



Cape Fear Public Transportation Authority

Transit Asset Management Plan

Revised January 2021

Wave Transit Asset Management Plan

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Executive Summary	1
1.2	Accountable Executive	2
1.3	Plan Horizon and Update Schedule	2
2.0	FTA DEFINITIONS	2
2.1	Capital Asset.....	2
2.2	State of Good Repair	3
2.3	SGR Performance Measures	3
3.0	CAPITAL ASSET INVENTORY	4
3.1	Rolling Stock.....	4
3.2	Equipment	7
3.3	Facilities	8
4.0	CONDITION ASSESSMENT	9
4.1	Asset Condition Analysis	10
4.2	System Replacement Value.....	10
4.3	Normal Reinvestment.....	11
4.4	Asset Backlog.....	11
4.5	SGR Need.....	11
5.0	Decision Support Tools.....	11
5.1	AssetWorks Software	11
6.0	Investment Prioritization.....	11
7.0	Fleet Requirements	13
7.1	Fixed Route Vehicle Needs.....	14
7.2	Fixed Route Vehicle Specifications	14
7.2.1	Heavy Heavy Duty Bus	15
7.2.2	Cutaway.....	15
7.2.3	Replica Trolley	15
7.3	Paratransit Vehicle Needs	15
7.4	Vanpool Vehicle Needs.....	15
7.5	Non-Revenue Vehicle Needs	16
7.6	Spare Ratio Requirements	16
7.7	Current Fleet Analysis and Plan.....	16
8.0	ADOPTION	17
	APPENDIX A. Depreciation Schedule.....	18
	APPENDIX B. Inventory Assessment Methodology	19
	Appendix C. Spare Ratio Calculations	21

1.0 INTRODUCTION

1.1 Executive Summary

In 2016, the Federal Transit Administration (FTA) published a rule requiring public transit providers receiving Federal assistance to undertake certain transit asset management activities. Although the regulations set out minimum standards to satisfy Federal transit asset management requirements, they do not represent the full suite of transit asset management best practices. This plan covers many activities that are not required by the regulations but meet FTA’s regulatory requirements for effectively maintaining and managing transit assets. This plan satisfies the FTA Transit Asset Management Planning requirement. The plan, together with the *Maintenance Plan*, also meets the requirements of the Authority’s *Fleet Management Plan*. The Federal Transit Administration (FTA) has released new requirements for transit agencies related to asset management in the *Fixing America’s Surface Transportation (FAST) Act*. The regulations require recipients and subrecipients of Federal financial assistance under 49 U.S.C. Chapter 53 to prepare a Transit Asset Management Plan (TAMP). As a recipient of these funds, Wave Transit must comply with the regulations. The Authority falls into the Tier II classification for transit providers as it operates fewer than 100 vehicles in peak revenue service. The required TAMP elements for Tier II providers are summarized in the table below.

Tier II TAMP Requirements

1	Inventory of Capital Assets
2	Condition Assessment
3	Decision Support Tools
4	Investment Prioritization

Asset condition has been determined for all capital assets and is summarized in the table below.

FTA Condition Assessment Summary

Assessment Measure	Condition Rating
FTA State of Good Repair (SGR) Criteria	100% of all capital assets are in a SGR
FTA Performance Measures	Rolling Stock <ul style="list-style-type: none"> o 22.39% meets or exceeds ULB* Equipment <ul style="list-style-type: none"> o 58.33% meets or exceeds ULB* Facility <ul style="list-style-type: none"> o 0% of units are rated below 3 on the TERM scale

* useful life benchmark

In addition to the application of FTA State of Good Repair (SGR) criteria and performance measures as required by the TAMP, this plan further analyzes the capital asset inventory using methods recommended by the American Public Transportation Association (APTA). Results of the assessment are summarized in the table below.

APTA Inventory Analysis

Analytic Applied	Result
Total System Replacement Value Rolling Stock	\$15,052,000 (2020 dollars)
Total System Replacement Value Equipment	\$431,600 (2020 dollars)
Normal Reinvestment (over 10 years)	\$15,483,600 (Annual Normal Reinvestment \$1,548,360)
Capital Asset Backlog	\$2,760,000 (2020 dollars)
SGR Need (over 10 years)	\$4,316,000 (estimated)
SGR Need (annually)	\$431,600 (estimated)

1.2 Accountable Executive

The Accountable Executive is responsible for the creation, administration, and updates to the plan to ensure compliance with FTA and in accordance with the schedule referenced in Section 1.3 below. The Authority’s Executive Director, Marie Parker, is the designated Accountable Executive for the TAMP document.

1.3 Plan Horizon and Update Schedule

This plan has a horizon of five years. This plan will be updated at a minimum every four years, or if significant changes occur in the assets or the system requiring a more frequent update. Significant rolling stock acquisition in 2018 and 2019 combined with the construction of Padgett Station require this plan update. The next mandatory plan update is due in May 2024.

The current North Carolina Statewide Transportation Improvement Program (STIP) was adopted in 2019 and runs from 2020 through 2029. Updates to this plan will be coordinated around updates of the STIP, as necessary.

2.0 FTA DEFINITIONS

The following definitions are defined by the Federal Transit Administration (FTA) in the final rule regarding Transit Asset Management requirements, published July 26, 2016.

2.1 Capital Asset

As determined by the FTA, a “capital asset” includes the categories of rolling stock, equipment, infrastructure, and facilities. Capital assets can include those a transit provider owns, operates, manages, leases, or operates under contract. Rolling stock is a revenue vehicle used in providing public transportation, including vehicles used for carrying passengers on fare-free services. Equipment is defined as an article of nonexpendable, tangible property having a useful life of not less than one year. Infrastructure means the underlying framework or structures that support a public transportation system. Facility is described as a building or structure that is used in providing public transportation. The definition of facility is further clarified by the American Public Transportation Association (APTA) as: “structures that enclose or support maintenance, operations and administrative activities, including those that house specialized equipment that supports the operations and maintenance of the vehicles.” These definitions are summarized below in Table 1.

Table 1. FTA Capital Asset Definitions

Capital Asset	Definition
Rolling Stock	A revenue vehicle used in providing public transportation, including vehicles used for carrying passengers on fare-free services
Equipment	Nonexpendable, tangible property with a useful life of not less than one year
Infrastructure	The underlying framework or structures that support a public transportation system
Facilities	Building or structure used in providing public transportation

2.2 State of Good Repair

The FTA defines a State of Good Repair (SGR) as: **“the condition in which a capital asset is able to operate at a full level of performance.”** Further, a capital asset is in a state of good repair when the following criteria are met: 1) it is able to perform its designated function, 2) does not pose a known unacceptable safety risk, and 3) its lifecycle investments must have been met or recovered including all preventive maintenance, rehabilitation, and replacements.

Table 2. FTA SGR Criteria

1. Asset is able to perform its designated function
2. Asset does not pose a known unacceptable safety risk
3. Asset lifecycle investments have been met or recovered

2.3 SGR Performance Measures

If an asset meets the SGR criteria and is determined to be in a state of good repair then its performance can be measured. The FTA proposes an SGR performance measure for each asset that is the least burdensome to measure while still efficient. For the measurement of rolling stock and equipment, the FTA proposes an age-based assessment which would measure the percentage of revenue vehicles within a particular asset class that have either met or exceeded their useful life benchmark (ULB). Length of useful life for each unit is determined by an FTA based useful life schedule, which group assets into 7 categories, and varies by asset type within a range of 4 to 12 years or 100,000 to 500,000 miles. The depreciation schedule is provided in Table 4 and Appendix A. Wave Transit does not currently own any infrastructure assets and performance measures for the infrastructure asset category will not be discussed. The FTA suggests a condition-based assessment of facilities using the *Transit Economic Requirements Model (TERM)* scale to define the percentage of facilities within an asset class rated below 3 on the TERM scale (1=poor to 5=excellent).

Table 3. FTA Performance Measures (Proposed)

Asset Category	Classes Measured	Performance Measure
Rolling Stock	All revenue vehicles	Percentage of revenue vehicles within a particular asset class that have either met or exceeded their useful life benchmark (ULB)
Equipment	Non-revenue vehicles Maintenance equipment	Percentage of vehicles and equipment that have met or exceeded their ULB
Facilities	All buildings or structures	Percentage of facilities within an asset class, rated below 3 on the Transit Economic Requirements Model (TERM) scale (1=poor to 5=excellent)

3.0 CAPITAL ASSET INVENTORY

This plan and inventory includes all capital assets, as defined by the FTA. Capital asset categories are limited to rolling stock, equipment, and facilities. Wave Transit does not currently own any infrastructure assets. Asset data is managed and stored using AssetWorks, the Authority and the North Carolina Department of Transportation's (NCDOT) asset management database. Each asset listed is maintained using a manufacturer recommended preventive maintenance (PM) schedule and/or is inspected annually. PM programs and inspections have been entered into AssetWorks and managers are alerted to scheduled maintenance through a forecasting calendar.

3.1 Rolling Stock

Wave Transit owns 67 units of rolling stock. This includes heavy duty buses, body on chassis buses, vans, and rubber-tired trolley buses. All 67 units meet the criteria for an SGR.

For all 67 units of rolling stock, an SGR requirement has been determined and therefore a performance measure can be applied. The FTA performance measure for rolling stock is the percentage of units that have either met or exceeded their useful life benchmark (ULB). Length of useful life for each unit is determined by an FTA based depreciation schedule, which groups assets into 7 categories, and varies by vehicle type within a range of 4 to 12 years or 100,000 to 500,000 miles. The depreciation schedule is provided in Table 4 and Appendix A. Table 5 provides the rolling stock inventory with the age of the vehicle, depreciation category, and indicates whether or not the unit has met or exceeded its Useful Life Benchmark (ULB) as determined by the depreciation schedule. In order to meet or exceed the benchmark a unit must fulfill the criteria for age or mileage. Currently 22% or 15 of the 67 units of Rolling Stock meet or exceed their ULB.

Table 4. Depreciation Schedule

Category	Vehicle Type	ULB
1	Large (35'-40'), heavy-duty buses	12 yrs. or 500,000 miles
2	Medium (30'), heavy-duty buses	10 yrs. or 350,000 miles
3	Medium (30'), medium-duty buses	7 yrs. or 200,000 miles
4	Medium (25'-35'), light-duty buses	5 yrs. or 150,000 miles
5	Small (16'-28'), light-duty buses	4 yrs. or 100,000
6	Other vehicles	4 yrs. or 100,000
7	Furniture, fixtures, machinery and equipment	3, 5, 7 or 10 years

Table 5. Rolling Stock ULB

	Equipment ID	Year	Model	In Service Date	Actual Life Years	Dep. Schedule	Meets or Exceeds ULB
1	1805	2018	Glaval Entourage LTV	12/1/2018	1	7 yrs. 250,000	No
2	1806	2018	Glaval Entourage LTV	12/1/2018	1	7 yrs. 250,000	No
3	1807	2018	Glaval Entourage LTV	12/1/2018	1	7 yrs. 250,000	No
4	1803	2018	Gillig CNG Bus	6/5/2018	1	12 yrs. 500,000	No
5	1804	2018	Gillig CNG Bus	6/5/2018	1	12 yrs. 500,000	No
6	2801	2018	Startrans	8/21/2018	1	5 yrs. 100,000	No
7	2802	2018	Startrans	8/29/2018	1	5 yrs. 100,000	No
8	2803	2018	Startrans	8/21/2018	1	5 yrs. 100,000	No
9	2804	2018	Startrans	8/22/2018	1	5 yrs. 100,000	No
10	2805	2018	Startrans	9/10/2018	1	5 yrs. 100,000	No
11	2806	2018	Startrans	8/21/2018	1	5 yrs. 100,000	No
12	2807	2018	Startrans	8/22/2018	1	5 yrs. 100,000	No
13	1701	2017	Glaval Entourage LTV	4/7/2017	2	7 yrs. 250,000	No
14	1702	2017	Glaval Entourage LTV	4/7/2017	2	7 yrs. 250,000	No
15	1611	2016	Ford LTV Defender	6/1/2016	3	7 yrs. 250,000	No
16	1612	2016	Ford LTV Defender	6/1/2016	3	7 yrs. 250,000	No
17	1613	2016	Ford LTV Defender	6/1/2016	3	7 yrs. 250,000	No
18	1502	2015	Champion LTV - CNG	8/19/2015	4	7 yrs. 250,000	No
19	1503	2015	Gillig CNG Bus	6/1/2015	4	12 yrs. 500,000	No

Wave Transit Asset Management Plan

20	1504	2015	Gillig CNG Bus	6/1/2015	4	12 yrs. 500,000	No
21	1505	2015	Gillig CNG Bus	2/2/2016	3	12 yrs. 500,000	No
22	1506	2015	Gillig CNG Bus	2/3/2016	3	12 yrs. 500,000	No
23	1507	2015	Gillig CNG Bus	2/9/2016	3	12 yrs. 500,000	No
24	1508	2015	Gillig CNG Bus	2/3/2016	3	12 yrs. 500,000	No
25	2501	2015	Ford Champion Crusader	3/20/2015	4	5 yrs. 100,000	No
26	2502	2015	Ford Champion Crusader	3/20/2015	4	5 yrs. 100,000	No
27	2503	2015	Ford Champion Crusader	4/21/2015	4	5 yrs. 100,000	No
28	2504	2015	Ford Champion Crusader	3/30/2015	4	5 yrs. 100,000	No
29	2505	2015	Ford Champion Crusader	4/1/2015	4	5 yrs. 100,000	No
30	2506	2015	Ford Champion Crusader	12/18/2015	4	5 yrs. 100,000	No
31	2507	2015	Ford Champion Crusader	12/18/2015	4	5 yrs. 100,000	No
32	3401	2014	GMC 2500	8/1/2014	4	5 yrs. 100,000	Yes
33	3402	2014	GMC 2500	8/1/2014	4	5 yrs. 100,000	Yes
34	3403	2014	GMC 2500	8/1/2014	4	5 yrs. 100,000	Yes
35	3404	2014	GMC 2500	8/1/2014	4	5 yrs. 100,000	Yes
36	2201	2012	Ford Champion Crusader	4/1/2013	6	5 yrs. 100,000	Yes
37	2203	2012	Ford Champion Crusader	4/1/2013	6	5 yrs. 100,000	Yes
38	2206	2012	Ford Champion Crusader	4/1/2013	6	5 yrs. 100,000	Yes
39	2207	2012	Ford Champion Crusader	4/1/2013	6	5 yrs. 100,000	Yes
40	1001	2010	Gillig Hybrid Bus	12/15/2010	9	12 yrs. 500,000	No
41	1002	2010	Gillig Hybrid Bus	12/15/2010	9	12 yrs. 500,000	No
42	907	2009	Goshen Shuttle	1/6/2010	9	7 yrs. 250,000	Yes
43	910	2009	Goshen Shuttle	1/6/2010	9	7 yrs. 250,000	Yes
44	P907	2009	Ford E350 Van	9/1/2009	10	5 yrs. 100,000	Yes
45	702	2007	Gillig Bus	6/14/2007	12	12 yrs. 500,000	No
46	501	2005	Gillig Bus	1/31/2005	14	12 yrs. 500,000	Yes
47	502	2005	Gillig Bus	1/31/2005	14	12 yrs. 500,000	Yes



Wave Transit Asset Management Plan

48	310	2003	Gillig Bus	5/7/2003	15	12 yrs. 500,000	Yes
49	1901	2019	Gillig Bus	7/30/2019	0	12 yrs. 500,000	No
50	1902	2019	Gillig Bus	7/30/2019	0	12 yrs. 500,000	No
51	1903	2019	Gillig Bus	7/30/2019	0	12 yrs. 500,000	No
52	1904	2019	Gillig Bus	7/30/2019	0	12 yrs. 500,000	No
53	1905	2019	Gillig Bus	7/30/2019	0	12 yrs. 500,000	No
54	1906	2019	Gillig Bus	7/30/2019	0	12 yrs. 500,000	No
55	1907	2019	Gillig Bus	7/30/2019	0	12 yrs. 500,000	No
56	1910	2019	Starcraft	11/01/2019	0	7 yrs. 250,000	No
57	1911	2019	Starcraft	11/01/2019	0	7 yrs. 250,000	No
58	1912	2019	Starcraft	11/01/2019	0	7 yrs. 250,000	No
59	1913	2019	Starcraft	11/01/2019	0	7 yrs. 250,000	No
60	1908	2019	Hometown	11/15/2019	0	10 yrs. 350,000	No
61	1909	2019	Hometown	11/15/2019	0	10 yrs. 350,000	No
62	2901	2019	Startrans	04/25/2019	0	5 yrs. 100,000	No
63	2902	2019	Startrans	04/25/2019	0	5 yrs. 100,000	No
64	2903	2019	Startrans	05/05/2019	0	5 yrs. 100,000	No
65	2904	2019	Startrans	05/05/2019	0	5 yrs. 100,000	No
66	2905	2019	Startrans	05/05/2019	0	5 yrs. 100,000	No
67	1802	2008	Goshen	12/10/2015	11	7 yrs. 250,000	Yes

3.2 Equipment

Twelve units owned by Wave Transit meet the following FTA definition of Equipment: “Nonexpendable, tangible property with a useful life of not less than one year...including nonrevenue vehicles and maintenance shop equipment.” All 12 units meet the criteria for an SGR. Because SGR has been determined, a performance measure can be applied. The FTA performance measure for Equipment is the percentage of units that have either met or exceeded their useful life benchmark (ULB). Length of useful life for each unit is determined by an FTA regulation-based Agency depreciation schedule and varies within a range of 4 to 10 years. See Appendix A for the full depreciation schedule. Table 5 details the equipment inventory with the age of the equipment, depreciation category, and indicates whether or not the unit has met or exceeded its useful life benchmark (ULB) as determined by the depreciation schedule. In order to meet or exceed the benchmark a unit

must fulfill the criteria for age or mileage. Currently 42% or 5 of the 12 equipment units meet or exceed their ULB.

Table 6. Equipment ULB

Equipment ID	Year	Description	Inservice Date	Actual Life Years	Dep. Schedule	Meets or Exceeds ULB
51997-4501	2015	2015 GMC SIERRA 2500 CNG	5/15/2015	4	5	No
51997-4502	2015	2015 GMC SIERRA 3500 DIESEL	6/1/2015	4	5	No
51997-4601	2016	2016 Chevy Equinox	11/20/2015	4	5	No
51997-SCISSORLIFT	2014	Genie Scissorlift	12/8/2014	5	7	No
51997-5001	2015	Mohawk In-Ground Lift Parallelogram	6/29/2015	4	7	No
51997-5002	2015	Mohawk In-Ground Lift Multiflex	6/29/2015	4	7	No
51997-5003	2015	Challenger In-Ground Lift	6/29/2015	4	7	No
51997-903	2010	903 FORD ESCAPE HYBRID	8/29/2009	9	5	Yes
51997-904	2010	904 FORD ESCAPE HYBRID	8/29/2009	9	5	Yes
51997-FORKLIFT	2003	2003 HYSTER FORKLIFT	1/1/2003	16	7	Yes
51997-P801	2008	P801 FORD E350 VAN	4/25/2008	11	5	Yes
51997-P903	2009	P903 FORD E350 VAN	9/1/2009	10	5	Yes

3.3 Facilities

Five units owned by Wave Transit meet the FTA criteria for inclusion in the asset category facilities. A facility is defined as a building or structure that is used in the provision of public transportation. The definition of facility is further clarified by the American Public Transportation Association (APTA) as structures that enclose or support maintenance, operations and administrative activities, including those that house specialized equipment that supports the operations and maintenance of the vehicles. All units meet the criteria for a SGR. Because SGR has been determined a performance measure can be applied. The performance measure for this asset class is the percentage of units rated below three on the *Transit Economic Requirements Model* (TERM) scale (1= poor to 5 = excellent). The TERM scale is shown in Table 6 and provides both a qualitative and numeric condition rating. The Facility units and their TERM ratings are shown in Table 7. Currently 0% or no facility units are rated below 3 on the TERM scale.

Table 7. FTA TERM Scale*

Rating	Condition	Description
Excellent	4.8-5.0	No visible defects, near new condition
Good	4.0-4.7	Some slightly defective or deteriorated components
Adequate	3.0-3.9	Moderately defective or deteriorated components
Marginal	2.0-2.9	Defective or deteriorated components in need of replacement
Poor	1.0-1.9	Seriously damaged components in need of immediate repair

* Source: Transit Economic Requirements Model

Table 8. Facility TERM Rating

	Equipment ID	Year Constructed	Equipment description	TERM Rating
1	51997-5000	2015	Ops Center	4.9
2	51997-6000	2011	Forden Station	4.5
3	51997-5008	2015	CNG Compressor Station (Structure)	4.9
4	51997-5011	2015	Vehicle Wash System (Enclosure)	4.8
5	51997-7000	2020	Padgett Station	5.0

4.0 CONDITION ASSESSMENT

The TAMP condition assessment process is comprised of two steps. First, the application of FTA state of good repair (SGR) criteria and second, a performance assessment with differing FTA measures for each asset category. Results of the condition assessment are summarized in Table 9. The application of the FTA criteria for SGR shows that 100% of Wave Transit's 84 capital asset units including rolling stock, equipment, and facilities are in a state of good repair. One hundred percent of all rolling stock is in a SGR. All or 100% of equipment and facility units meet the SGR criteria. The following figures are calculated for capital asset units that are in a SGR. Currently 22% or 15 of the 67 units of rolling sock meet or exceed their ULB. Forty-two percent or 5 of the 12 equipment units meet or exceed their ULB and 0% or 0 facility units are rated below 3 on the TERM scale.

Table 9. FTA Condition Assessment

Assessment Measure	Condition Rating
FTA SGR Criteria	100% of all capital assets are in a SGR
FTA Performance Measure	Rolling Stock 100% of rolling stock is in a SGR
	Equipment 100% of equipment is in a SGR
	Facilities 100% of facilities are in a SGR

4.1 Asset Condition Analysis

In addition to the application of FTA SGR criteria and performance measures as required by the TAMP, this report analyzes the capital asset inventory using methods recommended by the American Public Transportation Association (APTA). The APTA recommended method of inventory assessment was developed by the Chicago Regional Transportation Authority (RTA) and put forth by the APTA in their 2013 *Standards Development Program publication, Capital Asset Inventory and Condition Assessment*. The methodology is provided in Appendix B. This method of assessment prescribes analysis of the capital asset inventory resulting in the following data shown in Table 10: system replacement value, normal reinvestment, asset backlog, and state of good repair need (SGR need).

System replacement value is defined as the cost to replace all assets with new assets. This cost is based on the last actual cost of replacing an asset in that category, when available. For assets where this data is not available, the original purchase price of the asset is used. The normal reinvestment figure is the anticipated cost for asset replacements/investments over a 10 year period. Asset backlog is defined by APTA as the cost to replace all assets that have exceeded their useful life. In this analysis, multiple FTA ULB criteria are used to determine the useful life of an asset. Thus, the backlog will include assets that have exceeded their ULB as well as those that have met their ULB. An SGR need is defined as the sum of the backlog and normal reinvestment quantities, and represents the total projected monetary investment needed for a 10 year period. For the APTA analytics, facility asset data are only used in the calculation of the system replacement value. The decision not to include facility assets in the calculation of SGR need is based on the fact that most Facility assets are relatively new, with many years of useful life remaining, and no backlog. Additionally, they have limited history of expenditure/investment to develop a normal reinvestment estimate, and no replacements are anticipated during the 10 year period.

Table 10. Capital Asset Inventory Analysis

	Applied Analytic	Result
4.1	System Replacement Value Rolling Stock	\$15,052,000 (2020 dollars)
4.2	System Replacement Value Equipment	\$431,600 (2020 dollars)
4.3	Normal Reinvestment (over 10 years)	\$15,483,600 (Annual Normal Reinvestment \$1,556,000)
4.4	Capital Asset Backlog	\$2,760,000 (2020 dollars)
4.5	SGR Need (over 10 years)	\$4,316,000 (estimated)

4.2 System Replacement Value

The system replacement value or cost to replace all capital assets with new assets is estimated at \$42,501,000. This figure is a sum of the current estimated cost (when available), or the original cost for all capital assets including rolling stock, equipment and facilities in 2020 dollars.

4.3 Normal Reinvestment

Normal reinvestment, or anticipated asset replacements/investment cost over a 10 year period is estimated to be \$15,483,600. This figure is a sum of the estimated rolling stock normal reinvestment of \$15,052,000 and the estimated equipment normal reinvestment cost of \$431,600. No normal reinvestment cost has been estimated for facility assets.

4.4 Asset Backlog

The total asset backlog or replacement cost for all capital assets that have met or exceeded their useful life is estimated at \$2,760,000. This figure is a sum of the estimated rolling stock backlog of \$2,556,000 and the estimated equipment backlog of \$204,000. There is no facilities backlog.

4.5 SGR Need

The sum of the total normal reinvestment and capital asset backlog amounts, the SGR need, is estimated at \$4,316,000 for a 10 year period. The annual SGR need is estimated at \$431,600. The SGR need for rolling stock is estimated to be \$255,600. Equipment SGR need is an estimated \$20,400. No SGR need has been calculated for facility assets.

5.0 DECISION SUPPORT TOOLS

Wave Transit primarily utilizes AssetWorks software to aid in the development of capital project prioritization. The information that is collected and organized by the software is then used to guide investment prioritization.

5.1 AssetWorks Software

AssetWorks is Wave Transit's data clearinghouse for all asset management related data. AssetWorks stores all equipment records, including maintenance records, preventive maintenance schedules and records, mileage history, parts usage, and labor and parts allocation to work order. This single source allows a comprehensive history of the maintenance failures and repairs made to each asset, as well as usage and service history. This data is then tracked by asset type in an attempt to see maintenance cost by asset type and age.

Currently, Wave Transit has access to approximately six years of detailed records (this is how long AssetWorks software has been in place). While this provides some useful information, it is not sufficient to predict maintenance costs and needs over the course of a 12 year vehicle life. Over the six years, accuracy has increased as employee training has improved, and the organization has learned how to better utilize the software. As more years of accurate data accumulates, the decision support value of this tool will increase.

6.0 INVESTMENT PRIORITIZATION

It is estimated that 28 vehicles or 41.79% of the Authority's revenue rolling stock will have met or exceed its useful life within the five year forecast of this plan. Paratransit and vanpool vehicles have a useful life of five years or less so all vehicles in these two categories would be eligible for replacement regardless of their current condition. Even new shuttles with two years use would be eligible for replacement and have been prioritized.

Vehicle replacement prioritization is a fluid process as the Authority is regularly replacing rolling stock. At the time of this report, funding for replacement vehicles which meet or exceed their ULB is being identified. Priority is not given to vehicle type and identifying funding for a large bus is significantly more challenging than for other vehicles due to the cost of the vehicles. Replacement asset prioritization is outlined in Table 11. Assets are rated as high priority, medium priority, or low priority. Investment in replacement vehicles has been prioritized to replace assets in chronological order from oldest to newest. Investment priority is directly

Wave Transit Asset Management Plan

related to available funding which is inconsistent. The following lists the investment prioritization for capital assets over the next five years:

Table 11. Capital Asset Investment Prioritization

FIXED ROUTE

Priority	Vehicle	Model Year	Make	Model	VIN	Date in Revenue Service	Date Removed or Planned	Useful Life Years	Actual Life Years	Useful Life Miles	Actual Mileage as of 3/13/2020	Replacement Cost
High	310	2003	Gillig	LF	15GGB201231073147	5/7/2003	5/7/2015	12	17	500,000	579,221	\$ 550,000
High	501	2005	Gillig	LF	15GGB201151074423	1/31/2005	1/31/2017	12	15	500,000	564,298	\$ 550,000
High	502	2005	Gillig	LF	15GGB201351074424	1/31/2005	1/31/2017	12	15	500,000	593,441	\$ 550,000
High	702	2007	Gillig	LF	15GGB271771078162	6/14/2007	6/14/2019	12	13	500,000	468,881	\$ 550,000
High	907	2009	Goshen	LTV	1GBE5V19X9F400535	1/6/2010	1/6/2017	7	10	250,000	298,460	\$ 155,000
High	910	2009	Goshen	LTV	1GBE5V1949F400756	1/6/2010	1/6/2017	7	10	250,000	362,370	\$ 155,000
High	1802	2009	Goshen	LTV	1GBE5V1958F406631	1/7/2016	1/7/19	7	10	250,000	284,176	\$ 155,000
Med	1001	2010	Gillig	LF Hybrid	15GGB301XA1176867	12/15/2010	12/15/2022	12	10	500,000	440,136	\$ 550,000
Med	1002	2010	Gillig	LF Hybrid	15GGB3011A1176868	12/15/2010	12/15/2022	12	10	500,000	289,778	\$ 550,000
Med	1502	2015	Champion	LTV CNG	1FDGF5GY7FEC65706	8/19/2015	8/20/2020	7	5	250,000	84,158	\$ 155,000
Low	1503	2015	Gillig	LF CNG	15GGB2719F1184949	6/1/2015	6/1/2027	12	5	500,000	301,850	\$ 550,000
Low	1504	2015	Gillig		15GGB2715F1184950	6/1/2015	6/1/2027	12	5	500,000	307,809	\$ 550,000
Low	1505	2015	Gillig	LF CNG	15GGB271XG1184945	2/2/2016	2/2/2028	12	4	500,000	278,763	\$ 550,000
Low	1506	2015	Gillig	LF CNG	15GGB2711G1184946	2/3/2016	2/3/2028	12	4	500,000	246,377	\$ 550,000
Low	1507	2015	Gillig		15GGB2713G1184947	2/9/2016	2/9/2028	12	4	500,000	300,389	\$ 550,000
Low	1508	2015	Gillig	LF CNG	15GGB2715G1184948	2/3/2016	2/3/2028	12	4	500,000	197,134	\$ 550,000
Low	1611	2016	Champion	LTV	1FDGF5GT8GEC18997	6/1/2016	6/1/2021	7	3	250,000	244,999	\$ 155,000
Low	1612	2016	Champion	LTV	1FDGF5GT8GEC18996	6/1/2016	6/1/2021	7	3	250,000	124,710	\$ 155,000
Low	1613	2016	Champion	LTV	1FDGF5GT4GEB80683	6/1/2016	6/1/2021	7	3	250,000	153,262	\$ 155,000
Low	1701	2017	Glaval	Entourage	1FDGF5GT4GED42327	4/7/2017	4/7/2022	7	2	250,000	78,444	\$ 155,000
Low	1702	2017	Glaval	Entourage	1FDGF5GT2GED42343	4/7/2017	4/7/2022	7	2	250,000	86,366	\$ 155,000
Low	1803	2018	Gillig	Gillig - CNG	15GGB3115J3191537	6/5/2018	6/5/2030	12	1	500,000	122,111	\$ 500,000
Low	1804	2018	Gillig	Gillig - CNG	15GGB3117J3191538	6/5/2018	6/5/2030	12	1	500,000	85,993	\$ 550,000
Low	1805	2018	Startrans	Entourage	1FDAF5GY6HEE59281	11/1/2018	11/1/2025	5	1	250,000	20,192	\$ 155,000
Low	1806	2018	Startrans	Entourage	1FDAF5GY4HEE66262	11/1/2018	11/1/2025	5	1	250,000	18,399	\$ 155,000
Low	1807	2018	Startrans	Entourage	1FDAF5GYXHEE59283	11/1/2018	11/1/2025	5	1	250,000	17,929	\$ 155,000
Low	1901	2019	Gillig	LF CNG	15GGB3115K3193001	7/25/2018	7/25/2030	12	0	500,000	36,760	\$ 550,000
Low	1902	2019	Gillig	LF CNG	15GGB3117K3193002	7/25/2018	7/25/2030	12	0	500,000	30,246	\$ 550,000
Low	1903	2019	Gillig	LF CNG	15GGB3119K3193003	7/25/2018	7/25/2030	12	0	500,000	38,053	\$ 550,000
Low	1904	2019	Gillig	LF CNG	15GGB3110K3193004	7/25/2018	7/25/2030	12	0	500,000	49,656	\$ 550,000
Low	1905	2019	Gillig	LF CNG	15GGB3112K3193005	9/20/2019	9/20/2031	12	0	500,000	34,455	\$ 550,000
Low	1906	2019	Gillig	LF CNG	15GGB3114K3193006	9/20/2019	9/20/2031	12	0	500,000	33,187	\$ 550,000
Low	1907	2019	Gillig	LF CNG	15GGB3116K3193007	10/7/2019	10/7/2031	12	0	500,000	37,879	\$ 550,000
Low	1910	2019	Startrans	LTV CNG	1FDAF5GY6KEE43878	TBD	TBD	7	0	250,000	185	\$ 155,000
Low	1911	2019	Startrans	LTV CNG	1FDAF5GY6KEE76203	TBD	TBD	7	0	250,000	195	\$ 155,000
Low	1912	2019	Startrans	LTV CNG	1FDAF5GY6KEE76205	TBD	TBD	7	0	250,000	188	\$ 155,000
Low	1913	2019	Startrans	LTV CNG	1FDAF5GY7KEE76209	TBD	TBD	7	0	250,000	199	\$ 155,000
Low	1908	2019	Hometown	Trolley CNG	1D9SC3129KW687087	11/22/2019	11/22/2031	10	0	350,000	7,590	\$ 450,000
Low	1909	2019	Hometown	Trolley CNG	1D9SC3122KW687089	11/22/2019	11/22/2031	10	0	350,000	3,658	\$ 450,000

VANPOOL

Priority	Vehicle	Model Year	Make	Model	VIN	Date in Revenue Service	Date Removed or Planned	Useful Life Years	Actual Life Years	Useful Life Miles	Actual Mileage as of 3/13/2020	Replacement Cost
High	3401	2014	GMC	SAVANA	1GJW7PFA6E1190041	8/1/2014	8/1/2018	4	5	100,000	90,444	\$ 28,000
High	3402	2014	GMC	SAVANA	1GJW7PFA9E1190275	8/1/2014	8/1/2018	4	5	100,000	108,075	\$ 28,000
High	3403	2014	GMC	SAVANA	1GJW7PFAXE1189233	8/1/2014	8/1/2018	4	5	100,000	33,763	\$ 28,000
High	3404	2014	GMC	SAVANA	1GJW7PFA2E1189680	8/1/2014	8/1/2018	4	5	100,000	18,793	\$ 28,000

PARATRANSIT

Priority	Vehicle	Model Year	Make	Model	VIN	Date in Revenue Service	Date Removed or Planned	Useful Life Years	Actual Life Years	Useful Life Miles	Actual Mileage as of 3/13/2020	Replacement Cost
----------	---------	------------	------	-------	-----	-------------------------	-------------------------	-------------------	-------------------	-------------------	--------------------------------	------------------



Wave Transit Asset Management Plan

High	P907	2009	Ford	E350	1FTDS34L96DA40882	9/1/2009	5/1/2015	5	10	100,000		\$ 60,000
High	2201	2013	Champion	Crusader	1FDEE3FL4CDB33945	4/1/2013	4/1/2018	5	6	100,000	169,651	\$ 60,000
High	2203	2013	Champion	Crusader	1FDEE3FL8CDB33964	4/1/2013	4/1/2018	5	6	100,000	152,456	\$ 60,000
High	2206	2013	Champion	Crusader	1FDEE3FL4CDB33976	4/1/2013	4/1/2018	5	6	100,000	158,406	\$ 60,000
High	2207	2013	Champion	Crusader	1FDEE3FL6CDB33977	4/1/2013	4/1/2018	5	6	100,000	149,858	\$ 60,000
Med	2501	2015	Champion	Crusader	1FDEE3FLXFDA17332	3/20/2015	3/20/2020	5	4	100,000	155,421	\$ 60,000
Med	2502	2015	Champion	Crusader	1FDEE3FL1FDA17333	3/20/2015	3/20/2020	5	4	100,000	139,592	\$ 60,000
Med	2503	2015	Champion	Crusader	1FDEE3FL3FDA17334	4/21/2015	4/21/2020	5	4	100,000	169,315	\$ 60,000
Med	2504	2015	Champion	Crusader	1FDEE3FL5FDA17335	3/30/2015	3/30/2020	5	4	100,000	164,762	\$ 60,000
Med	2505	2015	Champion	Crusader	1FDEE3FL5FDA17318	4/1/2015	4/1/2020	5	4	100,000	151,239	\$ 60,000
Med	2506	2016	Champion	Crusader	1FDEE3FLXGDC22439	12/18/2015	12/18/2020	5	3	100,000	134,428	\$ 60,000
Med	2507	2016	Champion	Crusader	1FDEE3FL4GDC11386	12/18/2015	12/18/2020	5	3	100,000	118,427	\$ 60,000
Low	2801	2018	Starcraft	Allstar XL	1FDEE3FS3JOC31241	8/21/2018	8/21/2023	5	1	100,000	38,806	\$ 60,000
Low	2802	2018	Starcraft	Allstar XL	1FDEE3FS3JOC31242	8/29/2018	8/29/2023	5	1	100,000	81,747	\$ 60,000
Low	2803	2018	Starcraft	Allstar XL	1FDEE3FS3JOC31243	8/21/2018	8/21/2023	5	1	100,000	37,484	\$ 60,000
Low	2804	2018	Starcraft	Allstar XL	1FDEE3FS3JOC31244	8/22/2018	8/22/2023	5	1	100,000	37,152	\$ 60,000
Low	2805	2018	Starcraft	Allstar XL	1FDEE3FS3JOC31245	9/10/2018	9/10/2023	5	1	100,000	33,888	\$ 60,000
Low	2806	2018	Starcraft	Allstar XL	1FDEE3FS2JDC31246	8/21/2018	8/21/2023	5	1	100,000	38,784	\$ 60,000
Low	2807	2018	Starcraft	Allstar XL	1FDEE3FS6JDC31234	8/22/2018	8/22/2023	5	1	100,000	37,431	\$ 60,000
Low	2901	2019	Starcraft	Allstar XL	1FDEE3FS1KDC26220	6/10/2019	6/10/2024	5	0	100,000	25,251	\$ 60,000
Low	2902	2019	Starcraft	Allstar XL	1FDEE3FS1KDC26217	6/10/2019	6/10/2024	5	0	100,000	22,942	\$ 60,000
Low	2903	2019	Starcraft	Allstar XL	1FDEE3FS5KDC26218	6/14/2019	6/14/2024	5	0	100,000	17,290	\$ 60,000
Low	2904	2019	Starcraft	Allstar XL	1FDEE3FS3KDC26219	6/14/2019	6/14/2024	5	0	100,000	17,082	\$ 60,000
Low	2905	2019	Starcraft	Allstar XL	1FDEE3FS1KDC26221	6/14/2019	6/14/2024	5	0	100,000	8,807	\$ 60,000

Five Paratransit vehicles are rated as high priority for replacement due to age and current condition. The high priority Paratransit vehicles have a replacement value of \$60,000 in 2020 dollars. Federal funding has been identified for all five replacement Paratransit vehicles from annual §5339 apportionments. Local funding has yet to be identified. Seven Paratransit vehicles with a 2020 value of \$420,000 are rated as medium priority. Twelve Paratransit vehicles with a 2020 value of \$720,000 are rated as low priority for replacement over the five year plan forecast. Seven buses, shuttles and trolleys are rated as high priority for replacement due to age and current condition. The high priority buses, shuttles and trolleys have a replacement value of \$2,665,000. Funding has not been identified for the high priority vehicles. The Authority has identified a possible funding from the North Carolina portion of the Volkswagen settlement. The high priority buses and shuttles are prime candidates for VW funding since they meet the pre 2009 requirement of the funding.

Three buses and shuttles are rated as medium priority for replacement due to age and condition and/or anticipated depreciation over the five year plan forecast. The replacement cost for medium priority buses and shuttles have a value in 2020 of \$2,255,000. No buses and shuttles with a low replacement priority will meet or exceed their useful life over the five year plan forecast. All four vanpool vans are rated as high priority for replacement. A replacement cost of \$56,000 in 2020 dollars will be necessary to replace two of the vehicles to meet current need.

7.0 FLEET REQUIREMENTS

In order to operate an effective transit service, it is imperative that Wave Transit's fleet is not only in a state of good repair, but also that it contains the proper types of vehicles, and the proper number, to operate the required service. This section analyzes fleet needs and presents a plan for vehicle replacement based on these needs.

7.1 Fixed Route Vehicle Needs

Wave Transit operates 25 vehicles in peak service on fixed route. Each route is assigned a type of vehicle, depending on the unique route requirements. These types are heavy heavy duty (HHD) buses, medium duty body on chassis vehicles (LTV), and heavy heavy duty trolley (trolleys) replica buses. Each fixed route is evaluated on an annual basis to determine if the requirements have changed. These requirements, applied in order, are:

- Only cutaway vehicles can service UNCW station due to roadway size limitations
- Three HHD buses are limited to routes on the periphery of the UNCW campus
- The Port City Trolley is a branded route, and must have a replica trolley
- If a route carries more than 18 passengers per hour at peak, it must have a HHD bus due to capacity requirements.
- If a route carries more than 10 passengers per hour on average, it must have a HHD bus for capacity and durability requirements
- If a route carries more than 0.06 passengers in a wheelchair per hour, it must have a low floor bus to minimize route delays due to load time. Based on the fleet characteristics of Wave Transit, this means it must be a HHD bus
- Routes not specified by the above are assigned a cutaway

Based on these requirements, the current route requirements are:

Route	Vehicle Type
101-1	HHD
101-2	HHD
103	HHD
104	HHD
105	HHD
106	HHD
107/301	LTV
108	HHD
201	HHD
202	HHD
203	Trolley
204	LTV
205	HHD
207	HHD
209	HHD
701 Blue	LTV
702 Green	LTV
703 Red	LTV
704 Yellow	HHD
705 Loop Shuttle	LTV
707-1 Red Express	LTV
707-2 Red Express	LTV
711-1 Grey	LTV
711-2 Grey	HHD
712 Teal	LTV

7.2 Fixed Route Vehicle Specifications

To best meet the needs of passengers, three types of fixed route vehicles have been determined to be valuable to the fleet.

7.2.1 Heavy Duty Bus (HHD)

The primary fixed route vehicle is a heavy duty bus. Wave Transit currently operates low-floor Gillig HHD buses. Heavy heavy duty buses are ordered as 35' low floor buses for maximum cost efficiency, and convenience to customers. After extensive investment in Compressed Natural Gas fueling infrastructure, all heavy duty buses are ordered with CNG powered engines. This yields an environmental benefit from reduced emissions and cost savings on fuel. While not all HHD duty buses are CNG, future orders are anticipated to be CNG. Wave Transit anticipates the entire HHD fleet will be CNG powered by 2022.

7.2.2 Medium Duty Body on Chassis Vehicles (LTV)

Routes with less usage or those that are required to operate in more restrictive rights of way, utilize body on chassis shuttle buses. The buses are manufactured on OEM chassis and are not designed to meet the duty cycle of fixed route buses. These vehicles have a shorter useful life and require higher maintenance than HHD buses, though they are less expensive to purchase and operate in the short term. Cutaways are high floor vehicles with wheelchair accessible lifts. Cutaways are equipped with diesel or CNG engines. The raised floor requires the operator to assist wheelchair passengers into the vehicle which significantly increases boarding times. The increased time poses a safety problem by delaying traffic behind buses. It also reduces schedule adherence.

7.2.3 Replica Trolley

Wave Transit operates a single branded free trolley route in the historic commercial business district. Trolleys used on this route are rubber wheeled, replica trolleys with wooden trim and a historic feel. The trolley vehicles are compressed natural gas powered.

7.3 Paratransit Vehicle Needs

Wave Transit currently operates up to 16 paratransit vehicles at peak hours. This number is flexible, based on service demand, and can vary. It is reevaluated annually. Paratransit vehicles are typically powered by gasoline engines.

Paratransit vehicles utilize body on chassis light duty vehicles with a capacity of two wheelchair positions, and up to eight passenger seats. While it may be beneficial to have one or two vehicles with a smaller capacity (such as one wheelchair position and two or three seats), the majority of vehicles need the larger capacity or service would be unnecessarily inefficient. The Authority is working to identify low floor minivan options that are currently available to improve efficiency. While there are currently no minivan options on the North Carolina procurement contract, there are Wave Transit partners with contracts that may be a viable option.

7.4 Vanpool Vehicle Needs

In Wave Transit's vanpool program, the vehicles are owned and maintained by the Authority, while the operation is handled by private individuals or companies. The number of vanpools in operation at any time fluctuates. For its vanpool program, Wave Transit utilizes twelve passenger vans. The vehicles are gasoline powered.

7.5 Non-Revenue Vehicle Needs

Wave Transit utilizes a variety of non-revenue vehicles in support of daily operations and administration. The following list outlines the non-revenue vehicle needs.

- Two service trucks for maintenance of bus stops, facilities, and road call response
- Three administrative vehicles for business travel, road supervision, and accident response
- One administrative vehicle for the 5310 program
- Two retired paratransit vans for fixed route operator relief driver transportation

7.6 Spare Ratio Requirements

Fleet requirements are based on two factors. First, a sliding scale indicating the spare ratio needed for each vehicle category based on fleet age. The scale starts at an 18% spare ratio for an average fleet age of 1 year, and increases by 0.7% spare ratio for each additional year of average fleet age. The progression of spare ratio to fleet age factors in the decreased reliability of older vehicles, which requires more vehicles to maintain reliable operations. The size of the scale is based on data obtained from the Transit Cooperative Research Program Synthesis 109, which analyzed spare ratio needs at transit systems across the country.

Second, fleet requirements are based on the mileage and age each vehicle will be required to operate, versus the mileage put on the vehicle each year. For example, a heavy heavy duty bus is Altoona tested for 12 years or 500,000 miles. If a vehicle is required to last 12 years, it should average 41,700 miles per year of service. Therefore, for every 41,700 miles of scheduled service to be performed each year by a heavy duty bus, one such bus is required. Any fewer vehicles would require the remaining vehicles to operate in revenue service beyond their tested service life.

These two factors are combined, with the vehicle requirements determined to be the higher number for each vehicle category, either based on the average age dictated spare ratio, or on the number of vehicles needed to maximize life and utilization of the vehicle category.

The charts and calculations used by the Authority are included in Appendix C. The results are as follows:

	Max in Service	Vehicles Needed	Spare Ratio
Trolley	1	2	100%
Heavy Duty Bus	14	22	57%
Cutaway	10	13	30%
Paratransit	17	20	25%
Vanpool	2	3	50%

7.7 Current Fleet Analysis and Plan

Wave Transit currently owns more revenue vehicles than this plan identifies. Current need, compared to actual ownership, is shown in the chart below:

	Vehicles Needed	Vehicles Owned
Trolley	2	2
Heavy Duty Bus	22	21
Cutaway	13	15
Paratransit	17	24
Vanpool	3	4

As demonstrated in the table above, Wave Transit is in need of one additional heavy heavy duty bus, and can reduce the fleet by two cutaways, and one vanpool van.

While the Paratransit fleet is overcapitalized, the transition to managed care could significantly impact the need for Paratransit service and vehicles. As vehicles approach their useful life, attrition measures will be implemented to adjust the Paratransit fleet.

The expansion of the heavy heavy duty bus fleet is in part due to routes that were once considered cutaway vehicle routes growing in ridership, and now being operated by heavy heavy duty buses, primarily on routes serving UNCW. At this time, because of the age of the fleet and the need for an additional heavy heavy duty bus, we do not anticipate eliminating the two additional cutaways.

The Paratransit division is undergoing potentially significant changes due to changes at the state level with the Non-Emergency Medicaid Transportation program. The Authority has been unable to determine if these changes will decrease, increase, or leave unchanged the ridership demand felt by the division. Due to the possibility that ridership will be increased, potentially significantly, Wave Transit is going to hold any fleet reduction until the changes at the state level are implemented and evaluated. If the current fleet needs evaluation is still accurate, four Paratransit vehicles will be retired without being replaced. If the current fleet needs evaluation is no longer deemed accurate, it will be updated, and action will be taken based on the update.

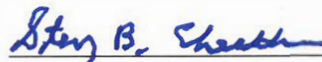
The vanpool program currently has more vanpools than necessary. However, the number of vanpools in service at any given time can vary based on current contracts. We do not anticipate reducing this fleet at this time. Rather, efforts are moving towards securing additional contracts to expand the program.

ADOPTION

8.0

The Cape Fear Public Transportation hereby adopts the revised *CFPTA Asset Management Plan* on this the 28 day of January 2021.





Sterling Cheatham
Chairman

Attest



Megan Matheny
Secretary

APPENDIX A

Depreciation Schedule

Depreciation is calculated by the straight-line method over an estimated useful life. The estimation of useful life is determined by the FTA for each type of asset. Effective July 1, 2013 with the adoption of the following depreciation schedule on June 26, 2014 Wave Transit will depreciate capital assets based on the following schedule:

1. Large (35'-40'), heavy heavy duty buses - 12 yrs. or 500,000 miles
2. Medium (30'), heavy duty buses - 10 yrs. or 350,000 miles
3. Medium (30'), medium duty buses - 7 yrs. or 200,000 miles
4. Medium (25'-35'), light duty buses - 5 yrs. or 150, 000 miles
5. Small (16'-28'), light duty buses - 4 yrs. or 100,000
6. Other vehicles - 4 yrs. or 100,000
7. Furniture, fixtures, machinery and equipment - 3, 5, 7 or 10 yrs.

APPENDIX B

Inventory Assessment Methodology

Excerpted from the APTA Standards Development Program Recommended Practice, Capital Asset Inventory and Condition Assessment

© 2013 American Public Transportation Association

Inventory Assessment Methodology

(Developed by Chicago Regional Transportation Authority [RTA])

The following recommended steps are herewith offered in order to follow a relatively easy, seamless, affordable and understandable procedure in developing an asset inventory and asset condition assessment.

1. Based on the agreed upon condition assessment strategy and agency may assemble an inventory assessment team composed of in-house asset stewards and contracted asset type experts to form a project team to collect and assemble the data into the inventory/assessment (I/A). The in house staff may be asked to work part time on the I/A or to take it on as a temporary full time project.
2. Review sample inventory / assessments within this report, and select one or more to use as a guide for your I/A. Guidance and templates for this process will be forthcoming.
3. Define, tally, categorize and construct a living listing of every asset type, to form the basis of your agencies I/A. This is meant to be a large exhaustive list of every asset type within the agencies properties. For example a large transit system may include as many as 100 asset types broken into as many as 10 categories. These may include facilities, structures, rolling stock, track, yards etc. When assembling an inventory for the first time, asset data will most likely need to be obtained from a variety of sources. Potential asset data sources include:
 - Prior I/A efforts
 - Maintenance Management Systems (MMS, e.g., Maximo, Ellipse etc...)
 - Fleet roster (for vehicles)
 - Department level / asset manager records: which may exist in spreadsheet format
 - Fixed Asset Ledger (accounting system): Generally not a preferred source for larger assets but useful for small value items such as radios, shelters, and non-revenue vehicles
 - Primary data collection
4. Create a recording template for each asset type (using the guide documents noted above). The templates should be designed to provide enough data to document each asset's type, date built or acquired (to assess age), quantity, unit cost and condition.
5. Determine estimated useful life for each asset. These may be copied from the provided guide document samples or determined by the I/A team.
6. Establish age for each asset. Should the actual purchase or installation date be unavailable, proxies (estimates) must be used to determine these quantities.
7. The ratio of age to useful life can be used to group assets into age quintiles and these quintiles can then be used as simple measures of asset condition as follows:
 - 5 = 25% of useful life consumed
 - 4 = 26% to 50% of useful life consumed
 - 3 = 51% to 75% of useful life consumed
 - 2 = 76% to 100% of useful life consumed

- 1 => 100% of useful life consumed
8. Populate the asset type templates with available data. Proxies (educated estimates) must be used for any unavailable data in order for the I/A to be as complete as possible.
 9. Perform an inspection of a sampling segment of each asset type in order to verify the consistency of the calculated conditions above with the observed conditions. This activity may necessitate changes to some of the condition ratings of the I/A.
 10. Determine replacement costs (Cost to replace with new asset) for each asset. Knowledge of the original cost is helpful in this task. If unavailable; a proxy must be used to estimate such. This quantity represents the System Replacement Value. How do we handle betterment of an asset? Technology etc.
 11. Calculate the replacement cost for all assets that exceed their useful life (i.e., rated 1 using the condition measure suggested above). This quantity represents the Backlog.
 12. Determine the time period for the asset condition assessment. For consistency it is recommended that a 10 year period be utilized by all agencies. Create a 10 year matrix using Excel or other to record the following.
 13. Determine any anticipated asset replacements (example bus fleet replacements) and any anticipated large capital investments (example locomotive half life overhaul) over the 10 year period. This quantity represents the Normal Reinvestment. Plot these on the 10 year matrix.
 14. Add the quantities Backlog and Normal Reinvestment. This quantity represents the SGR Need for the ten year period.
 15. In order to visualize the size of the SGR Need, it is helpful to compare it to the System Replacement Value. This can be done by simply dividing the SGR need for the ten year period by 10 to get an Annual average SGR need. This quantity can be compared to the agency's System Replacement Value. For example, one large older agency's SGR need for the ten year period is \$26.4B. This amounts to an annual average SGR need of \$2.6B. Its System Replacement Value is \$140B. By dividing the \$2.6B by \$140B we can see that the annual average SGR need for this agency amounts to 1.8% of its System Replacement Value.

In order for different agencies' quantities to be comparable, a level of consistency is important. As mentioned in item 12, it is recommended that all agencies utilize a consistent 10 year I/A period. In that same spirit, it is also recommended that the quantities used throughout the assessment period remain in starting dollar quantities, without addition of yearly inflationary adjustments. These costing upgrades may be added separately to individual reports. It is further recommended that a consistent 20% to 30% be added to all quantities to account for soft costs, including force account and contingencies. It is recommended that after performing a Capital Asset Inventory and Condition Assessment, that it be upgraded every year for five years in order to maximize its accuracy. A following computerized, continual, living, work authorization SGR tracking system by in house maintenance specialists for the purpose of keeping the State of Good Repair accurately definable over time, by in house forces is an excellent goal.

APPENDIX C

Spare Ratio Calculations

Avg. Fleet Age	Spare Ratio %	Vehicles in Max Service:															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	18.0%	2	3	4	5	6	8	9	10	11	12	13	15	16	17	18	19
2	18.7%	2	3	4	5	6	8	9	10	11	12	14	15	16	17	18	19
3	19.4%	2	3	4	5	6	8	9	10	11	12	14	15	16	17	18	20
4	20.1%	2	3	4	5	7	8	9	10	11	13	14	15	16	17	19	20
5	20.8%	2	3	4	5	7	8	9	10	11	13	14	15	16	17	19	20
6	21.5%	2	3	4	5	7	8	9	10	11	13	14	15	16	18	19	20
7	22.2%	2	3	4	5	7	8	9	10	11	13	14	15	16	18	19	20
8	22.9%	2	3	4	5	7	8	9	10	12	13	14	15	16	18	19	20
9	23.6%	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
10	24.3%	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
11	25.0%	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20
12	25.7%	2	3	4	6	7	8	9	11	12	13	14	16	17	18	19	21
13	26.4%	2	3	4	6	7	8	9	11	12	13	14	16	17	18	19	21
14	27.1%	2	3	4	6	7	8	9	11	12	13	14	16	17	18	20	21
15	27.8%	2	3	4	6	7	8	9	11	12	13	15	16	17	18	20	21
16	28.5%	2	3	4	6	7	8	9	11	12	13	15	16	17	18	20	21
17	29.2%	2	3	4	6	7	8	10	11	12	13	15	16	17	19	20	21
18	29.9%	2	3	4	6	7	8	10	11	12	13	15	16	17	19	20	21
19	30.6%	2	3	4	6	7	8	10	11	12	14	15	16	17	19	20	21
20	31.3%	2	3	4	6	7	8	10	11	12	14	15	16	18	19	20	22

Spare vehicle assessment need based on age

	Avg. Fleet Age	Max in Service	Vehicles Needed
Gillig	5	15	19
LTV	4	10	13
Trolley	1	1	2
Paratransit	4	16	20
Vanpool	6	1	2

Spare vehicle assessment need based on mileage

	Useful Miles	Annual Miles	Vehicles Needed
Gillig	500,000	902,078	22
LTV	150,000	320,345	15
Trolley	250,000	40,492	2
Paratransit	100,000	86,503	19
Vanpool	100,000	55,764	2