CHALLENGER	9	\$0.76M
		VPG MV-1 DELUXE	11	\$0.73M
		23' CHAMPION FELX VAN	3	\$0.40M
	CRITICAL IT ASSETS	COMPUTER EQUIPMENT	351	\$0.76M
		SOFTWARE	2	\$0.07M
	OTHER ASSETS	MISC FACILITIES UPDATES	30	\$0.36M
2024	REVENUE VEHICLES	23' CHAMPION FLEX VAN	25	\$3.36M
		40' GILLIG BUS	6	\$3.36M
		VPG MV-1 DELUXE	1	\$0.07M
	CRITICAL IT ASSETS	SOFTWARE	3	\$0.06M
		COMPUTER EQUIPMENT	52	\$0.36M
	OTHER ASSETS	MISC FACILITIES UPDATES	22	\$0.53M
		SWEEPER/SCRUBBER-CAPTOR	1	\$0.08M
		ROTARY MOBILE COLUMN LIFT	1	\$0.05M
		AIR COMPRESSOR	1	\$0.04M
TIME CLOCK		4	\$0.02M	
MISC NON-REVENUE VEHICLES	9	\$0.20M		

**Table 5-4: SGR Investments by Priority Type, FYs 2019-2028 (Cont'd)**

YEAR	PRIORITY TYPE	ASSET DESCRIPTION	NUMBER OF ASSETS	ASSET VALUE
2025	REVENUE VEHICLES	40' GILLIG BUS	14	\$7.97M
	CRITICAL IT ASSETS	COMPUTER EQUIPMENT	58	\$0.23M
	OTHER ASSETS	MISC FACILITIES UPDATES	8	\$0.04M
		ID BADGE PRINTER & CAMERA	1	\$0.01M
TIMECLOCK-STROMBERG		1	\$0.005M	
2026	REVENUE VEHICLES	40' GILLIG BUS	14	\$8.21M
	CRITICAL IT ASSETS	COMPUTER EQUIPMENT	20	\$0.16M
	OTHER ASSETS	MISC FACILITIES UPDATES	2	\$0.002M
2027	REVENUE VEHICLES	40' GILLIG BUS	9	\$5.43M
		VPG MV-1 DELUXE	3	\$0.27M
		MOTOROLA PTP 800 MICROWAVE RADIO SYSTEM	1	\$0.03M
	CRITICAL IT ASSETS	COMPUTER EQUIPMENT	155	\$1.95M
		SOFTWARE	26	\$0.64M
	OTHER ASSETS	FUEL LANE UPGRADE	1	\$0.08M
		MISC FACILITIES UPDATES	17	\$0.05M
		ID BADGE PRINTER & CAMERA	5	\$0.04M
TIMECLOCK-BADGE ID READER		3	\$0.02M	
2028	REVENUE VEHICLES	40' GILLIG BUS	12	\$7.47M
	CRITICAL IT ASSETS	COMPUTER EQUIPMENT	67	\$0.91M
		SOFTWARE	1	\$0.02M
	OTHER ASSETS	MISC FACILITIES UPDATES	14	\$0.23M

## 6. TAM Implementation Program

The TAM implementation program describes the actions and activities that HART will conduct over the next five years to:

- Achieve the TAM Plan goals and objectives
- Address the Asset Management Policy
- Work towards a high level of asset SGR.

The program consists of the implementation strategy that provides the framework and action items for the multi-year implementation of asset management good practices. The target state for HART is to ultimately accomplish a cost-efficient and data-driven TAM process with a high percentage of assets in SGR.

HART has developed an approach to implementation that builds on the capabilities developed to prepare this TAM Plan and establishes a continuous TAM improvement process. A high-level roadmap illustrates the implementation strategy supported by detailed implementing actions.

### 6.1. FTA Requirements

Table 6-1 explains how the TAM Plan addresses FTA requirements.

**Table 6-1: TAM Implementation Requirements**

FTA TAM PLAN REQUIREMENTS	DESCRIPTION
<p><b>6. Implementation Strategy</b> <i>How is HART planning to execute the TAM Plan?</i></p>	<p>Phased implementation approach with four strategies:</p> <ol style="list-style-type: none"> <li>1. Build internal TAM organization and maintain core AM capabilities</li> <li>2. Complete the HART asset inventory and condition assessments</li> <li>3. Develop an asset management IT platform</li> <li>4. Advancement TAM to data-driven lifecycle management</li> </ol>
<p><b>7. Key Annual Activities</b> <i>Annual activities that HART will perform to maintain the TAM Plan?</i></p>	<p>Actions to implement the TAM Plan over the next several years, such as:</p> <ul style="list-style-type: none"> <li>• Maintaining the asset registry and annual inventory update</li> <li>• NTD reporting for performance targets and annual reporting</li> <li>• Facility assessments at a rate of 25 % per year (or more)</li> <li>• TAM Plan update</li> <li>• Implementing good TAM business practices</li> </ul>
<p><b>8. Identification of Resources</b> <i>Who "owns" TAM at HART?</i></p>	<p>Maturing the existing TAM program organization and carrying the TAM principles into the agency and daily operations</p>
<p><b>9. Evaluation Plan</b> <i>How will HART update the TAM Plan and move to continuous TAM improvements?</i></p>	<p>Implement phased approach and key annual activities structured into overall implementation roadmap, supported by detailed action items</p>

### 6.2. TAM Implementation Strategy

The HART TAM implementation consists of four strategies:

1. Strategy 1: Build internal TAM organization and maintain core AM capabilities

The TAM organization is a needed foundation to grow the TAM capabilities for the implementation actions that will be managed over the next five years.

HART will establish its formalized asset management organization assigning responsibilities and resources to institutionalize the newly developed TAM Plan process at HART. This will address ownership for the management of the implementation program and the efforts for the various asset groups and its owners and the TAM continuous improvement at HART. This includes all annual NTD reporting and preparation for the next TAM Plan development.

Implementation period is short-term, the organizational foundation will be set as part of the initial implementation actions, stabilized, and finalized within the next 24 months.

2. Strategy 2: Complete the HART asset inventory and condition assessments

For major asset groups, HART will complete the HART asset inventory and consolidate in one data base. This includes all facility assets and infrastructure assets, as appropriate. Due to the age of the facilities on the 21<sup>st</sup> Avenue Campus HART will need to plan for capital reinvestments including the heavy maintenance building but potentially beyond that. Solid planning requires knowledge of the facility asset base.

Implementation period is short-term, within the next 24 months.

3. Strategy 3: Develop an asset management IT platform

To create an asset management IT platform HART will follow three work streams.  
(1) Utilize full functionality of existing systems at HART (e.g. in Trapeze)  
(2) Determine a solution supporting asset management for facility assets  
(3) Determine overall asset management platform across all asset groups with defined interfaces and processes.

Implementation period is short to mid-term, within the next three years.

4. Strategy 4: Advancement TAM to data-driven lifecycle management:

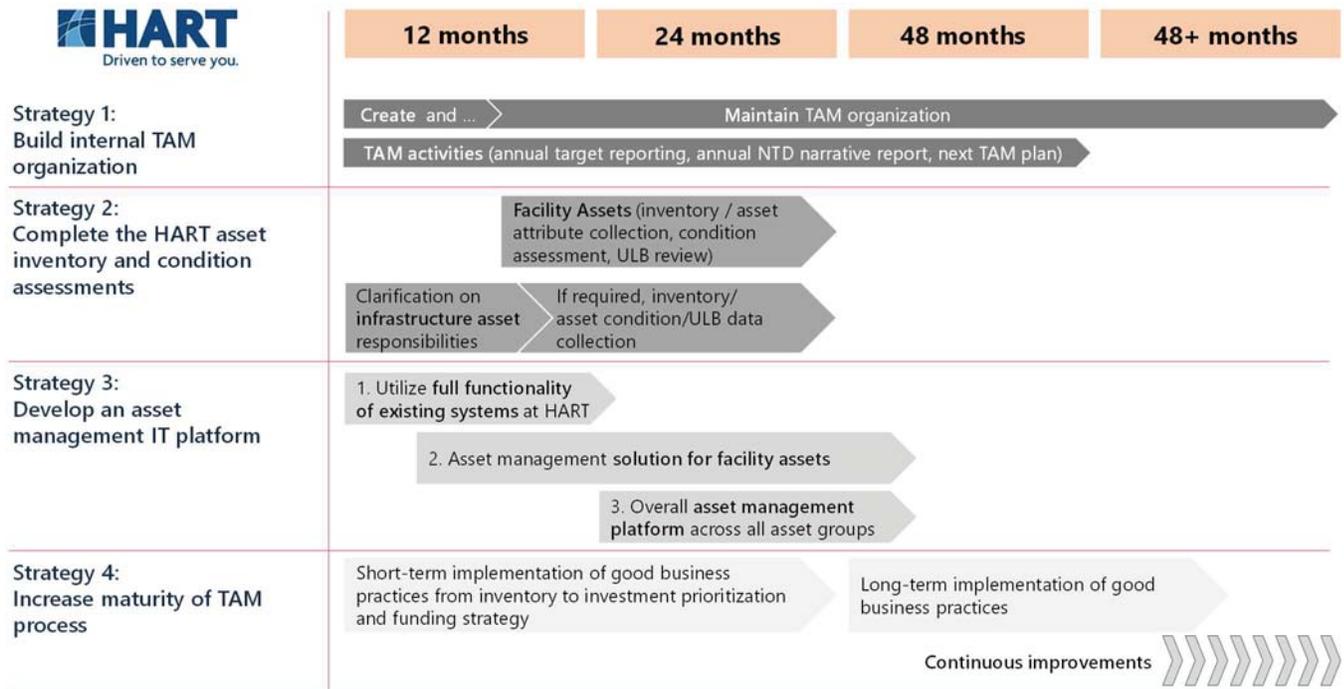
HART will implement improved TAM practices based on data-driven analytics and decision making to optimize its asset SGR and efficiency. Implementation will be a combination of early actions (e.g. for rolling stock) and actions that will be implemented once the asset management IT platform is matured.

Ultimately, TAM will be an ongoing and continuous improvement process for organization, information solution, and business practices to improve agency SGR and asset performance.

Implementation period is short to mid-term. Implementation of good business practices can start short term, especially if independent of an asset management system, but are considered an on-going action that may have long-term implementation times.

Figure 6-1 below illustrates HART's short to long-term TAM implementation roadmap across the strategies described above.

Figure 6-1: TAM Implementation Strategy



### 6.3. TAM Implementation Plan

The implementation plan includes actions that advance the four strategies which are described in more detail below.

#### Strategy 1: Build internal TAM organization and maintain core TAM capabilities

HART has established an organizational framework as already mentioned in the HART TAM Policy (chapter 2). This TAM organization will formally take responsibility for addressing the annually reporting requirements to FTA and NTD and prepare for the next TAM.

The TAM organization is built around three levels:

1. Executive level – Top Management
2. Program Management level with TAM Representative, TAM Program Manager, and TAM Core Team.
3. Working Group level with HART designated staff.

This organizational framework ensures that:

1. The TAM process is integrated across all departments and decisions are aligned with policy and overall goals,
2. Interfaces are seamless,
3. Implementation has appropriate proportionality in precision and quantification of risks, costs, performance, data collection/analysis/management, and decision-making process,
4. Overall implementation achieves expected outcomes and benefits to HART.

The key effort of the TAM implementation actions will be performed by the TAM Core Team under the oversight and leadership of the TAM Program Manager. Currently, this is an open position and HART is

planning to hire a full-time staff member. This Program Manager reports to the TAM Representative who presents the liaison to the Executive level and the CEO as accountable executive. The TAM Representative provides overall directions and guidance to the TAM Program Manager (especially during his/her familiarization phase) and Core team.

The Table 6-2 below explains the responsibility levels across the TAM organization.

**Table 6-2: TAM Resources and Roles Matrix**

<b>1. EXECUTIVE LEVEL – TOP MANAGEMENT</b>	
<p>Top Management provides the structured approach that incorporates asset management considerations into the day-to-day operations throughout the organization; Top Management are designed to support and promote continual improvement of the TAM.</p> <p>Top Management shall participate in quarterly review of the TAM Program for the first year and then annually in the review of the HART TAM performance or unless the following occurs:</p> <ol style="list-style-type: none"> <li>1. an urgent event associated to TAM;</li> <li>2. addressing the need for an immediate change.</li> </ol>	
<b>TAM Executive Leadership</b>	<ul style="list-style-type: none"> <li>• TAM Accountable Executive – Chief Executive Officer</li> <li>• TAM Top Management Team – Chief Executive Officer, Chief Administrative Officer, Chief Operating Officer, and Chief Financial Officer</li> </ul>
<b>2. PROGRAM MANAGEMENT LEVEL - TAM CORE TEAM</b>	
<p>The TAM Core Team has the working knowledge of the TAM framework. Its core function is to develop, implement, monitor and maintain all aspects of the TAM.</p> <p>The TAM Management Representative is the liaison between the TAM Executive Leadership and the TAM Program Manager/TAM Core Team</p> <p>Members of the TAM Core Team will collaborate with the TAM Program Manager and respective departments on educational/training needs, programs and continual improvement; the TAM Program Manager and TAM Core Team will provide the latest guidance, examples and resources for the implementation of processes and practices. The TAM Core Team is also responsible for annual NTD reporting of performance targets and actuals, the annual narrative report, as well as the next TAM Plan.</p> <p>The TAM Core Team will report TAM performance and opportunities for improvement to the TAM Management Representative. The TAM Program Manager will be the liaison between the TAM Core Team and TAM Management Representative.</p>	
<b>TAM Core Team</b>	<ul style="list-style-type: none"> <li>• TAM Management Representative</li> <li>• TAM Core Team Members: TAM Program Manager – Fixed Asset Accountant, Director of IT Systems, Director of Maintenance ,Director of Streetcar, and Manager of Fleet Maintenance (Rolling Stock)</li> </ul>
<b>3. WORKING GROUP LEVEL – HART DESIGNATED STAFF</b>	
<p>HART Designated TAM staff are responsible for representing their functional area of expertise. Designated TAM staff are responsible for related job responsibilities in accordance with HART’s TAM Policy and TAM Standard Operating Procedures. Staff designated for TAM activities are responsible for communicating and reporting TAM performance or any issues related to asset management to the TAM Program Manager or a TAM Core Team Member.</p>	
<b>HART Designated Staff</b>	<ul style="list-style-type: none"> <li>• Staff from various HART departments may be required to assist in the implementation and on-going TAM Plan actions for asset management:</li> <li>• Technical Departments – Facilities, Rolling Stock, Infrastructure, and Equipment</li> <li>• Administrative Departments – IT, Finance, Procurement, Grants ,Service Planning, Marketing, Project Management Office (PMO), Risk, and Safety</li> </ul>

For the TAM Core Team HART has determined the amount of resources dedicated towards TAM and the implementation actions. Just for the Core Team, HART will make 2.8 FTE personnel resources available which mainly span across the technical departments with interface to fixed asset accounting. Additional resources are available at the staff level across all technical and administrative departments. In addition to internal resources, HART is considering hiring outside support.

Table 6-3 below provide an overview of the resources within the TAM organization.

**Table 6-3: HART TAM Resource Allocation**

ORGANIZATION LEVEL	TAM IMPLEMENTATION RESOURCES
<p><b>TAM Core Team</b></p> <p><b>Personnel resources:</b> <b>2.8 FTE</b></p>	<ul style="list-style-type: none"> <li>• TAM Management Representative: 15% FTE</li> <li>• TAM Core Team Members:                             <ul style="list-style-type: none"> <li>○ TAM Program Manager: 100% FTE (to be hired)</li> <li>○ Fixed Asset Accountant: 75% FTE</li> <li>○ Director of IT Systems: 15% FTE</li> <li>○ Director of Maintenance: 25% FTE</li> <li>○ Director of Streetcar: 25% FTE</li> <li>○ Manager of Fleet Maintenance (Rolling Stock): 25% FTE</li> </ul> </li> </ul>
<p><b>HART Designated Staff</b></p> <p><b>Personnel resources:</b> <b>TBD, as needed</b></p>	<ul style="list-style-type: none"> <li>• Staff from various HART departments may be required to assist in the implementation and on-going TAM Plan actions for asset management:                             <ul style="list-style-type: none"> <li>○ Technical Departments</li> <li>○ Administrative Departments</li> </ul> </li> </ul>

Strategy 2: Complete the HART asset inventory and condition assessments

As described in Chapter 3, for some asset groups HART’s fixed asset accounting does not provide the level of detailed information of its assets as for e.g. rolling stock or equipment assets. To ensure a complete asset base HART will perform detailed inventory taking, such as:

1. For all facility assets on the 21st Avenue Campus and the Transfer Centers: Inventory taking of facility assets will follow the asset structure determined in the asset hierarchy. This will include collecting key asset attribute data that is currently not captured in the fixed asset accounting system but is essential to manage the assets over their lifecycles. For all facility assets, a condition assessment will be performed using the FTA TERM rating scale as well as a remaining asset life estimate. The current ULB will be revised if the condition assessments support deviating from the current value.
2. For the Ybor Building (administrative offices and Streetcar maintenance shop): HART will determine what its capital responsibilities are and what assets would need to be included in the asset inventory (despite that the building is not owned by HART). If required, relevant Ybor facility assets will be added to the inventory and condition assessment (as described under 1).
3. For the Streetcar right-of-way assets and Marion Transitway: HART will determine its responsibilities for the Streetcar right-of-way assets (incl. stations) and the Marion Transitway. If assets need to be registered, HART will first develop the asset hierarchy structure for the asset group, assets, and sub-

assets and collect the asset inventory, incl. key asset attribute data. If appropriate, a condition assessment for these assets may be needed as well.

### Strategy 3: Develop an asset management IT platform

This strategy is based on a separate evaluation of HART's asset management IT systems and associated processes. The full assessment can be found in the Appendix 4.

Based on this assessment, HART will implement three workstreams:

1. **Utilize full functionality of existing systems at HART:** HART can implement functions its systems have in place but are currently not used, e.g. the warranty management for its fleet or incorporating facilities consumable inventory management into Microsoft Dynamics/Great Plains and Trapeze. Also, HART can modify its current procedures for new asset onboarding or asset retirement.
2. **Determine a solution supporting asset management for facility assets:** Specifically for facility assets, evaluate alternative asset management software solutions (from low cost solutions integrating various systems to one enterprise system) that best meet HART requirements at reasonable cost and integrate with existing systems.
3. **Determine overall asset management platform across all asset groups with defined interfaces and processes:** Ultimately, HART wants to manage its assets organized in one asset register with standardized interfaces to minimize duplication in multiple systems. Taking into account the existing systems for asset management and commercial applications (e.g. for procurement, accounting, grants) the asset management platform needs to integrate with these existing systems and maintain the ability to support asset management good practices.

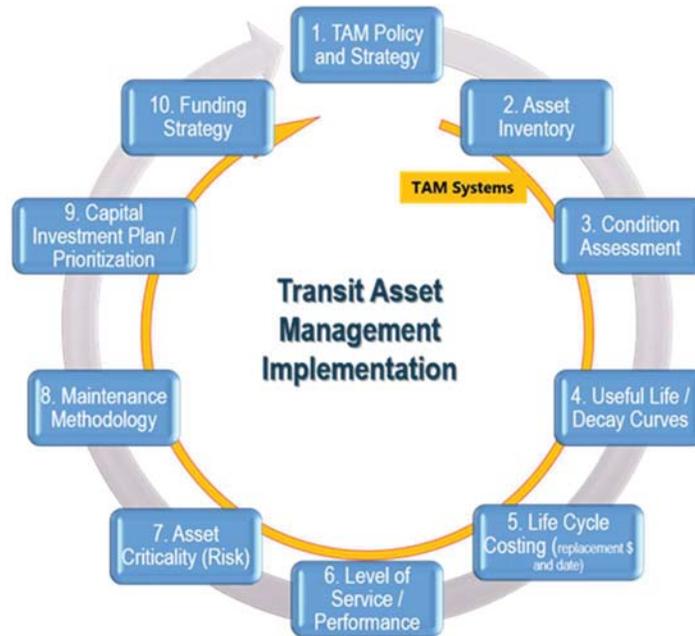
HART will develop an asset management system requirements document, identify viable solutions and evaluate against the requirements to ultimately select and implement best asset management solution platform that manages all HART assets, has the capability to process and track work orders, and monitors performance asset metrics.

### Strategy 4: Advancement TAM to data-driven lifecycle management:

Goal of strategy 4 is to ultimately move HART to advanced TAM practices based on data-driven analytics and decision making to optimize its asset SGR and efficiency. With the asset information platform now in place HART has full technology capabilities to manage the assets' whole lifecycle cost, risks, and performance to achieve operating and capital cost savings, improve service reliability, and contribute to safety for all stakeholders involved.

Implementation efforts will focus around ten implementation areas across all HART asset groups, as illustrated in Figure 6-2 below.

Figure 6-2: HART TAM Implementation Areas



Implementation efforts can either focus on individual areas or span across multiple areas due to the close interrelationship of these areas.

Table 6-4 explains some of the areas' starting points to identify opportunities for improvements.

HART has developed implementation action lists that address these areas. These actions listed in Table 6-5 following Table 6-4 are organized in three categories for (1) Policy and Organization, (2) Business Practices, and (3) Process/Technology/Tools.

**Table 6-4: HART TAM Implementation Areas**

Implementation Area	Implementation starting points and ideas
<b>1. TAM Policy / Strategy</b>	<ul style="list-style-type: none"> <li>Use policy to allocate TAM implementation effort to assets with highest expected benefit to HART</li> </ul>
<b>2. Asset Inventory</b>	<ul style="list-style-type: none"> <li>Maintain and advance asset hierarchy, including asset attributes</li> <li>Take inventory on assets not yet captured, focus on high-value and high-risk assets</li> <li>Determine process to add new and eliminate disposed assets</li> <li>Complete asset inventory, ideally in enterprise database</li> <li>Initiate analysis (“zero-based approach”) to identify assets that provide little value/benefit to agency</li> <li>Investigate outsourcing potential (including leasing)</li> <li>Investigate asset homogenization, where beneficial</li> </ul>
<b>3. Condition Assessment</b>	<ul style="list-style-type: none"> <li>Improve asset condition assessment methods and frequencies, incl. determining components with higher wear and tear or high failure rates</li> <li>Improve rating scale to allow more granular assessments (where beneficial)</li> <li>SGR Baseline Analysis</li> </ul>
<b>4. Useful Life / Decay Curves</b>	<ul style="list-style-type: none"> <li>Refine ULB standards and adjust where needed</li> <li>Development of asset-specific decay curves (where most appropriate) and forecasting methods to determine optimal replacement times</li> <li>Determining useful life benchmarks (ULB)</li> <li>Interface with maintenance methods (see 8.) – how do alternative maintenance methods impact decay curves and ULB</li> </ul>
<b>5. Life Cycle Costing</b> (replacement value and date)	<ul style="list-style-type: none"> <li>Develop life cycle cost methodology and decision support (for relevant assets)</li> <li>Determine commercial optimal replacement times (in addition to technical replacement time determined by asset operations and maintenance, see 8)</li> <li>Determine replacement cost (build data base for high value items and frequently procured asset). Leverage purchasing power through demand pooling.</li> </ul>
<b>6. Level of Service (LOS)/ Performance</b>	<ul style="list-style-type: none"> <li>Determine LOS required or desired (in relation to risk and impact resulting from asset failure)</li> <li>Determine asset specific performance metrics, measure units, frequency of measurements, and data storage method/location</li> <li>Determine link between performance metrics support asset condition rating and replacement times</li> </ul>
<b>7. Asset Criticality (Risk)</b>	<ul style="list-style-type: none"> <li>Review current practice of determining asset criticality and risk, expand asset criticality assessment by adding adequate parameters</li> <li>Risk of asset failure and its implications help making investment decisions, incl. prioritization</li> <li>Elevated risk assets require more detailed performance metrics, monitoring, forecasting, documentation (risk profile helps to also prioritize where to allocate TAM resources)</li> <li>Determine comprehensive risk assessment for all asset groups (or individual assets). Low risk assets are candidates that could be used beyond ULB</li> </ul>
<b>8. Maintenance Methodology</b>	<ul style="list-style-type: none"> <li>For prioritized assets, determine if more sophisticated maintenance methods can improve performance and reduce SGR need</li> </ul>
<b>9. Capital Investment Plan / Prioritization</b>	<ul style="list-style-type: none"> <li>Improve investment prioritization method</li> <li>Improve decision process for prioritization and investment selection</li> </ul>
<b>10. Funding Strategy</b>	<ul style="list-style-type: none"> <li>Leverage national, regional, and local funding sources</li> </ul>

## HART Transit Asset Management Plan

**Table 6-5: HART TAM Action Plan**

Number	Area	Process	Action Title	Action Detail	Short-Term: 0-24			Mid-Term: 3-5		
					0-6 mths	6-12 mths	12-24 mths	Year 3	Year 4	Year 5
<b>1: Policy and TAM Organization</b>										
1.1		1: Policy								
1.1.1		Board approval		Present to Board for approval in 2018	X					
1.2		2: Organization								
1.2.1		TAM Core team kickoff		Team kickoff to organize the team, actions, schedule, etc.	X					
		TAM Program Manager		Hire TAM Program Manager to lead Core Team	X					
1.2.2		Communication plan		Develop plan to communicate purpose and value of asset management at HART	X					
1.2.3		Quarterly meetings with executive management		Report on status and progress	X	X	X	X	X	X
1.3		3: TAM Plan Update								
1.3.1		Maintain TERM asset register		Maintain TAM asset register, complete inventory where needed, add new / retire old assets	X	X	X	X	X	X
1.3.2		Report FY18 asset inventory module data to NTD, Targets for FY19		Submit to NTD by January 2019		X				
1.3.3		Annual narrative to NTD, targets for FY20, and FY19 asset inventory module data for NTD		Submit to NTD by January 2020			X			
1.3.4		Annual narrative to NTD, targets for FY21, and FY20 asset inventory module data for NTD		Submit to NTD by January 2021				X		
1.3.5		Complete updated TAM Plan		No later than October 2022					X	

## HART Transit Asset Management Plan

**Table 6-5: HART TAM Action Plan (cont'd)**

Number	Area	Process	Action Title	Action Detail	Short-Term: 0-24			Mid-Term: 3-5			
					0-6 mths	6-12 mths	12-24 mths	Year 3	Year 4	Year 5	
	<b>2: Business Practices</b>										
2.1		1: TAM Policy and Strategy									
2.1.1			Review TAM policy	Annual review, board approval if changes			X	X	X	X	
2.2		2: Asset Inventory									
2.2.1			Asset onboarding process	Revise onboarding process		X					
2.2.2			Asset disposal process	Revise disposal process			X				
2.2.3			Facility Inventory	Develop facility inventory for all facilities (ideally together with condition assessment and collection of attribute data)			X				
2.2.4			Clarify the Ybor building responsibility	Determine responsibility for capital assets at Ybor and develop asset inventory as needed		X					
2.2.5			Determine responsibility of streetcar infrastructure and Marion Transitway	Determine HART responsibility for capital assets for streetcar infrastructure and Marion transit way. If needed, determine how asset inventory and lifecycle management etc. will be developed.		X					
2.2.6			Ybor Streetcar infrastructure	Add to TAM asset register		X					
2.2.7			More comprehensive asset attribute list	Develop more comprehensive asset attribute list for HART assets. Determine methodology and schedule to collect attribute information		X					
2.2.8			Collect attribute information	Based on determined methodology and schedule, collect attribute information.			X				
			Asset base review	Review existing asset base with regards to reduce asset base, outsource asset intensive processes, or homogenize assets (ongoing process)		X	X	X	X	X	X

## HART Transit Asset Management Plan

**Table 6-5: HART TAM Action Plan (cont'd)**

Number	Area	Process	Action Title	Action Detail	Short-Term: 0-24			Mid-Term: 3-5			
					0-6 mths	6-12 mths	12-24 mths	Year 3	Year 4	Year 5	
2.3		3: Condition Assessment									
2.3.1			Condition assessment for facility assets	Perform condition assessments for facility assets (ideally in conjoint with inventory taking)				X			
2.3.2			Condition assessment process for other key assets	Develop methodology for assessing asset condition, incl. rating scale, frequency of assessments, developing decay curves over time)				X			
2.3.3			Implement condition assessment for key assets	Implement condition assessments					X		
2.4											
2.4.1		4: Useful Life / Decay Curves	ULB assessment	Critically revise ULB standards		X					
2.5											
2.5.1		5: Life Cycle Costing	Develop lifecycle costing for revenue vehicles	Primarily for buses, develop lifecycle cost model. Collect operating and capital cost for operation/maintenance				X			
2.6											
2.6.1		6: Level of Service / Performance	Develop performance metrics for key assets	Determine key assets (high value, high criticality), select performance metrics (need to support condition assessments)				X			
2.7											
2.7.1		7: Asset Criticality (Risk)	Revise asset criticality (risk) methodology	Develop new/enhanced methodology to measure asset criticality			X				
2.8											
2.8.1		8: Maintenance Methodology	Maintenance improvement	For revenue vehicles						X	
2.9											
2.9.1		9: Capital Investment Plan / Prioritization	Develop a CIP process	Develop a standardized process and methodology for capital planning			X				
2.9.2			Investment prioritization	Develop enhanced methodology for a prioritization model				X			

## HART Transit Asset Management Plan

Table 6-5: HART TAM Action Plan (cont'd)

Number	Area	Process	Action Title	Action Detail	Short-Term: 0-24			Mid-Term: 3-5		
					0-6 mths	6-12 mths	12-24 mths	Year 3	Year 4	Year 5
2.10		10: Funding Strategy								
2.10.1			Identify new funding sources	Research various funding sources, also outside of FTA formula funding			X			
2.10.2			Flatten/spreading funding plan to support vehicle replacements	Create a funding plan that would allow for even annual spending and remove replacement spike purchases.			X			
<b>3: Process/Technology/Tools</b>										
3.1		1: Asset Management Support Tools								
3.1.1			Leverage existing Trapeze functionalities	For Trapeze modules already in place at HART use full extent of functionalities (warranty tracking, update numbering scheme for facility assets, etc.)	X					
3.1.2			Determine asset management solution for facility assets	Focus on facility assets. Assess various solutions and select best asset management tool supporting facility assets. Assessment needs to be coordinated with existing systems as well as the overall platform solution (under 3.1.3)			X			
3.1.3			Project to investigate asset management platforms	Assessment of AM integrated solutions vs. asset specific solutions (with interfaces). Define solution requirements (incl. MMS), search/ evaluate against requirements/ select solution. Include current TAM systems used at HART and interfaces to other administrative			X			
3.1.2			Implement selected AM solution	Implementation of selected solution				X		

## HART Transit Asset Management Plan

**Table 6-5: HART TAM Action Plan (cont'd)**

Number	Area	Process	Action Title	Action Detail	Short-Term: 0-24		Mid-Term: 3-5		
					0-6 mths	6-12 mths	12-24 mths	Year 3	Year 4
3.2		2: Asset Management Work Maintenance Management							
3.2.1			MMIS fleet	Review current practice of using fleet MMIS. Expand, if needed		X			
3.3		3: Project Prioritization							
3.3.1			Prioritization planning and interface to other systems/processes	Assure interface of asset management tools with prioritization planning and grants management			X		
3.4		4: Capital Planning							
3.4.1			Integration	Integrate capital planning, investment prioritization and SGR analysis				X	
3.5		5: Grants Management							
3.5.1			System support	Identify grants system solutions				X	

## 7. Appendices

### Overview

Appendix 1: FTA Approval for ULB of 11 years for “Chillers”

Appendix 2: Safety & Criticality Scores

Appendix 3: IT Systems Assessment

## Appendix 1: FTA Approval for ULB of 11 years for "Chillers"

Company: HART  
System: 12/15/2017 2:09:53 PM  
User Date: 12/15/2017  
Page: 1  
User ID:3705

RECORD NOTES REPORT

Note ID: 801BBB-001  
Created/Last Modified: 6/12/2012 8:51:30 AM

801BBB AND 801BBB1 ARE THE GRAND TOTAL OF THE HVAC IMPROVEMENTS. 55.73% IS ADMIN COST AND 44.27% IS MAINT COST. OF THE ADMIN PORTION, PROJECT MANAGER BOB ATACK INDICATED THAT \$141,006.00 WILL NOT BE DEMOLISHED DURING CONSTRUCTION OF THE NEW ADMIN RENOVATION. SO I SEPARATED A LINE FOR THIS IN THE PURCHASE SCREEN. DO NOT DIPOSE OF THIS PORTION. ONLY THE REMAINING ADMIN OF \$69,284.90 OF THIS WILL BE DEMOLISHED.

MAGGIE SANDBERG AT FTA SAID HART COULD CHANGE THE ERROR ON THE 30 YEAR LIFE TO MATCH THE DOCUMENTS BECAUSE THE GRANT DID NOT INDICATE A USEFUL LIFE. THIS WAS STATED IN A CONFERENCE CALL WITH JEANIE AND THE PROJECT ENGINEERS AT HART. THE LIFE WAS CHANGED FROM 30 YEARS TO 11 YEARS. BUT THIS WAS NOT RETROACTIVE. THEREFORE, WHEN THE \$69,284.90 PORTION IS DISPOSED, THERE WOULD NEED TO BE A MANUAL RECALCULATION OF ACTUAL LOSS FROM APRIL 20, 2001 TO DATE OF DEMOLITION.

DALE SMITH PROVIDED AN ASHRAE SERVICE LIFE STUDY FOR AIR COOLED CHILLERS. I HAVE ATTACHED THIS TO THE HVAC ASSETS. THE STUDY SHOWS THAT 11 YEARS IS THE REPLACEMENT LIFE OF AIR COOLED CHILLERS. THESE UNITS ARE EXPOSED TO THE ELEMENTS AND RUN ALL THE TIME.

THIS ASSET ALSO CONTAINS THE HVAC CONTROLS AND DUCTWORK THAT WAS NOT DEMOLISHED. SO THERE WILL STILL BE PART OF AN ASSET REMAINING WHEN THE PROJECT IS COMPLETE. I CANNOT GET GP TO DEPRECIATE THIS ASSET CORRECTLY. SO WE WILL HAVE TO MANUALLY CALCULATE FOR THIS PORTION OF THE DISPOSAL ONCE IT IS REPLACED.

# HART Transit Asset Management Plan

## Appendix 2: Safety & Criticality Scores

**Table 1: Safety Scores**

ASSET HIERARCHY					SAFETY SCORE
LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	BUILDING STRUCTURE		5
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	FIRE PROTECTION SYSTEM		5
EQUIPMENT	BUS EQUIPMENT	LIFTS	MOBILE LIFTS		4
EQUIPMENT	BUS EQUIPMENT	LIFTS	STATIONARY LIFTS		4
EQUIPMENT	SYSTEMS	RADIO EQUIPMENT	ITS		4
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	ELECTRICAL SYSTEM		4
ROLLING STOCK	REVENUE	STREETCAR	STREETCAR BREEZER		3
ROLLING STOCK	REVENUE	STREETCAR	ELECTRIC STREETCAR		3
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	CAD/AVL/GPS		3
ROLLING STOCK	REVENUE	BUSES	CNG		2
ROLLING STOCK	REVENUE	BUSES	DIESEL		2
ROLLING STOCK	REVENUE	VANS	CNG		2
ROLLING STOCK	REVENUE	VANS	DIESEL		2
ROLLING STOCK	REVENUE	VANS	GAS		2
EQUIPMENT	BUS EQUIPMENT	FUELING SYSTEM	CNG		2
EQUIPMENT	BUS EQUIPMENT	FUELING SYSTEM	DIESEL		2
EQUIPMENT	BUS EQUIPMENT	FORKLIFTS			2
EQUIPMENT	BUS EQUIPMENT	OTHER EQUIPMENT			2
EQUIPMENT	STREETCAR EQUIPMENT	MOBILE COLUMN LIFT SYSTEM- 4 COLUMNS			2
EQUIPMENT	STREETCAR EQUIPMENT	MOBILIFT WHEELCHAIR LIFT IN BACK CORNER			2
EQUIPMENT	STREETCAR EQUIPMENT	CATERPILLAR FORKLIFTS			2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	CCTV		2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	PHONE SYSTEM	PHONE SYSTEM	2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	PHONE SYSTEM	SATELLITE PHONES	2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	END USER PCs	2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	ID BADGE PRINTER & CAMERA	2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	SERVERS	2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	TIME CLOCKS	2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	SOFTWARE		2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	OTHER COMPONENTS	NETWORK EQUIPMENT	2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	OTHER COMPONENTS	NETWORK STORAGE	2
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	FAREBOX		2
EQUIPMENT	SYSTEMS	BUSES	BUS ROUTERS		2
EQUIPMENT	SYSTEMS	STREETCAR	OPTOCOM SYSTEM		2
EQUIPMENT	SYSTEMS	STREETCAR	GPS VEHICLE KIT - SERIES 2000		2
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	ALARM SYSTEM		2
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	HVAC SYSTEM		2
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	PLUMBING SYSTEM		2
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	SIGNAGE		2
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	TVM - TICKET VENDING MACHINE - BRT	1 or 2
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	STATION TVM MACHINES	1 or 2
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	COIN DISPENSERS & CHANGERS	1 or 2
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	POINT-OF-SALE SYSTEM	1 or 2
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	CHANGE MACHINES	1 or 2
ROLLING STOCK	NON-REVENUE	ADMIN VEHICLES			1
ROLLING STOCK	NON-REVENUE	MAINT VEHICLES			1
ROLLING STOCK	NON-REVENUE	OPER VEHICLES			1
EQUIPMENT	BUS EQUIPMENT	BUS WASH			1
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	A/V EQUIPMENT		1
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	BACK-UP POWER		1
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	PRINTERS/PLOTTERS	1
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	OTHER COMPONENTS	SERVER EQUIPMENT	1
EQUIPMENT	SYSTEMS	RADIO EQUIPMENT	METRORAPID		1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	CURRENCY COUNTER/SCANNER	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	CASH BINS	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	COIN CONVEYOR	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	COIN SORTER/COUNTER W/PRINTER	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	REVENUE COLLECTION UNIT	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	CASHBOX ID COMPUTER	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	CASHBOX ID/VAULT UPGRADE - GFI	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	OTHER	GFI GARAGE DATA SYSTEM FOR PROBING	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	OTHER	POWER SUPPLY-DC 30 AMP	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	OTHER	MULTIPLY ISOLATION BOXES-IN GFI OFFICE	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	OTHER	PORTABLE PROBE	1
EQUIPMENT	SYSTEMS	AUTOMATED PASSENGER COUNT SYSTEM (APC)			1
EQUIPMENT	SYSTEMS	BUSES	TRANSIT SIGNAL PRIORITY		1
EQUIPMENT	SYSTEMS	STREETCAR	TROLLEY INVERTER SOFTWARE		1
EQUIPMENT	OTHER	SHOWER LOCKERS FOR 21ST ADMIN			1
EQUIPMENT	OTHER	FURNITURE			1
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	VERTICAL CONVEYANCE		1
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	DRAINAGE		1
FACILITIES	LAND	PASSENGER FACILITIES	BUS STOPS		1
FACILITIES	LAND	PARKING	PARKING LOTS		1

# HART Transit Asset Management Plan

**Table 2: Criticality Scores**

ASSET HIERARCHY					CRITICALITY SCORES			CRITICALITY TOTAL
LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	COST	SERVICE	MISSION	
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	FIRE PROTECTION SYSTEM		5	5	5	5
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	BUILDING STRUCTURE		5	5	4	4.8
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	REVENUE COLLECTION UNIT	5	2	4	3.75
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	CASHBOX ID COMPUTER	5	2	4	3.75
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	CASHBOX ID/VAULT UPGRADE - GFI	5	2	4	3.75
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	OTHER	GFI GARAGE DATA SYSTEM FOR PROBING	5	1	2	3
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	OTHER	POWER SUPPLY-DC 30 AMP	5	1	2	3
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	OTHER	MULTIPLEX ISOLATION BOXES-IN GFI OFFICE	5	1	2	3
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	OTHER	PORTABLE PROBE	5	1	2	3
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	CASH BINS	5	1	1	2.8
ROLLING STOCK	REVENUE	BUSES	CNG		2	3	4	2.75
ROLLING STOCK	REVENUE	BUSES	DIESEL		2	3	4	2.75
EQUIPMENT	BUS EQUIPMENT	FUELING SYSTEM	CNG		2	3	4	2.75
ROLLING STOCK	REVENUE	VANS	CNG		1.5	3	5	2.73
ROLLING STOCK	REVENUE	VANS	DIESEL		1.5	3	5	2.73
ROLLING STOCK	REVENUE	VANS	GAS		1.5	3	5	2.73
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	TVM - TICKET VENDING MACHINE - BRT	3	2	3	2.65
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	STATION TVM MACHINES	3	2	3	2.65
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	POINT-OF-SALE SYSTEM	3	1	3	2.3
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	ELECTRICAL SYSTEM		3	2	1	2.25
EQUIPMENT	BUS EQUIPMENT	FUELING SYSTEM	DIESEL		2	2	3	2.2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	END USER PCs	2	1	4	2.05
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	SERVERS	2	1	4	2.05
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	TIME CLOCKS	2	1	4	2.05
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	SOFTWARE		2	1	4	2.05
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	COIN DISPENSERS & CHANGERS	1	2	3	1.75
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	PASSENGER STATIONS/CENTERS	CHANGE MACHINES	1	2	3	1.75
ROLLING STOCK	REVENUE	STREETCAR	STREETCAR BREEZER		2	1	2	1.65
ROLLING STOCK	REVENUE	STREETCAR	ELECTRIC STREETCAR		2	1	2	1.65
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	FAREBOX		2	1	2	1.65
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	CCTV		1	1	4	1.6
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	PHONE SYSTEM	PHONE SYSTEM	1	1	4	1.6
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	OTHER COMPONENTS	NETWORK EQUIPMENT	1	1	4	1.6
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	OTHER COMPONENTS	NETWORK STORAGE	1	1	4	1.6
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	CAD/AVL/GPS		1	2	2	1.55
EQUIPMENT	BUS EQUIPMENT	BUS WASH			2	1	1	1.45
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	HVAC SYSTEM		2	1	1	1.45
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	PLUMBING SYSTEM		2	1	1	1.45
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	DRAINAGE		2	1	1	1.45
EQUIPMENT	BUS EQUIPMENT	LIFTS	MOBILE LIFTS		1	1	3	1.4
EQUIPMENT	BUS EQUIPMENT	LIFTS	STATIONARY LIFTS		1	1	3	1.4
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	PHONE SYSTEM	SATELLITE PHONES	1	1	2	1.2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	BACK-UP POWER		1	1	2	1.2
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	ID BADGE PRINTER & CAMERA	1	1	2	1.2
EQUIPMENT	SYSTEMS	RADIO EQUIPMENT	ITS		1	1	2	1.2
EQUIPMENT	SYSTEMS	BUSES	TRANSIT SIGNAL PRIORITY		1	1	2	1.2
EQUIPMENT	SYSTEMS	STREETCAR	OPTOCOM SYSTEM		1	1	2	1.2
EQUIPMENT	SYSTEMS	STREETCAR	GPS VEHICLE KIT - SERIES 2000		1	1	2	1.2
FACILITIES	LAND	PASSENGER FACILITIES	BUS STOPS*		1	1	2	1.2
ROLLING STOCK	NON-REVENUE	ADMIN VEHICLES			1	1	1	1
ROLLING STOCK	NON-REVENUE	MAINT VEHICLES			1	1	1	1
ROLLING STOCK	NON-REVENUE	OPER VEHICLES			1	1	1	1
EQUIPMENT	BUS EQUIPMENT	FORKLIFTS			1	1	1	1
EQUIPMENT	BUS EQUIPMENT	OTHER EQUIPMENT			1	1	1	1
EQUIPMENT	STREETCAR EQUIPMENT	MOBILE COLUMN LIFT SYSTEM- 4 COLUMNS			1	1	1	1
EQUIPMENT	STREETCAR EQUIPMENT	MOBILIFT WHEELCHAIR LIFT IN BACK CORNER			1	1	1	1
EQUIPMENT	STREETCAR EQUIPMENT	CATERPILLAR FORKLIFTS			1	1	1	1
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	A/V EQUIPMENT		1	1	1	1
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	COMPUTERS/PRINTERS	PRINTERS/PLOTTERS	1	1	1	1
EQUIPMENT	SYSTEMS	ENTERPRISE SYSTEMS	OTHER COMPONENTS	SERVER EQUIPMENT	1	1	1	1
EQUIPMENT	SYSTEMS	RADIO EQUIPMENT	METRORAPID		1	1	1	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	CURRENCY COUNTER/SCANNER	1	1	1	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	COIN CONVEYOR	1	1	1	1
EQUIPMENT	SYSTEMS	REVENUE COLLECTION SYSTEM	BUS/STREETCAR FACILITY	COIN SORTER/COUNTER W/PRINTER	1	1	1	1
EQUIPMENT	SYSTEMS	AUTOMATED PASSENGER COUNT SYSTEM (APC)			1	1	1	1
EQUIPMENT	SYSTEMS	BUSES	BUS ROUTERS		1	1	1	1
EQUIPMENT	SYSTEMS	STREETCAR	TROLLEY INVERTER SOFTWARE		1	1	1	1
EQUIPMENT	OTHER	SHOWER LOCKERS FOR 21ST ADMIN			1	1	1	1
EQUIPMENT	OTHER	FURNITURE			1	1	1	1
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	ALARM SYSTEM		1	1	1	1
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	VERTICAL CONVEYANCE		1	1	1	1
FACILITIES	LAND	ADMIN/ MAINT FACILITIES	SIGNAGE		1	1	1	1
FACILITIES	LAND	PARKING	PARKING LOTS		1	1	1	1

Appendix 3: IT Systems Assessment



**Hillsborough Transit Authority**



**Transportation Asset Management (TAM) Plan  
Asset Information Strategy  
July 2018**

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# Hillsborough Transit Authority Transportation Asset Management (TAM) Plan Asset Information Strategy

## Executive Summary

As part of the development of its Transit Asset Management (TAM) Plan, the Hillsborough Transit Authority (HART) requested an evaluation of its asset management systems and the preparation of an asset information strategy. The goal of this assessment was to evaluate HART's current systems in terms of their ability to meet asset information requirements to support the TAM Plan and for consistency with and the ability to support asset management good practices.

For purposes of this analysis, asset information was defined broadly to include the following business processes/functions:

- Asset registry;
- Work management;
- Procure to pay/inventory management;
- Financial management as it supports asset management;
- Asset planning/capital planning; and
- Capital project execution;

HART currently utilizes several management systems to provide these functions, with various systems being used for functions such as asset registry and work management for different asset classes. Systems performing asset information related functions include Trapeze™ Enterprise Asset Management (EAM), Cisco My Devices/Cisco Prime®, Microsoft Service Desk, Solar Winds®, Microsoft Dynamics®/Great Plains, Microsoft Excel/Access, and others.

As a result, there are wide variations in the completeness of the information and the extent of functionality available by asset class. Likewise, the number of disparate systems/tools being utilized by HART has created a larger and more complex application architecture than is necessary, increasing the internal staff effort and cost to maintain this systems environment.

HART's current asset information systems are all commercial off-the-shelf (COTS) solutions, but in many cases, HART is not fully leveraging its investment in these products and is using only a portion of the functionality available. In some cases, such as the lack of using the warranty management functionality available in the Trapeze™ EAM product being used for fleet assets, it is impacting the potential for HART to obtain the full range of potential business benefits, such as full cost recovery for eligible warranty repairs. In other cases, such as grants management/grants accounting, it has caused processes to be much more manual and labor intensive than necessary and led to the development of offline spreadsheets or other manual workarounds. There is also limited integration among the different systems (for example for asset onboarding and asset retirement), which creates duplication of effort and can lead to systems getting out of sync with each other.

In terms of TAM Plan information requirements and asset management good practice, the system assessment identified several key gaps including:

- There is limited facilities management functionality available within the Trapeze™ Fleet module currently implemented. This results in a significant amount of manual effort for Facilities staff, limits

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## Transportation Asset Management (TAM) Plan

### Asset Information Strategy

HART's ability to apply best practices in managing their facilities and will require maintaining a spreadsheet to manage all the additional facility asset registry and condition information collected during the TAM Plan project;

- Warranty tracking functionality is available in Trapeze™ but is not currently used;
- Consumable inventory for facilities is not managed in a system or charged to work orders, limiting the ability to fully understand the cost of maintaining facilities assets;
- Asset numbers are re-used for facility assets (in Trapeze EAM) resulting in a loss of history for future asset planning and capital planning analysis;
- There is no system which can currently support asset registration for the street car infrastructure assets (linear assets);
- Support for the procure to pay and inventory management processes requires complicated interfaces between Workplace for requisition creation and approval, Microsoft Dynamics®/Great Plains for purchasing and inventory and Trapeze™ EAM for inventory charge out to work orders as opposed to potentially utilizing as much of the functionality in Microsoft Dynamics®/Great Plains as possible to reduce the hand-offs and associated interface points between systems;
- Asset onboarding and asset retirement processes are primarily manual, with potential timing challenges in information being entered into the financial system and the governing asset management system depending on asset class;
- An off-line spreadsheet is utilized to support grants management/grants accounting functions. In addition, because this spreadsheet is not interfaced with other systems, manual research and intervention is required to make sure it stays in sync (for example when a requisition charged to a grant is changed or cancelled within Workplace); and
- There are no systems or management tools to support asset planning/capital planning such as recommending candidate assets for replacements or supporting evaluating and prioritizing potential capital projects.

To address these gaps and others identified during the analysis, the Gannett Fleming team has identified several possible alternatives. Where appropriate, we have identified alternative approaches to achieving the recommendation, as indicated in the illustration below:

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For some options such as facilities management and grants management/grants accounting there are two viable alternatives which are to either acquire a new built for purpose commercial software solution implemented as a Software as a Service (SaaS) or Cloud-based solution or to extend the capabilities of existing products such as Trapeze™ EAM or Microsoft Dynamics®/Great Plains.

While we recognize that a new Cloud-based solution for facilities management and/or grants management may be more cost effective in the short-run, we are recommending a potential implementation roadmap, which is based on extending and building on HART’s investment to date in Trapeze™ and Microsoft Dynamics®/Great Plains. This proposed implementation roadmap is based on the guiding principles of leveraging HART’s existing technology investment, simplifying the application architecture foot print and reducing complex interface points where possible. Based on these guiding principles, we have selected alternatives for a new facilities management solution which leverage the existing investment in Trapeze™ and for grants management which further leverage the use of Microsoft Dynamics®/Great Plains. HART would also further simplify its application architecture environment by transitioning the requisitioning functionality currently in Workplace into Microsoft Dynamics®/Great Plains.

The proposed implementation roadmap is divided into three phases based on business priority and the level of investment required. The implementation roadmap also assumes validation of the recommended direction for grants management and procure to pay through a requirements definition and solution fit/gap analysis as a first step. The three phases within the implementation roadmap are:

**Year 1: Foundation Elements and Project Planning** – This phase includes implementation of warranty management using functionality already available in Trapeze™; incorporating facilities consumable inventory management into Microsoft Dynamics®/Great Plains and Trapeze™ using available functionality; beginning to utilize unique asset numbers for facility components to maintain asset history; and conducting requirements definition and fit/gap analysis efforts for the procure to pay and grants management functionality.

**Year 2 and Year 3: System Evaluation and Implementation Phase 1** - This phase includes evaluating various solutions (from low cost solutions integrating various systems to one enterprise system). After

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selection and implementation, a rollout plan will determine how the asset register is built and maintained, work management systems set up, and integration with existing HART system is secured.

**Year 4 and Forward: Implementation Phase 2** – This phase includes linking the selected TAM IT system solution with investment prioritization tools and capital planning.

## 1. Introduction

The Hillsborough Transit Authority (HART) is the regional transportation provider in Hillsborough, County Florida (Metropolitan Tampa). HART was created in October of 1979 to plan, finance, acquire, construct, operate and maintain mass transit facilities and supply transportation assistance in Hillsborough County. It provides bus and paratransit services and jointly operates a street car line in conjunction with the City of Tampa. Gannett Fleming was engaged by HART to develop its Transit Asset Management (TAM) Plan. As part of the development of the TAM Plan, HART requested an evaluation of its asset information systems and the preparation of an asset information strategy. The objective of this evaluation was two-fold:

- Conduct a gap-fit assessment of HART’s asset management and related systems in terms of the current system’s abilities to support:
  - TAM Plan requirements,
  - NTD requirements,
  - Asset management good practices, and
  - Other system opportunities based on good practice;
- Develop recommendations to address identified gaps.

eVision Partners performed this work as a major subconsultant under the direction of Gannett Fleming. The remainder of this document provides a summary of the findings and recommendations in terms of potential improvements in HART’s asset and other information systems and potential alternative approaches for implementing these recommendations.

This report is organized as follows:

- **Methodology and Approach** – This section describes our approach and work steps for developing the asset information systems strategy for HART.
- **Overview of As-Is Environment** – This section provides an overview of HART’s current asset management business processes. It also outlines the key systems and other tools currently utilized to support asset management related functions for HART.
- **Findings** – This section outlines key gaps in terms of TAM Plan requirements, asset information good practices and other findings based on our team’s evaluation of HART’s current As-Is asset management systems environment.
- **Recommendations** – This section documents the recommendations to address identified gaps. It is divided into recommendations which will require minimal additional investment and recommendations which will require significant effort or additional investment on the part of HART. Where appropriate, we have identified alternative approaches to achieving a recommendation.

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- **Implementation Suggestions** – This section presents one potential implementation roadmap based on implementing alternatives to address key gaps which leverage and build on HART’s existing investment to date in Trapeze™ and Microsoft Dynamics®/Great Plains. The roadmap is divided into three phases based on business priority and the level of investment required to implement.

## 2. Methodology and Approach

The Gannett Fleming/eVision Partners team conducted a set of fact-finding interviews on March 29-30, 2018. These groups interviews were conducted with all key asset owners and other stakeholders in terms of asset information. Interviews were conducted with approximately 20 staff members representing rolling stock, facilities, infrastructure including information technology (IT) assets and budget, grants, capital planning and fixed assets. In addition, the project team collected and reviewed various documentation about HART’s current systems. The findings from these interviews were then validated in a stakeholder workshop on May 18, 2018 and a follow-up session with additional stakeholders on May 31, 2018. Following the validation session and follow-up discussions with HART management, this management summary report was prepared. Exhibit 1 provides an overview of our project approach for preparing the Asset Information Systems Strategy.

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Exhibit 1: Approach for Performing Asset Information Systems Strategy



## 3. Overview of As-Is Environment

This section presents a summary of HART's As-Is environment from two perspectives: process and systems.

### 3.1. HART As-Is Asset Management and Related Business Processes

In terms of asset management business processes, HART is most advanced from a process perspective in terms of the rolling stock asset class, with limited asset management business processes defined for facilities, infrastructure and equipment. Exhibit 2 outlines the As-Is environment in terms of asset management business processes as defined from an industry best practice perspective.

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**Exhibit 2: Summary of HART’s As-Is Asset Management Business Processes**

EAM Process Level	HART Status
<b>Asset Management</b>	
Asset registry and hierarchy	<ul style="list-style-type: none"> <li>• Asset registries are currently in place for:               <ul style="list-style-type: none"> <li>○ Rolling stock;</li> <li>○ Some facility assets;</li> <li>○ Some infrastructure assets;</li> <li>○ Equipment; and</li> <li>○ IT assets.</li> </ul> </li> </ul>
Asset condition & assessment	<ul style="list-style-type: none"> <li>• There is currently no formal condition assessment process.</li> </ul>
Asset status and location	<ul style="list-style-type: none"> <li>• There is currently no process for asset status and location in Trapeze™ Enterprise Asset Management (EAM).</li> <li>• There are some asset status and location processes supported in the Microsoft Dynamics®/Great Plains financial system.</li> </ul>
Asset criticality and risk assessment	<ul style="list-style-type: none"> <li>• There is currently no process in place for asset criticality and risk assessment.</li> </ul>
Asset configuration management	<ul style="list-style-type: none"> <li>• There is no process for asset configuration and management in Trapeze™ EAM.</li> <li>• Some processes exist in Microsoft Dynamics®/Great Plains.</li> </ul>
Component tracking	<ul style="list-style-type: none"> <li>• There is no process for component tracking in Trapeze™ EAM.</li> <li>• Some processes exist in Microsoft Dynamics®/Great Plains.</li> </ul>
Life-cycle costing	<ul style="list-style-type: none"> <li>• There is currently no life-cycle costing process.</li> </ul>
Asset on-boarding	<ul style="list-style-type: none"> <li>• There is a manual onboarding process initiated by Finance in which Finance staff enter asset information into the fixed assets register in Microsoft Dynamics®/Great Plains; based on information provided by Finance, asset owners then enter similar asset registry information into Trapeze™ EAM for fleet, facilities and equipment assets or into Cisco® for IT assets.</li> </ul>
Asset disposal	<ul style="list-style-type: none"> <li>• Asset disposal is a manual process in which the disposition is recorded separately by Finance in the fixed asset register in Microsoft Dynamics®/Great Plains and by asset owners into Trapeze™ EAM for fleet, facilities and equipment assets or Cisco® for IT assets.</li> </ul>
NTD reporting	<ul style="list-style-type: none"> <li>• There is no automated NTD reporting process/procedure in Trapeze™ EAM or any other HART system. Gathering of data for NTD is primarily a manual process.</li> </ul>

In terms of work management, business processes are established to a great degree for rolling stock and IT assets. Some business processes are also defined for facilities assets. However, inventory is not charged out to facilities work orders. In addition, facilities work orders are done at the system level and not at the component level due to the way facility assets are currently set-up in the HART Trapeze™ EAM system (as “stationary equipment”.) Exhibit 3 presents a summary of HART’s As-Is work management business processes.

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**Exhibit 3: Summary of HART's As-Is Work Management Business Processes**

EAM Process Level	HART Status
<b>Work Management (Maintenance Management)</b>	
Problem/incident reporting & tracking	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock and some facility assets.</li> <li>• Incident reporting through Operations is not optimal.</li> <li>• IT uses Microsoft Service Desk.</li> </ul>
Planned maintenance program management	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock and some facility assets.</li> <li>• IT uses Microsoft Service Desk.</li> </ul>
Work planning, scheduling & management	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock and some facility assets for work planning, scheduling and management.</li> <li>• IT uses its own "Change Management System".</li> </ul>
Warranty tracking	<ul style="list-style-type: none"> <li>• For most assets, warranty tracking is a manual process (e.g. Excel spreadsheet)</li> <li>• IT uses Cisco My Devices/Cisco Prime® to support warranty tracking.</li> </ul>
Usage & maintenance history	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for usage and maintenance history for rolling stock.</li> <li>• IT uses Microsoft Service Desk.</li> </ul>
External contract maintenance	<ul style="list-style-type: none"> <li>• There is no support for tracking external contract maintenance in HART systems.</li> </ul>
Failure analysis	<ul style="list-style-type: none"> <li>• Solar Winds® is used for failure analysis for IT assets.</li> <li>• There is no system supported failure analysis processes for other assets.</li> </ul>
Maintenance costing	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock for maintenance costing for labor and materials.</li> <li>• Only labor cost is captured for facilities.</li> </ul>
Activity-based costing	<ul style="list-style-type: none"> <li>• There is no system support for activity-based costing.</li> </ul>

In terms of inventory management business processes, inventory is managed and controlled in a combination of the Trapeze™ EAM system and the Microsoft Dynamics®/Great Plains financial system for rolling stock assets. Inventory is not managed for other asset classes. Exhibit 4 provides a summary of HART's As-Is inventory management business processes.

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**Exhibit 4 Summary of HART’s As-Is Inventory Management Business Processes**

EAM Process Level	HART Status
<b>Inventory Management</b>	
Item definition & location	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock.</li> <li>• Item definition and location for IT assets is supported by a combination of Microsoft Dynamics®/Great Plains, Microsoft Service Desk and spreadsheets.</li> </ul>
Warehouse/storeroom configuration & management	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock.</li> </ul>
Inventory transactions and material usage tracking	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock.</li> </ul>
Material replenishment	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock.</li> </ul>
Cycle counting and physical inventory	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock.</li> </ul>
Serialized item & lot tracking	<ul style="list-style-type: none"> <li>• Trapeze™ EAM is used for rolling stock.</li> </ul>
Inventory accounting & valuation	<ul style="list-style-type: none"> <li>• Inventory accounting and valuation is performed in Microsoft Dynamics®/Great Plains except for facilities consumable inventory which is expensed.</li> </ul>

### 3.2. HART As-Is Systems Environment

HART currently uses a few disparate management systems and other software tools to provide asset management functionality across the different asset classes. Exhibit 5 provides a summary of the asset management systems and tools being utilized by major asset management business function for HART.

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**Exhibit 5: Summary of HART Asset Management As-Is Systems Environment**

Asset Management Business Function	Management Systems and Other Tools Utilized
Asset Registry	<ul style="list-style-type: none"> <li>• Microsoft Dynamics®/Great Plains for fixed asset accounting;</li> <li>• Trapeze™ EAM fleet module for fleet, equipment and partial support for facilities;</li> <li>• Microsoft Service Desk for IT assets;</li> <li>• Cisco My Devices/Cisco Prime® for IT assets; and</li> <li>• Solar Winds® for IT assets.</li> </ul>
Work Management	<ul style="list-style-type: none"> <li>• Trapeze™ EAM for fleet, facilities and equipment;</li> <li>• Microsoft Service Desk for IT assets; and</li> <li>• Solar Winds® for IT assets.</li> </ul>
Procure to Pay/Inventory Management	<ul style="list-style-type: none"> <li>• Workplace for purchase requisitions and review/approval workflow;</li> <li>• Microsoft Dynamics®/Great Plains for purchase orders and receipt/management of inventory; and</li> <li>• Trapeze™ EAM with a shadow inventory to support charge out of inventory to work orders for fleet.</li> </ul>
Financial Management	<ul style="list-style-type: none"> <li>• Microsoft Dynamics®/Great Plains.</li> </ul>
Asset Planning/Capital Planning	<ul style="list-style-type: none"> <li>• None.</li> </ul>
Capital Project Execution	<ul style="list-style-type: none"> <li>• Microsoft Dynamics®/Great Plains for project accounting; and</li> <li>• Spreadsheets for grants management functions.</li> </ul>

## 4. Findings

This section summarizes the Gannett Fleming team’s findings concerning HART’s current asset information systems environment. These findings were developed based on benchmarking the capabilities of HART’s current As-Is asset management systems environment against industry good practices in terms of asset information systems functionality.

### 4.1. Overall

- HART is currently not using an all-encompassing Enterprise Asset Management (EAM) system. Different systems/tools are utilized to manage similar processes across different asset groups:
  - The fleet module of Trapeze™ EAM is used primarily for rolling stock, and
  - Other asset groups either use Trapeze™ EAM partially or in conjunction with one or more other systems;
- There is an overall lack of process and system integration:
  - Asset Management processes are supported by a myriad of systems, such as Trapeze™ EAM, Cisco My Devices/Cisco Prime®, Microsoft Service Desk, Solar Winds®, Microsoft Dynamics®/Great Plains, Microsoft Excel/Access, and others, and

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- Trapeze™ EAM, Microsoft Service Desk, My Devices/Cisco Prime®, Solar Winds® (etc.) and Microsoft Dynamics®/Great Plains do not share a common asset register platform and perform duplicative business processes.

#### 4.2. Fleet and Equipment

- Warranty tracking functionality is available in Trapeze™ EAM but is not currently used. The lack of formal tracking of warranties for components can potentially result in some replacement components being purchased while still under warranty.

#### 4.3. Infrastructure

- There is no asset registry support for linear assets (streetcar infrastructure).

#### 4.4. Facilities

- HART lacks a true facility management system:
  - There is no capability to maintain a facilities hierarchy. Facility assets are being entered into the fleet module of Trapeze™ EAM as static equipment which prevents the use of the full facilities hierarchy and requires all work to be charged to the highest-level system or component element, and
  - Work orders are established, and costs captured at the system or major component level versus for each individual facility asset or component within a system;
- In Trapeze EAM, facility asset numbers are re-used when an asset is replaced resulting in a loss of history associated with the original (or prior) asset. This prevents HART from having data on the cost to repair systems/ components of various types or from various manufacturers; and
- Facilities consumable inventory is not managed in Microsoft Dynamics®/Great Plains or Trapeze™ EAM. Facilities consumable inventory is being expensed upon purchase. This approach is inconsistent with good inventory control practices. In addition, no inventory cost can be charged to a facility work order resulting in incomplete cost information for facility maintenance activities.

#### 4.5. Procure to Pay

- The application architecture supporting the Procure to Pay cycle is complex. Requisitions are entered and reviewed and approved in Workplace and then approved requisitions are transferred into a purchase order in Microsoft Dynamics®/Great Plains. Inventory is received in Microsoft Dynamics®/Great Plains but then interfaced into Trapeze™ EAM to be available for charge-out to work orders. This architecture approach requires complicated interfaces and necessitates synchronizing three (3) off-the-shelf products. This approach also does not leverage workflow functionality that appears to be available in the Microsoft Dynamics®/Great Plains product.

#### 4.6. Asset Management

- Asset onboarding is a manual process with potential for a time lag. The onboarding process into management systems is based on payment of a vendor invoice and not receipt of an asset. An asset may be on property for a period of time before it is entered into Microsoft Dynamics®/Great Plains, while commissioning/testing is occurring, and the vendor invoice is being processed. While the invoice

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is being received and processed, the asset may be in production use and need to be in the Trapeze™ EAM system for warranty tracking and potential maintenance work orders.

- Asset retirement processes are manual. There is no integration between the financial system and asset management systems. Retiring an asset within the fleet module of Trapeze™ EAM or another asset management system does not trigger retirement within the fixed assets register in Microsoft Dynamics®/Great Plains.

#### 4.7. Project Planning

- HART currently has no asset planning/capital planning tools, nor an established department. The current systems do not have capabilities to assist in supporting the identification of candidate assets for replacement or for the grouping of these candidate assets into candidate projects. Likewise, there are no tools to assist in project prioritization/selection.

#### 4.8. Project Execution

- HART has limited grants management/grants accounting functionality within Microsoft Dynamics®/Great Plains or other systems. Offline spreadsheets are used extensively to manage grants and there is significant manual work required to keep these spreadsheets up to date. As an example, the grants tracking spreadsheets are not automatically updated to increase the uncommitted balance for a grant when requisitions are cancelled in Workplace.

## 5. Suggestions

This section summarizes our suggested improvements to HART's asset information systems. The recommendations have been categorized into those requiring minimal additional investment and those requiring some level of additional investment. Where appropriate, multiple alternative approaches to achieving the recommendation have been provided.

### 5.1. Suggestions Requiring Minimal Additional Investment

Three recommendations can be implemented with minimal additional investment as follows:

#### 1. Leverage/extend the capabilities of the existing Trapeze™ EAM fleet module where possible.

HART should fully leverage all the capabilities available within the Trapeze™ EAM fleet module. One example of the greater use of the existing Trapeze™ EAM solution components currently licensed by HART includes implementing warranty management capabilities within Trapeze™ EAM. Based on our team's experience with other clients, the use of the warranty tracking functionality within Trapeze™ EAM will provide a very quick payback to HART in terms of money saved through increased warranty claims submitted. The warranty functionality should be able to be deployed by HART internal resources; however, it may be appropriate to budget \$15,000 - \$20,000 for any required consulting support.

#### 2. Migrate facilities consumable inventory into Microsoft Dynamics®/Great Plains and the Trapeze™ EAM fleet module.

The management of facilities consumable inventory in an automated system will improve inventory handling processes and controls. It will also allow facilities consumable inventory to be charged to a work order (even if the work order is at a higher-level such as the major system than is ultimately desirable).

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Facilities consumable inventory would be received into Microsoft Dynamics®/Great Plains and then interfaced to Trapeze™ EAM to be available for charging out to facility work orders. This recommendation should be implementable with existing HART business and technical staff.

### **3. Change the facility asset numbering process to maintain the history associated with a facility asset.**

This change in business process will allow HART to preserve the asset maintenance history for all facilities assets. This data can then be leveraged in the future for various analysis such as estimating the lifecycle cost of an asset or in repair/replace analysis. The team recognizes that a primary driver for reusing asset numbers was to minimize the number of assets in the system since HART licenses Trapeze™ EAM in part by the number of assets managed in the system. We believe the impact of the increase in the asset count will be minimal at first and that HART can negotiate its licensing structure with Trapeze over the next two years to allow for more assets as part of acquiring the facilities modules as recommended in the next subsection. The implementation work for this recommendation can be performed by HART internal resources.

### **5.2. Suggestions Requiring Additional Investment**

The following four recommendations will require additional investment but are essential steps to improving HART's overall asset information systems environment.

#### **1. Implement a comprehensive facilities management solution**

A complete facilities management solution will support a facilities asset hierarchy, the capability to intake work requests, the ability to manage and track work orders at a component level and allow the charge-out of inventory to a work order. There are two alternative approaches to implementing a facilities management system.

##### ***Alternative 1: Acquire/implement the Trapeze™ facilities module***

The Trapeze™ EAM facilities module is a part of the Trapeze™ EAM State of Good Repair (SGR)/Capital Planning module. The Trapeze™ EAM facilities module can be added onto the existing Trapeze™ EAM fleet module to provide facilities management capabilities. The Trapeze™ EAM facilities module is built for facility asset classes and assets, supports the use of a hierarchy and provides more flexibility in terms of the level of assets at which work orders are established than by using stationary equipment in the Trapeze™ EAM fleet module.

Implementation of the Trapeze™ EAM facilities module will allow HART to store all facilities, fleet and equipment assets within a single database. It can also, at HART's option, allow for capturing at least asset registry information for IT assets in Trapeze™ EAM, providing a single source of truth for the asset registry. In addition, the Trapeze™ EAM facilities module will provide support for linear assets, addressing the current gap in terms of how to store street car infrastructure assets within a management system.

The Trapeze™ EAM facilities module has a similar look and feel to the Trapeze™ EAM fleet module which may speed up user adoption of the new module. At the same time, however, several HART users indicated to the team that the current Trapeze™ EAM fleet module is difficult to navigate and not user friendly, which is a disadvantage for this alternative.

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Implementation of the Trapeze™ EAM facilities module will leverage existing integration with Microsoft Dynamics®/Great Plains. The cost of implementing the Trapeze™ EAM facilities module is higher than implementing a stand-alone Cloud-based Facilities module, but since the Trapeze™ EAM Capital Planning/SGR functionality is included within the same software module as facilities from a software licensing perspective, HART has an option for future expansion of capabilities without additional software licensing cost (implementation services for activating the Capital Planning/SGR capability would represent additional incremental costs to HART).

The estimated cost of implementing the Trapeze™ EAM facilities module is \$300,000 - \$400,000 for a 10 to 15-year useful life, with 1-2 software updates at 25% of initial cost every five years. The ongoing operating cost is estimated at \$40,000 - \$50,000 per year, which represents the annual software maintenance cost.

Note that Trapeze™ EAM typically offers an on-premise solution with license cost paid upfront. However, HART could try to negotiate a capital lease approach to reduce Year 1 capital expenditure. It is assumed that no additional server hardware or other new technical infrastructure will be required to implement the Trapeze™ EAM facilities module.

#### ***Alternative 2 – Acquire Cloud-based facilities management solution***

An alternative approach for addressing facilities management requirements is to procure and implement a Cloud-based facilities management solution. A Cloud-based facilities management solution would also allow for defining facilities assets by systems and components, support managing a facilities asset hierarchy and allow for charging labor and inventory cost to work orders at the component level. However, to fully burden or cost out work orders would require development of integration points with Microsoft Dynamics®/Great Plains.

A Cloud-based facilities management solution would provide a good practice facilities management solution, but it would leave HART with asset registry and condition assessment information in two separate management systems. The solution may be more user friendly than Trapeze™ EAM and would likely involve a lower implementation cost and total cost of ownership. The Cloud-based solution would likely not have support for linear assets, leaving a gap in terms of the street car infrastructure.

The total estimated cost of the Cloud-based facilities management solution is \$100,000 - \$150,000 for a 10 to 15-year useful life, with upgrades as provided by the Software as a Service (SaaS) vendor. The estimated annual operating cost is \$40,000 - \$50,000 per year for the third-party SaaS subscription cost.

#### **2. Extend Microsoft Dynamics®/Great Plains capabilities**

Under this recommendation, HART should extend the use of Microsoft Dynamics®/Great Plains capabilities as part of its next planned upgrade of the product to fully support the procure to pay process by migrating requisitions and the approval workflows into Microsoft Dynamics®/Great Plains. This would take advantage of functionality available within Microsoft Dynamics®/Great Plains and eliminate interface points now required between Workplace and Microsoft Dynamics® /Great Plains.

In addition, as part of this proposed project, HART should implement a streamlined and more automated asset onboarding process and asset retirement process in Microsoft Dynamics®/Great Plains and develop the required integration with Trapeze™ EAM and potentially with the Cisco® product suite and Solar Winds® for IT assets to support more automated end-to-end asset onboarding and asset retirement processes.

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By leveraging all the available capabilities within the Microsoft Dynamics®/Great Plains environment, HART should be able to reduce the complexity of its application footprint and potentially eliminate the need to utilize the Workplace product. Such a recommendation will likely, however, require business process re-engineering and organizational change management and the full buy-in of HART executive management. The goal should be to use the out-of-the-box capabilities of Microsoft Dynamics®/Great Plains to the extent possible, re-engineering HART business processes to utilize the capabilities of the Microsoft Dynamics®/Great Plains software unless there is a regulatory or statutory reason why a business process cannot work using the Microsoft Dynamics®/Great Plains capabilities available out-of-the-box.

The Gannett Fleming team recommends that the first action taken under this recommendation be a requirements definition effort to specify in more detail the requirements for requisitioning, asset onboarding and asset retirement. A fit/gap analysis should then be conducted to validate the fit of Microsoft Dynamics®/Great Plains solution to meet the requisitioning requirements. We believe, based on our market survey work, that the capabilities within the current release of Microsoft Dynamics®/Great Plains can meet most of HART's needs in this regard (especially with some business process rationalization) but a fit analysis will help to validate this assumption.

The estimated cost of this recommendation is \$100,000 - \$150,000 for external services to augment HART IT staff as needed. There should be no incremental operating cost since HART already licenses all the required Microsoft Dynamics®/Great Plains software modules.

This recommendation will result in a lower cost to maintain the HART information systems environment over time and may allow HART to eliminate the use of Workplace and the associated costs of licensing and operating this application.

### **3. Implement grants management solution**

This recommendation involves implementing a grants management/grants accounting solution for HART, which is integrated with the agency's financial management and procure to pay functionality. The grants management solution could be implemented either by leveraging capabilities available within Microsoft Dynamics®/Great Plains software or by implementing a Cloud-based grants management solution. Each of these alternative approaches are described below.

#### ***Alternative 1: Utilize Microsoft Dynamics®/Great Plains Grants Accounting Functionality***

Based on a market scan performed by the Gannett Fleming team, the latest release of Microsoft Dynamics®/Great Plains appears to have basic grants accounting functionality which may be able to replace the functions currently being performed in the off-line spreadsheet. Coupled with bringing requisition functionality into Microsoft Dynamics®/Great Plains, use of the grants accounting functionality in Microsoft Dynamics®/Great Plains could allow for streamlining and further automating HART's grants accounting processes.

This approach, if feasible, would provide for enhanced grants management functionality without introducing another software tool into HART's application environment. It is recommended that HART undertake a requirements definition and fit/gap analysis effort as a first step to further delineate the agency's grants management and grants accounting requirements and then to assess the fit of the latest release of Microsoft Dynamics®/Great Plains to meet these requirements.

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The estimated cost of this alternative is \$50,000 - \$75,000 for external services to augment HART IT staff as needed. There would be no incremental operating cost as the team believes HART already licenses all the required Microsoft Dynamics®/Great Plains modules. This assumption, however, will need to be validated during the fit analysis.

## ***Alternative 2: Implement Cloud-based based grants management solution with integration to Microsoft Dynamics®/Great Plains***

Under this alternative, HART would procure and implement a Cloud-based grants management solution from a SaaS vendor and integrate the selected product with Microsoft Dynamics®/Great Plains. This approach may result in a more robust solution from a grants management perspective but would require development of interfaces with Microsoft Dynamics®/Great Plains. It would also add an additional software product and set of interfaces to the HART applications architecture.

The cost of Alternative 2 is estimated at \$50,000 – \$75,000 for a 10 to 15-year useful life, with upgrades as provided by the SaaS vendor. The implementation cost includes the cost of designing, developing, testing and implementing the required interfaces to Microsoft Dynamics®/Great Plains. The annual operating cost is estimated at \$20,000 to \$40,000 which represents the SaaS subscription cost.

## **4. Implement Trapeze™ EAM SGR/Capital Planning module to provide asset planning and capital planning tools**

This recommendation involves implementing the Trapeze™ EAM SGR/Capital Planning module (the same software module as the facilities module), to provide HART with analytical support for identifying and prioritizing its assets for replacement. The functionality of the Trapeze™ EAM SGR/Capital Planning module includes:

- Tracks asset details including:
  - Asset hierarchy,
  - Safety criticality,
  - Remaining useful life,
  - Date/cost to refurbish, and
  - Date/cost to replace and condition;
- Defines and manages asset condition processes to ensure ongoing upkeep of condition data;
- Tracks detailed data on asset deterioration over time including:
  - Age-based decay curves,
  - Physical condition assessment, and
  - Performance-based condition rating scoring;
- Compares system calculated condition score with physical condition assessment;
- Reviews current SGR backlog status and capital project status in real-time;

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- Provides capital projects portal to scope and track projects including:
  - Manually generating potential projects by selecting assets or defining project and linking assets, and
  - Displaying assets that are already included in capital projects so that you do not select the same asset for a project the next year; and
- Provides capital planning roll-up to asset class (rolling stock, facility, equipment, infrastructure).

The estimated cost of implementing the Trapeze™ EAM SGR/Capital Planning module is \$200,000 - \$300,000 for a 10 to 15-year useful life, with 1-2 software updates at 25% of initial cost every five years. The annual operating cost is estimated to be \$40,000 - \$50,000 per year which represents software licensing cost. Note that there would be a potential for economies of scale if the Trapeze™ EAM facilities module is also implemented since there would not be any additional licensing or maintenance cost since the Trapeze™ EAM facilities module and SGR/Capital Planning capabilities are within the same Trapeze™ EAM software module.

The Gannett Fleming team also evaluated the potential implementation of an investment decision tool for HART. An investment decision tool would give HART the ability to integrate asset projects identified in the Trapeze™ EAM SGR/Capital Planning module with non-asset projects and evaluate these projects under different scenarios with various resource constraints (funding or other constraints such as staff capacity) to select the optimal mix of projects which maximize system performance. Given where HART is from an asset lifecycle maturity perspective and that most of its capital investments are state of good repair related, we do not believe that it is necessary to implement an investment decision software tool at this time.

## 6. Example for Implementation Roadmap

This section provides one potential implementation roadmap, grouping the recommendations by priority and by the level of anticipated HART investment. This proposed implementation roadmap is based on the guiding principles of leveraging HART's existing technology investment, simplifying the application architecture foot print and reducing complex interface points where possible. Based on these guiding principles, we have selected alternatives for facilities management which leverage the existing investment in Trapeze™ EAM and for grants management which further leverage the use of Microsoft Dynamics®/Great Plains. HART would also further simplify its application architecture environment by transitioning the requisitioning functionality in Workplace into Microsoft Dynamics®/Great Plains. The grants management and procure to pay recommendations are based on validating the solution capabilities through fit/gap analyses.

We have staged the implementation of the various recommendations across three (3) phases over a minimum of a four-year period. Each implementation phase is outlined below.

### **Year 1: Foundation Elements and Project Planning**

- Implement warranty management;
- Incorporate facilities consumable inventory management into Microsoft Dynamics®/Great Plains and Trapeze EAM™;
- Begin to utilize unique asset numbers for facility components;

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- Conduct detailed requirements gathering for procure to pay, asset onboarding and asset retirement and conduct fit/gap analysis with Microsoft Dynamics®/Great Plains for procure to pay (requisition) functionality; and
- Define requirements for grants management and conduct fit/gap analysis with Microsoft Dynamics®/Great Plains.

#### **Year 2 and Year 3: Implementation Phase 1**

- Implement Microsoft Dynamics®/Great Plains enhancements as part of the next product upgrade cycle including:
  - Procure to Pay/Requisitioning,
  - Asset Onboarding,
  - Asset Retirement,
  - Grants Management, and
- Implement Trapeze™ EAM facilities Module.

#### **Year 4 and Forward: Implementation Phase 2**

- Implement Trapeze™ EAM SGR/Capital Planning module.

Note that we have prioritized implementing the Trapeze™ EAM facilities module ahead of the SGR/Capital Planning capability for several reasons:

- HART does not currently have a facility management solution;
- HART has developed a facilities hierarchy as part of the TAM Plan project which cannot be implemented in the Trapeze™ EAM fleet module;
- HART has collected a significant amount of facilities attribute data as part of the TAM Plan project which is currently in a spreadsheet; and
- There is a gap in terms of where to manage street car infrastructure assets (linear assets) which can be addressed through the Trapeze™ EAM facilities module.

Exhibit 6 provides a notional implementation timeline.

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## Exhibit 6: Suggested Implementation Timeline

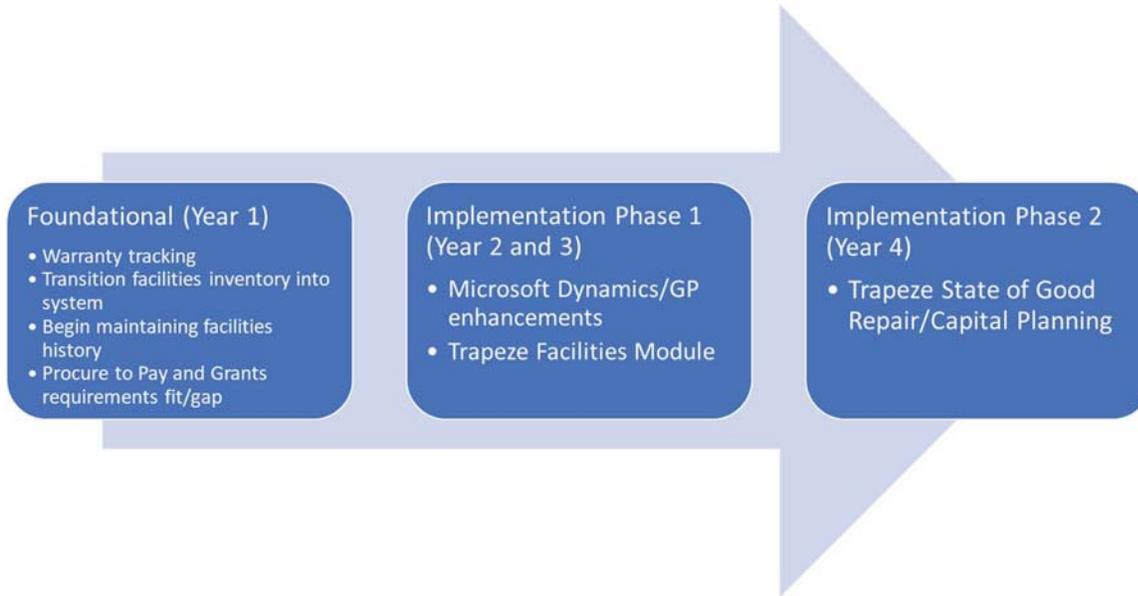


Exhibit 7 outlines the estimated implementation cost by year<sup>27</sup>. Cost is included for incremental cost only. No cost is assumed for activities which can be performed by internal staff and/or does not require any additional software licenses, etc.

<sup>27</sup> All cost presented are rough estimates based on experience, but not tailored to the specific HART situation. Actual cost for software and services may deviate.

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**Exhibit 7: Estimated Implementation Cost by Year**

Phase	Total Cost	Year 1	Year 2	Year 3	Year 4
<b>Foundational</b>					
Warranty Management	\$20,000	\$20,000	\$0	\$0	\$0
Facilities Inventory Management	\$0	\$0	\$0	\$0	\$0
Unique Facility Numbers	\$0	\$0	\$0	\$0	\$0
Requirements Definition and Fit/Gap	\$0	\$0	\$0	\$0	\$0
<b>Implementation Phase 1</b>					
Microsoft Dynamics®/Great Plains Enhancements	\$225,000	\$0	\$100,000	\$125,000	\$0
Trapeze™ Facilities Module	\$300,000	\$0	\$200,000	\$100,000	\$0
<b>Implementation Phase 2</b>					
Trapeze™ SGR/Capital Planning	\$200,000	\$0	\$0	\$0	\$200,000
<b>Total</b>	<b>\$745,000</b>	<b>\$20,000</b>	<b>\$300,000</b>	<b>\$225,000</b>	<b>\$200,000</b>

Please note that the cost estimate assumes economies of scale in terms of software licensing for Trapeze™ EAM SGR/Capital Planning module, with licensing cost being charged to the Trapeze™ EAM facilities implementation since it occurs first.