



TRANSIT ASSET MANAGEMENT PLAN



**Federal Transit
Administration**

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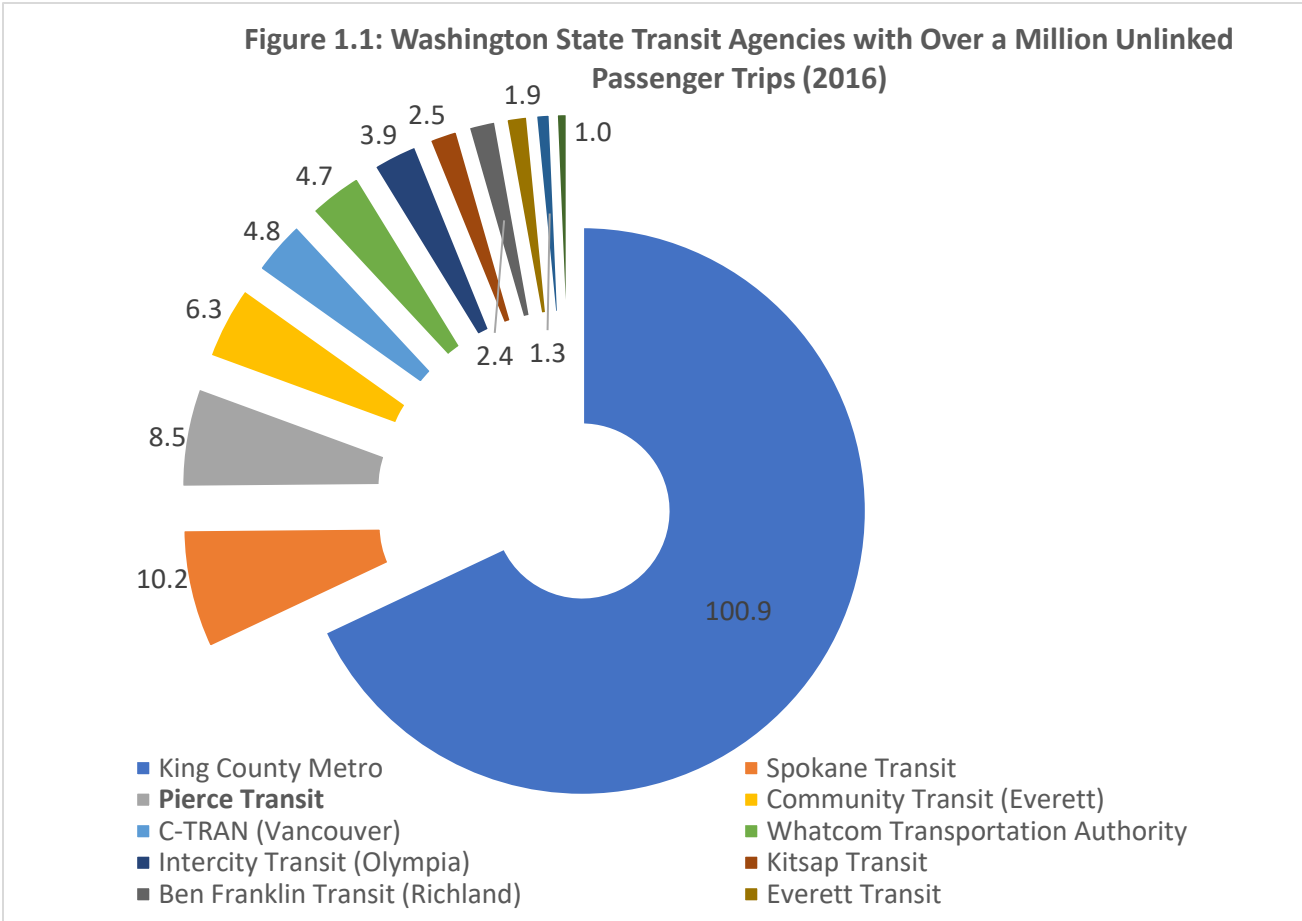
Section 1 – Introduction, Purpose, Goals and Objectives, Asset Management Vision

1.1 Introduction from the Accountable Executive - Sue Dreier, Chief Executive Officer

As the agency's Chief Executive Officer and Accountable Executive for Transit Asset Management, I am pleased to present our inaugural Transit Asset Management Plan or "TAMP" for adoption in September 2018. Since the Final Rule took effect on October 1, 2016, staff has been coordinating on its format, collecting and evaluating data on our five asset categories (i.e., headquarters facilities, passenger facilities, equipment, revenue vehicles, and non-revenue or service and support vehicles) and making recommendations for both fiscal and environmental sustainability – while still focusing on growth - through 2021 and beyond. It is stated in the guidance that, "Agencies that have collected and maintained detailed inventories of their transit assets have benefited from a clearer understanding of their long-term capital reinvestment needs." We therefore are seeking to understand what we don't know about our various asset categories. We also are determined to further improve on data gathering and analytics, then using those tools to make objective decisions on purchasing new, refurbishing or replacing our largest capital assets. This will allow us to prioritize investments based on risks to our organizational objectives, regardless of the funding source.

Pierce Transit is a Tier I provider – Even though we don't operate any rail, we still meet the following criteria: ≥ 101 vehicles across all fixed route modes; ≥ 101 vehicles in one non-fixed route mode. As such, the FTA requires us to develop our own TAMP.

As of 2017, Pierce Transit was the third largest transit agency in Washington with 8.58 million Unlinked Passenger Trips. The 12 largest transit agencies in the state, based on fixed route motorbus ridership, are depicted in **Figure 1.1**.



Source: National Transit Database (2016 dataset)

The TAMP will serve to recognize Pierce Transit employees as assets too. As many employees retire or leave the agency over the next several years, we want to assure that Pierce Transit has a reputation in the job market as a great place to begin or continue a rewarding career in public transportation.

The plan will also forecast the condition of assets and funding needs over the upcoming ten-year TAMP horizon period (2019-2028).

1.2 TAMP’s Purpose: Defining Our State of Good Repair

No other task under Pierce Transit’s TAMP is paramount to identifying the agency’s State of Good Repair (SGR) targets. One analogy says that Transit Asset Management is the “path” and State of Good Repair is the “direction.” In fact, setting SGR Performance Measures and Targets was the TAMP’s first deliverable, as adopted on January 31, 2017, and shown in Section 4. Part of this exercise was aligning the Useful Life Benchmark (ULB) for the vehicles we operate; both in revenue service and support or non-revenue. Defined as, “The acceptable period of use in

service for a particular Transit Provider’s operating environment,” our ULBs demonstrate that by operating mostly alternative fuel vehicles in a temperate marine climate (i.e., cool, wet, winters and mild but relatively dry summers), coupled with tightly constrained funding for replacement vehicles, the agency is able to keep its fixed route bus fleet in operation somewhat longer than the FTA recommends.

1.3 Goals and Objectives

The TAMP will serve as a guiding document as it determines what assets we own, what condition they are in, what assets are needed in the future, and what level of funding is required to meet our vehicle replacement schedules and plans for continued restoration of service hours or new service types. Ultimately, the objective is steady but sustainable growth in fixed route bus and Vanpool (commute trip reduction) program ridership.

1.4 Policies and Strategies for an Effective TAMP

For Pierce Transit, this is an action plan for following up on the TAMP’s outcomes and recommendations, including executive-level directions to set or support the goals, including:

- Lifecycle costs and replacement optimization recommendations
- Post-implementation assessments
- Ongoing monitoring of asset conditions
- Concepts for continuous improvement (i.e., “lessons learned” as the TAMP was being developed)
- A process that is repeatable after the plan is finalized and internally accepted or adopted on October 1, 2018

1.5 Asset Management Vision Themes:

- **Safety** – First and foremost in everything we do.
- **Reliability** – Is perhaps the most important element of successful and heavily utilized mass transit systems worldwide. This is based on technology that is always up to date, plus equipment and facilities that fully function as intended.
- **Restoration** – Of passenger-facing facilities, ideally to enhance our image and increase ridership.
- **Growth** – Continuously adapting to emerging markets and adopting innovative practices or technological advances that are designed for efficiency or expansion.
- **Optimization of Resources** – Earning the public’s trust by always being fiscally responsible.
- **Sustainability** – Doing as much as we can to protect the natural environment through our transit services and internal practices. Also assuring that the agency is protected against further fluctuations in the local and national economies. Known as *The Triple*

Bottom Line or *3B* that measures social, environmental (ecological), and fiscal (economic) impacts.

- ***Minimizing or Mitigating Risk*** - Minimizing is defined as, “An active treatment strategy targeted at reducing the likelihood of experiencing a threat.” Mitigating is defined as, “An active treatment strategy targeted at reducing the consequences of a threat.”

The agency’s Asset Management Vision will be further developed in Section 3.

Section 2 - A Brief History of the Agency: 1979-2018

In May 1978, Pierce County elected officials called for a Public Transportation Improvement Conference to consider forming an enlarged public transportation district in Pierce County. One year later, a public forum was held for community leaders where an overwhelming majority agreed that improved and expanded public transportation was needed. A Public Transportation Improvement Conference (still referred to as the *PTIC*) was then held where a resolution was passed defining boundaries for a new public transportation district. In the late summer of 1979, Tacoma Transit staff and a team of consultants prepared a draft transportation plan. The plan included a system of timed transfer centers for fixed route bus service, SHUTTLE (paratransit) van service, ridesharing, and connections to both Olympia and Seattle. Two series of public workshops were then held where support was favorable for a new district, sales tax funding, and a public transportation plan. In a November 1979 election, 61 percent of Pierce County voters approved a 3/10ths of one cent (0.3 percent) sales tax to fund operation of a new Pierce County Public Transportation Benefit Area or “PTBA,” soon to be known as Pierce Transit. Areas comprising the new public transportation district included Bonney Lake, Buckley, DuPont, Fife, Fircrest, Milton, Orting, Parkland, Puyallup, Ruston, South Hill, Spanaway, Steilacoom, Sumner, and Tacoma.

By the end of 1980, the agency was operating 12 new bus routes linking Downtown Tacoma to points west (University Place), southwest (Puyallup), and southeast (Joint Base Lewis-McChord), along with complementary SHUTTLE paratransit services. Five more routes were added the following year. By January 1982, Pierce County had 39 bus routes in operation within its 275-square mile service area. That same year a grant from the Environmental Protection Agency was used to develop and operate a commuter rideshare program using carpool and vanpool vehicles. The Rideshare program also began promoting the concept using monthly passes to major employers throughout Pierce County. By the summer of 1985 the agency was able to pay off its contract with City of Tacoma for the purchase of Tacoma Transit. Using a combination of bond and tax revenues, Pierce Transit paid just over \$3 million for the transit operation when it was initially purchased from the City six years prior. The agency was originally located on a 5.6-acre parcel at 1235 S. Sprague Street in Tacoma from 1980-1987.

The 1990s saw continuous growth in ridership due to innovative marketing and partnering practices. Another factor was the development of transit centers or Park-and-Ride lots to encourage system utilization, such as on Commerce Street in downtown Tacoma, the Tacoma Dome Station, and Lakewood Mall.

The nationwide economic recession that began in December 2007 hit Pierce Transit equally hard. In balancing shrinking revenues with expanding demand, preserving the agency’s vital services to the community has always been its top priority. From 2008-2012, nearly \$111 million was cut, including a 43 percent reduction in bus service, elimination of special event

services, sale of land and assets, and a 19 percent reduction in staffing, including 31 percent in management positions.

To make a bad financial situation even worse, the agency later suffered two consecutive defeats at the ballot box in February 2011 and again in November 2012. The loss of the first Proposition 1 created a reduction plan focused on ridership and efficiency that reduced service 35 percent by October 2011. A Public Transportation Improvement Conference convened early in 2012. As a result, Pierce Transit's service and taxing area boundaries were reduced, including removing five jurisdictions from the PTBA, which took effect in May 2012. The cities of Bonney Lake, Buckley, DuPont, Orting, and Sumner, as well as portions of unincorporated Pierce County opted out of the service area. The approved delineation and the new composition of the Board of Commissioners became effective May 8, 2012. Taxing authority in the areas that were removed ended October 1, 2012. The financial impact was projected to be a loss of \$8 million annually in sales tax collections. That November, the second Proposition 1 also failed which, had it passed, would have resulted in eventually restoring much of the services lost since the recession.

Since 2013, the agency is steadily rebounding as the local economy continues to improve. In fact, sales tax revenues have exceeded expenditures for four straight years and the agency is growing again. In 2016, Pierce Transit's new CEO, Sue Dreier, began a campaign to "renew and refresh" the system plus "restore" service hours lost during the recession, to attract new or former customers. With gasoline prices at an all-time low, local fixed route transit systems nationwide witnessed a decrease in ridership in 2015 and again in 2016. Part of Pierce Transit's marketing campaign involves reinvesting \$15 million of capital reserves toward renewing existing properties by making necessary repairs, improving security, replacing landscaping, and upgrading lighting. It also plans to spend \$6 million restoring its six transit centers and 700 shelters. Examples include replacing broken glass panels with vandal-proof glass, fixing rooves, resurfacing bus zones and parking lots, and updating the bus stop flags at all 2,500 locations.

The agency restored 59,000 annual fixed route service hours for a total of 523,000 by the end of 2017 at a cost of \$15.5 million. Pierce Transit is expecting a growth in ridership based on latent demand, especially during nights and weekends. Customer satisfaction survey data consistently reveal that nothing is more important than more frequent and reliable service (i.e., reduced headways), extended hours (i.e., a greater service span, including early mornings and late nights), better connections, and adding back more weekend service.

To most effectively restore service hours, the Service Planning & Scheduling team recognized that Pierce Transit is in a time of transition from a route system designed four decades ago to one that better meets the traveling needs of the South Sound region today and into the future. The original route structure was designed for timed transfers, but service reductions to span and frequency no longer support that type of system. In order to restructure the system to meet the needs of current and potential riders, the agency conducted a comprehensive and

system-wide analysis of its existing fixed route bus service to help form recommendations for improvements and efficiencies. Since public input was such an important part of the process, Pierce Transit sought citizens' input into changes it might make and how the agency should prioritize service enhancements. The result was a complete restructuring where 30 of 36 routes were either expanded (i.e., more frequent or early morning/late evening service added), realigned or diverted, and even consolidated or eliminated entirely. The new fixed route system went into effect with the March 12, 2017 service change and will be continuously monitored for efficiencies and performance.

Pierce Transit as it is known today is a Public Transportation Benefit Area Corporation, incorporated under authority of Chapter 36.75A of the Revised Code of Washington State. Serving Washington's second largest county, Pierce Transit provides four types of service: fixed route, specialized transportation (SHUTTLE) services for the disabled, Vanpool ridesharing transportation services for long distance commuters, and seasonal trolley services. Today the agency's service area covers 292 square miles of Pierce County containing roughly 70 percent of the total county's population, estimated at 844,490 in 2016.

Headquarters Facilities: The Move from Tacoma to Lakewood, Washington

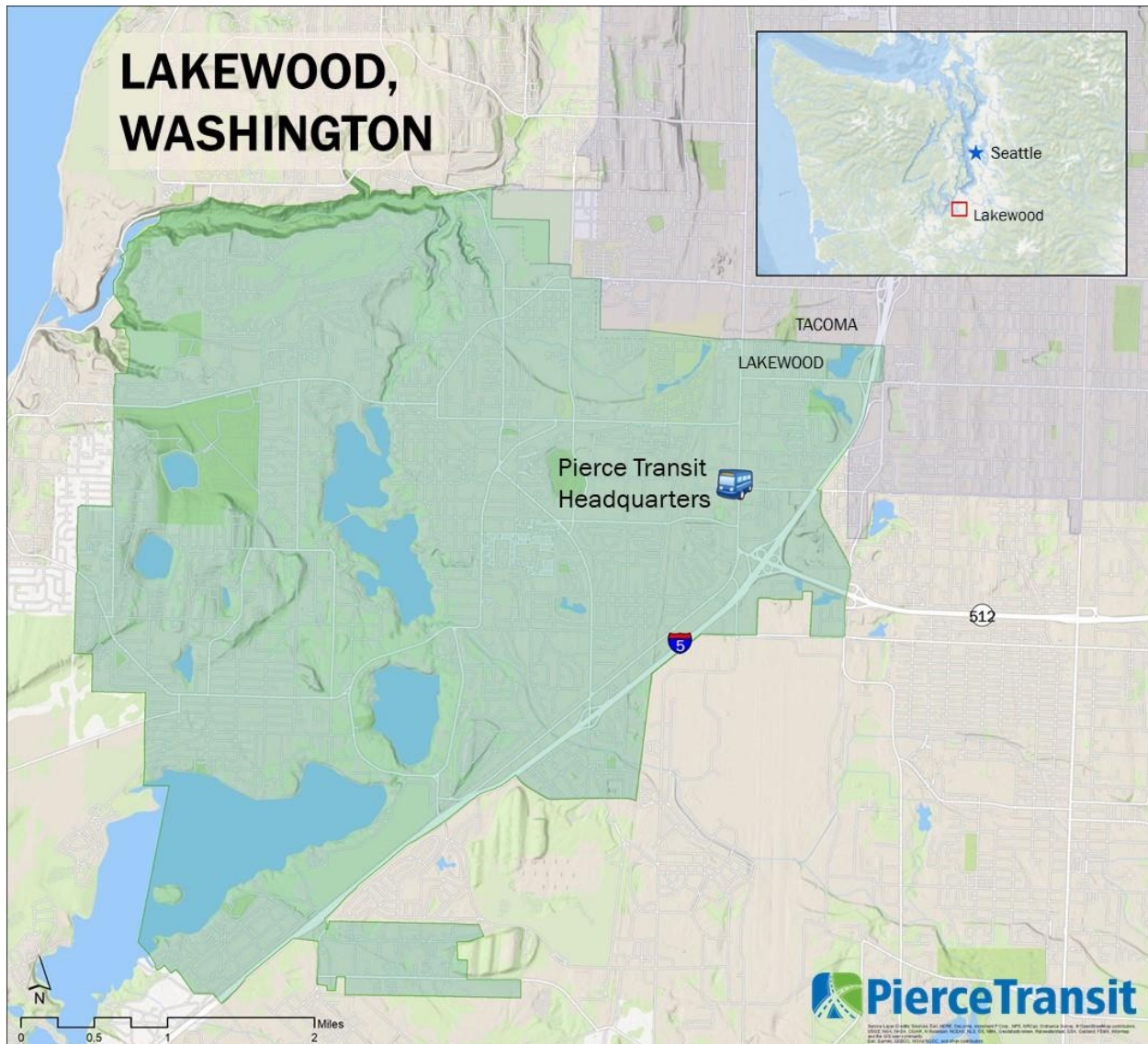
From 1980 through 1987, Pierce Transit was located at 1235 S. Sprague Street on a 5.6-acre parcel in Tacoma.

In 1983, the agency began evaluating two potential sites for a new and much larger maintenance and operating base. Three years later, a groundbreaking ceremony took place on the 19.3-acre property at the southwest corner of South Tacoma Way and 96th Street SW in Lakewood, formerly owned by United Auto Wrecking. The Tacoma location was sold on October 28, 1987, for \$1.5 million. The entire agency and vehicle fleet moved into its new – and current – location on December 7, 1987.

In 2001, a 11.5-acre site located immediately south of and across 96th Street SW from the existing Pierce Transit headquarters was purchased and used primarily for staff parking. Four years later, a two-story training center building was constructed. Originally owned by the City of Tacoma, this vacant site was once part of a gravel mining operation which closed in 1968.

Pierce Transit owns additional property located to the west of the Main Base. This is referred to as "West Base" and is currently used for storage and radio equipment repair and installation. It provides potential expansion capabilities for future agency growth.

Today approximately five acres of the 11.5-acre South Base site (southwest of the Administration Building) are developed. It currently functions as an employee and fleet parking area and includes a 26,500 square-foot Training & Administration Building (No. 5), constructed in 2005. The southern, undeveloped portion of the site is planned for a future parking expansion.



The Transition to Compressed Natural Gas Vehicles

Pierce Transit has always prided itself on its commitment to protecting the environment. By the end of 1986, that commitment was put into practice when the agency partnered with Washington Natural Gas and the Washington State Department of Energy to convert two 1974 GMC coaches to run on a combination of diesel fuel and Compressed Natural Gas (CNG). Five years later, Pierce Transit took delivery of its initial 15 natural gas-powered coaches built by Orion. In May 1999 the Department of Energy awarded Pierce Transit a Clean Cities National Partner Award at its Fifth National Clean Cities Conference and Exposition in Louisville, Kentucky, stating, “As one of the country’s first public transportation fleets to convert to alternative fuels, Pierce Transit is an alternative fuels pioneer.” At the time, more than half of

Pierce Transit's 207 buses were powered by nonpolluting compressed natural gas with a goal of powering its entire bus fleet with alternative fuels within five years.

In 1992, the agency added two fast-fill compressor stations on site, capable of refueling three CNG buses simultaneously in less than 10 minutes at a cost of \$880,000. A third fast-fill compressor station was added in 2000 on the northeast side of the bus lot at a cost of \$850,000.

In 2013, the clean fuel pioneering agency finalized a contract with the local utility, Puget Sound Energy¹, to buy an even better fuel: Renewable Compressed Natural Gas (R-CNG). This fuel is produced from biogases emitted by decomposing wastes at a 920-acre landfill in King County. This R-CNG is cleaner than CNG; it generates virtually no soot emissions and decreases carbon on a lifecycle basis by almost 90 percent (compared to 23 percent for fossil natural gas). Pierce Transit initially converted 143 of its 155 buses to R-CNG.

Having buses powered by CNG and an existing CNG fueling station, the switch to R-CNG was simple and cost little – other than having to arrange a long-term fuel purchase agreement with Puget Sound Energy. At the time of the transition, Pierce Transit received a rebate of approximately \$1,000 per month from the EPA, making the switch from CNG to R-CNG both environmentally and financially attractive.

Near Zero Emission Natural Gas Engines

Another technological breakthrough that Pierce Transit is embracing is Near Zero Emission natural gas engines. First introduced in 2016, ISL G NZ engines (manufactured by Cummins Westport) are the first MidRange engines in North America to receive emissions certifications from the U.S Environmental Protection Agency (EPA) and the Air Resources Board (ARB) in California for meeting the optional Near Zero Nitrogen Oxide (NOx) Emissions standard. NOx often appears as a brownish gas. It is a strong oxidizing agent and plays a major role in the atmospheric reactions with volatile organic compounds (VOC) that produce ozone (smog). These engines also meet the EPA's 2017 Greenhouse Gas (GHG) Emission requirement, based on a 9 percent Greenhouse Gas (GHG) reduction from the standard ISL G natural gas-powered engines first introduced in 2007.

In May 2017, the Board of Commissioners approved the replacement of 23 diesel-powered Gillig vehicles from 1999, with an average of 770,000 odometer miles, with 2018 model year coaches equipped with the new ISL G Near Zero Emission engines. The average price per new vehicle was \$643,220.

¹ Western Washington's largest energy service provider with 1.1 million electric and 790,000 natural gas customers in 10 counties (2018 data).

Battery-Electric Zero Emissions Buses Introduced

The agency continues to evaluate new transit vehicle technologies and alternative fuels as they are introduced. In 2016, Pierce Transit applied for FTA Section 5339(c) funding under the new *Low or No Emission Competitive Program*. It provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities. The agency received \$2,550,788 in grant monies with a match requirement of \$905,972. This purchased three *Proterra Catalyst E2* (which stands for “Efficient Energy”) 40-foot vehicles, at a cost of \$1.045 million each, for delivery in 2018. The new all-electric bus has a 440 to 600 kWh storage capacity, which helps it achieve a nominal range of up to 194 to 350 miles. Proterra says that the Catalyst E2, with its nominal range, has the capacity to travel the mileage of most U.S. mass transit routes on a single charge. In addition, battery charging infrastructure is required and the agency has purchased and installed three plug-in depot chargers at \$49,000 each plus installation. Three hours provides a full charge, allowing the vehicle to run for 350 miles under ideal conditions.

The manufacturer states that battery electric transit vehicles are not only clean and quiet but more economical to operate and maintain than conventional transit vehicles, including diesel-electric hybrids and even CNG powered vehicles; estimated from \$194,000-\$237,000 in savings over the life of the vehicle. Their sales collateral show this is due to battery electric vehicles having 30 percent fewer parts, plus not requiring oil changes, among other advantages.



Section 3 – TAMP Implementation Strategy and Asset Management Vision

3.1 Identifying our Implementation Strategy and Asset Management Vision

Pierce Transit’s Implementation Strategy includes understanding the current maturity of our assets and key information gaps. Then reviewing requirements and preparing a plan to address them. As such, Pierce Transit is using various methods or programs to gather and analyze data regarding its three asset categories (i.e., Facilities, Equipment, and Rolling Stock) as described in this section. The desired outcome is an objective but realistic assessment of both current conditions and future requirements, based on planned incremental growth in fixed route transit and Vanpool (ridesharing) services. This section will serve to highlight Pierce Transit’s transit asset management accomplishments in 2017 and 2018 along with planned progress towards its goals and objectives from 2019 thru 2021.

3.2 Facilities Condition Assessment

An integral part of the agency’s Transit Asset Management Plan (TAMP) was to conduct a facilities condition assessment, which is an objective rating (e.g., good/fair/poor or a percentage of residual or remaining useful life) of the condition of structural assets in the inventory. In 2017 Pierce Transit used an outside consulting firm specializing in commercial and industrial facilities to visually assess (inspect) both headquarters and customer-facing assets, document the conditions, and assess the remaining lifecycle of major asset systems. The project’s objective was to comprehensively report the overall condition (using a single numeric value where 5 = Excellent, 4 = Good, 3 = Adequate, 2 = Marginal, and 1 = Poor) of administrative, maintenance, and passenger facilities to the National Transit Database (NTD) in accordance with federal requirements. Under the scope of work the consultant assessed the condition of major facility components, then aggregated the component level data to obtain the overall condition rating. The work was completed in January 2018 using the methodology for defining, gathering, and reporting information outlined in Federal Transit Authority (FTA) Facility Condition Assessment Guidebook, to fulfill the data requirements outlined in Title 49 §5335 of the US Code National Transit Database.

Using the approach involves five steps:

1. Define the Facility Components
2. Establish Condition Assessment Language
3. Conduct the Assessment
4. Calculate the Overall Condition
5. Document and Report

The work included all on-base facilities at the Lakewood headquarters, plus all transit centers and park and-ride lots, for a total of 6 vertical structures and 13 passenger-facing facilities. This

information was then be added to the FTA’s Transit Economic Requirements Model (TERM) Lite database and was planned for an update the VFA.facility database, as explained in Section 3.4. Beginning in 2018, the various facilities and equipment conditions were reported in the NTD, even though this is the final optional reporting year for transit agencies nationwide. The complete report plus related appendices are included under **Appendix A**.

3.3 Transit Economic Requirements Model (TERM) Lite

The FTA’s TERM Lite is an analysis tool that gathers transit agency inventories of equipment, rolling stock, and non-revenue (service and support) vehicles to generate 20- to 30-year projections of capital reinvestment needs and priorities, the State of Good Repair backlog, plus current and future asset conditions. TERM Lite provides a “telescope view” or “big picture “that can inform short-term decision making, although not intended for detailed asset management (i.e., it is not designed to replace the agency’s Trapeze Enterprise Asset Management System).

TERM Lite was developed to answer the question, “Where do we want to be in 20 years?” That answer depends on three primary factors. While these are open ended questions (shown in the bullets below), the database allows them to be modeled, which translates into relational tables that simulate a 20-year planning horizon scenario. Once the current assets inventory, spending constraints, prioritization criteria, and a few other economic assumptions are provided, TERM Lite simulates 30 years of age, wear and tear, rehabilitation, maintenance, and replacement of the agency’s assets. The output is both an Asset Conditions forecast and a State of Good Repair Needs forecast (i.e., funding requirements).

- What does our inventory look like today?
- How much can we spend each year?
- What is (are) the most important agency goal(s)?
 - Safety?
 - System reliability?
 - The customer experience?
 - Asset conditions?
 - Something else entirely?

TERM-Lite simulates the long-term impact of constrained funding scenarios using a robust prioritization algorithm. The model considers five dimensions of priority: Asset Condition, Safety and Security, Reliability, Operations and Maintenance Cost Impacts, and one user defined criterion. As the models are run, the user is in control of how each asset type scores against other asset types. The user has the option to determine how each criterion is weighted against the other criteria.

3.4 VFA.facility by Accruent

Since 2011, Pierce Transit has been relying on the VFA.facility capital planning and management software, which has enabled the agency to better manage condition and sustainability

information about facility assets (both at headquarters and customer-facing), and then leverage that information to guide the selection of capital projects, plans and budgets.

VFA.facility is a cloud-based solution for facilities capital planning and management that provides a central source of facility data, and gives facility managers, capital planners, financial analysts and executives the detailed information they need to make optimal decisions about facility spending, sustainability investments, and capital planning. Although it should be noted that the database does not include any vehicles (revenue or non-revenue/service and support) or stand-alone equipment. A complete **Facilities Inventory and Requirements** matrix, including replacement values and conditions indices, is provided as **Appendix C**.

VFA.facility is considered a maintenance management system, providing a very detailed “microscope view” of assets and is designed to:

- Build compelling capital budgets for facilities renewal and deferred maintenance
- Validate and justify budgets based on condition data
- Execute capital plans with integration to procurement and work order systems
- Manage and reduce capital asset costs

As part of the annual Capital Selection process, the agency should rely on the facilities and vehicles condition information in the VFA.facility and FTA TERM Lite databases to drive recommendations for capital spending on agency facilities. Fully updating that information in the databases is one of the earliest action items under the TAMP.²

3.5 Relationship to Agency-wide Policies and Strategies

The 2017 Strategic Plan, as developed and adopted in May, lists the following new “True North” vision for the agency: “Your preferred transportation choice for today and tomorrow.” The agency’s Mission is: “Pierce Transit improves people’s quality of life by providing safe, reliable, innovative and useful transportation services that are locally based and regionally connected.” The Strategic Plan includes four new priorities that have a direct nexus to transit asset management and vice versa. Put another way, the first three priorities are not obtainable without agency assets that are maintained in a continuous State of Good Repair (SGR). The fourth priority identifies our employees as a critical asset too.

² Note: Since Pierce Transit’s TAMP was originally outlined, the agency replaced the personal computers used by all headquarters staff in December 2017. The new PCs’ operating system is Microsoft Windows 10. However, VFA.facility is not compatible with Microsoft’s latest operating system (i.e., not supported beyond Windows 7), making it essentially obsolete since it is no longer accessible using current desktop applications or configurations. The recommendation for a new Capital Facilities and Asset Conditions software vendor to replace VFA.facility in 2018 or 2019 is detailed in Section 12.5.

Priority	Objective	Outcomes
<i>#1 Improved Performance</i>	<ul style="list-style-type: none"> • Increase Pierce Transit’s market share of travel in the region 	<ul style="list-style-type: none"> • Total overall ridership increases beyond growth in total travel
<i>#2 Customer-Focused Decisions</i>	<ul style="list-style-type: none"> • Increase the community’s opinion that Pierce Transit is meeting its mission 	<ul style="list-style-type: none"> • We integrate the customer and community perspective into decision making • We use real-time information to plan future initiatives • Community’s perception of Pierce Transit improves • Partnerships provide useful data to support and fund future growth
<i>#3 Financial Stewardship</i>	<ul style="list-style-type: none"> • Act with financial accountability and transparency as stewards of the public trust. 	<ul style="list-style-type: none"> • Department-level budgeted versus actual expenses • Internal and external satisfaction with and understanding of financial information • Capital projects that use a documented cost-benefit analysis • Department-level metrics established and targets set to meet strategic objectives
<i>#4 Engaged Employees</i>	<ul style="list-style-type: none"> • Attract, cultivate, and maintain and engaged workforce 	<ul style="list-style-type: none"> • In depth employee development plans completed and implemented • On the Job Injury (OJI) rate decreases • Maintain retention rates • Employee Engagement survey participation increases

Source: Pierce Transit Strategic Plan Development – Board of Commissioners Working Session held April 10, 2017

Section 4 – State of Good Repair Policy and Implementation Path

4.1 State of Good Repair Policy

After the FTA’s Transit Asset Management Final Rule went into effect on October 1, 2016, Pierce Transit began immediately working on its State of Good Repair policy – including updating its Performance Measures and Targets for facilities, equipment, and rolling stock – prior to formal adoption and submission in January 2017. The agency found information provided by the FTA, including webinars and face-to-face advice from Region 10 staff to be very helpful. Under this federal requirement, the Puget Sound Regional Council (PSRC) Metropolitan Planning Organization (based in Seattle, Washington) formed a Transit Asset Management Advisory Committee which meets bimonthly to update FTA Region 10 staff on each of the transit and ferry provider’s progress in developing their TAMPs. It is also an open forum for information gathering and sharing best practices among peers. The group is fortunate to include King County Metro Transit, which ranked 12th in the nation in Unlinked Passenger Trips (125.3 million) and 15th in Passenger Miles (611.7 million) in 2014.³ Due to its size, King County Metro already has an extensive background and years of institutional knowledge in establishing State of Good Repair targets under transit asset management. It is therefore serving as a mentor to the other six motorbus or rail transit providers operating in the Central Puget Sound Region as we collectively move through the process to identify and implement our own SGR performance measures and targets.

Each transit agency or ferry operator is required to develop performance targets associated with performance measures for each asset category (i.e., Facilities, Equipment, Infrastructure, and Rolling Stock). Although performance targets are not directly aligned with the age and condition of the inventory within each asset class. Instead, a performance target is a quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by the FTA. Therefore, performance targets should incorporate replacements and upgrades anticipated to occur within that time period. All transit agencies and ferry operators within the region have developed their initial performance targets to date. Pierce Transit’s are depicted in **Table 4.2** on page 18.

The PSRC’s TAM Advisory Committee helped develop a method of addressing regional TAM performance targets in the context of multiple public transit agencies preparing their own agency-specific TAM performance targets. The method used relies upon information provided by agencies on their individual performance targets adopted by the January 31, 2017 deadline to produce a set of regional TAM performance targets.

³ Source: *Table 3: 50 Largest Transit Agencies Ranked by Unlinked Passenger Trips and Passenger Miles, Report Year 2014*. 2016 Public Transportation Fact Book, 67th Edition, p. 10. Published February 2017 by APTA.

The PSRC then incorporated information provided by the various agencies into a regional target as a “weighted average” of each agency’s target for a particular asset class’ performance measure. Under this method, the larger agencies – namely King County Metro and Sound Transit – will have more of an influence on the overall regional TAM target in each performance measure compared to the smaller agencies. The results of the initial TAM performance targets are shown in Table 4.1 below.

Asset Category	Asset Class	Performance Target for FFY 2017
Rolling Stock	Bus	No more than 2% of buses meet or exceed their ULB ¹
	Other Passenger Vehicles	No more than 28% of other passenger vehicles meet or exceed their ULB ¹
	Railcars	No more than 0% of railcars meet or exceed their ULB ¹
	Ferries	No more than 5% of ferries meet or exceed their ULB ¹
Infrastructure	Rail Fixed Guideway	No more than 2% of track segments have performance restrictions
	Track	
	Signals	
	Systems	
Facilities	Support	No more than 11% of support facilities rated below Adequate on the TERM Lite scale (i.e., a 3) ²
	Passenger	No more than 0% of passenger facilities rated below Adequate on the TERM Lite scale (i.e., a 3) ²
	Parking	No more than 7% of parking facilities rated below Adequate on the TERM Lite scale (i.e., a 3) ²
Equipment	Non-Revenue/Service & Support Vehicles	No more than 19% of equipment meets or exceeds its ULB ¹
	Construction	No more than 0% of construction equipment rated below Adequate on the TERM Lite scale (i.e., a 3) ²
	Maintenance	No more than 7% of maintenance equipment rated below Adequate on the TERM Lite scale (i.e., a 3) ²

1. Useful Life Benchmark is expressed in a number of years. FTA provides guidance on default Useful Life Benchmark by vehicle type with age ranges from 8 years for a van or minivan to 42 years as the default for a ferry boat. Most bus types fall within the 10-14-year timeframe. Each agency may set its own Useful Life Benchmark that varies from the FTA guidance based upon local conditions and vehicle operating environment.
2. Condition assessment is defined as part of the 5-point *Transit Economic Requirements Model (TERM) Lite* scale, where a 3 is considered “Adequate” on the 5-point scale; a 5 on the TERM Lite scale is considered “Excellent”; and a 1 on the TERM Lite scale is considered “Poor.”

The draft Regional TAM Performance Targets identified in Table 4.1 were presented to the PSRC’s Transportation Policy Board on June 8, 2017 for an action to meet federal requirements. They are considered the first step in the region’s role in implementing regional Transit Asset Management performance-based planning.

In addition to this work on the TAM performance targets, the PSRC incorporated a description of the performance measures and targets used in assessing TAM in the Performance Measures section of the *Regional Transportation Plan* update, adopted by the PSRC General Assembly on May 31, 2018. It maps how the region intends to catch up and keep pace with expected growth. It outlines unprecedented investments the region is making to improve highway, transit, rail, ferry, bicycle and pedestrian systems to support the safe and efficient movement of people and goods. For more information, please visit <https://www.psrc.org/our-work/rtp>



Table 4.2 - State of Good Repair (SGR) Performance Measures & Targets for Capital Facilities, Equipment, and Rolling Stock – Adopted January 31, 2017

Asset Category	Measured by	Revenue Vehicle Type		Performance Measure	Target
Facilities	Condition			Percent of capital facilities with a condition rating below 3.0 on the TERM Lite scale.	Rehabilitate and restore at least 75 percent of capital facilities to a condition rating of 3.0 or above on the TERM Lite scale by the end of calendar year 2021 (which is the end of the TAM horizon period).
Equipment	Age			Percentage of non-revenue, support, and service vehicles that have met or exceeded their Useful Life Benchmark (ULB).	No more than 10 percent of non-revenue, support, and service vehicles will be kept in operation beyond their ULB by the end of calendar year 2021.
	Condition			Percentage of equipment with a condition rating below 4.0 on the TERM Lite scale.	Update, replace, or upgrade all equipment to a condition rating of 4.0 or above on the TERM Lite scale by the end of calendar year 2021.
	Maintenance Agreement*		↓	Percentage of equipment currently in operation or utilization that requires a scheduled update, replacement, or upgrade in order to properly function to its full capabilities without interruption.	Continue to meet all manufacturers' or suppliers' schedules and requirements regarding updates/upgrades to or replacement of Security, Communications, and Information Technologies equipment, in order to properly function to its full capabilities without interruption.
Rolling Stock	Age	Fixed Route Motorbus			No more than 35 percent of fixed route buses will exceed their 16-
		Rubber Tired Trolley			

		SHUTTLE (Paratransit)	Percentage of revenue vehicles within a particular asset class that have met or exceeded their ULB.	year ULB by the end of calendar year 2021.
		Community Connector (Small Bus)		No more than 10 percent of revenue vehicles will be kept in operation beyond their ULB by the end of calendar year 2021.
		Vanpool		

4.2 Transit Asset Management Policy

The requirement to include TAM performance measures and targets in regional and transit agency planning was included in MAP-21, adopted in 2012. The purpose of the TAM regulations is monitoring and managing public transportation capital assets to enhance safety, reduce maintenance costs, increase reliability, and improve performance of the public transportation systems nationwide.

When the FAST Act was signed in December 2015 (replacing MAP-21), it doubled the amount of Administrative funding spent on Section 5326 *Transit Asset Management* by setting it at \$2 million per year from 2016-2020, subject to appropriations. In addition, the FAST Act created a new volunteer opportunity for states to pool *Bus and Bus Facilities* formula funding to support Transit Asset Management Plans for bus agencies.

The Federal Transit Administration (FTA) engaged in rule-making on the topic of TAM and performance-based planning over the following years. Federal rules were finalized in the summer of 2016 which established the timeline and process for developing planning documents that reflect TAM requirements, and the performance targets for federally-defined TAM performance measures. TAM performance targets are updated annually and TAMPs will cover a four-year period.

The final TAM rule is applicable to all recipients of FTA funding that own, operate, or manage capital assets used in the provision of public transportation. In this region, the rule applies to all fixed route transit operators and public ferry operators. Some special needs transportation operators will also need to comply with the TAM rule through a State-sponsored group plan.

As mentioned in the previous section, the PSRC convened a group of stakeholders from among the region's public transit agencies and ferry operators, along with participation from the Washington State Department of Transportation (WSDOT) and FTA Region 10.⁴ This group, known as the Transit Asset Management Advisory Committee, has been meeting regularly since the initial TAM Notice of Proposed Rule-making in 2013.

As part of Pierce Transit's Executive Management and Workforce Development teams' 2017 update to the agency's Strategic Plan, four goals and 16 relative objectives were established to guide the agency over the next five years. Goal number two focuses on internal processes and is designed to "Develop a culture which fosters safety, collaboration, data-driven decisions, and innovation." In turn, one of its objectives is to "Meet the targets and performance measures documented in the Transit Asset Management Plan (TAMP)."

⁴ Responsible for Alaska, Idaho, Oregon, and Washington.

4.3 Transit Asset Management Implementation Path

When Pierce Transit began evaluating options for which implementation path to follow in developing its TAMP, the consensus was that Capital Planning should serve as the “gatekeeper” for the data and fixed asset inventories that would be evaluated over time. The Capital Planning group took an interest in becoming the document’s champion and selected *Implementation Path #3* as the most logical one for the agency, “focusing on providing information on asset condition from a centralized asset inventory in a consistent way across all asset classes.” Characteristics of this path include:

- An enterprise initiative that starts by establishing asset management policies, strategy, and a plan that ensures a well-integrated and aligned organization.
- Using consistent, up-to-date, and increasingly complete asset inventory data to align with the agency’s performance management requirements and support all enterprise-level asset management business processes.
- A strong executive sponsorship commitment to asset management being one of the agency’s top strategic objectives.
- Staff at all levels increasingly understand how their job supports asset management.

What appealed to the agency about this implementation path were its many potential benefits, such as:

- Focuses on providing information on asset condition from a centralized asset inventory (TERM Lite database) in a consistent way across all asset classes. Information can be used to improve programming and prioritization to improve asset management outcomes.
- Capital improvements required to meet the level of service commitments are systematically identified and communicated.
- The focus of this implementation path is more at the planning level, but it can provide a springboard for increasing awareness and then driving initiative and methods to reduce lifecycle costs.
- Provides simplified access to comprehensive, reliable data to support agency decision-making and capital programming.
- Provides transparency in decision-making at all levels.
- Improves communications regarding the agency’s capital needs, funding decisions, and scenarios reflecting the impact of different levels of capital funding within the agency (internally) and with stakeholders (externally).

- Justifies the level of investment needed to improve an agency's assets' conditions and performance and the performance impacts of not receiving that level of funding.
- The benefits may be realized within a few years, depending on the agency's ability to compile appropriate data.

As noted in the FTA's *Transit Asset Management Guide* (Report No. 0098), "The focus of this implementation path is more at the planning level, but it can provide a springboard for increasing awareness and then focusing more on other aspects of asset management. While this path provides enterprise-level direction, it does not necessarily consider the operations and maintenance costs or require organization-wide change. It does, however, identify the improvements required to address preventative and reactive maintenance backlogs and rehabilitation requirements – all of which can help reduce lifecycle costs. This information allows for explicit consideration of resource allocation in the capital planning and programming processes between pressing asset condition-related needs and other improvements."

Beyond just an objective in the *2017-2021 Strategic Plan*, the agency will need to regularly update the multiple asset inventories and monitor their conditions.

- For *Facilities*, the agency can rely on the VFA.facility database or TERM Lite database to monitor existing conditions and pro-actively address minor rehabilitations before they become critical needs. Having an independent consultant conduct a hands-on inspection and write a current conditions assessment of all headquarters buildings plus passenger-facing facilities in 2017 was the basis for a comprehensive update to VFA.facility, the first since the database was initially populated in 2011. It will also be used to fulfill NTD reporting requirements beginning in 2018. The agency should then agree and commit to self-assessments of all facilities annually with an independent, outside assessment every fourth or fifth year (i.e., once every TAMP reporting cycle).
- For *Rolling Stock* and non-revenue/service and support vehicles (i.e., Equipment), this should be done at least quarterly or whenever new vehicles are delivered and used vehicles are either surplus or sold.
- Other, non-vehicular *Equipment* should also be easy to track, as long as the agency's TAMP administrator is always notified when new equipment is brought in or installed and old equipment is removed, sold, or disposed of. This would include anything valued at \$50,000 or more.

The recommendations listed previously will be addressed in greater detail in Section 15.

Section 5 – Timeline and Milestones, Due Dates, and Financial Requirements

5.1 Timeline and Milestones

Like other transit agencies nationwide, Pierce Transit responded to the call to officially begin its Transit Asset Management Plan when the FTA’s Transit Asset Management (TAM) Final Rule was published on July 26, 2016. The Final Rule requires FTA grantees to develop asset management plans for their highest valued public transportation assets, including vehicles, facilities, equipment, and other infrastructure. Since that time, Capital Planning staff has taken the lead in developing the TAMP and participated in numerous interactive webinars, as listed in Section 6.1. The Final Rule took effect on October 1, 2016.

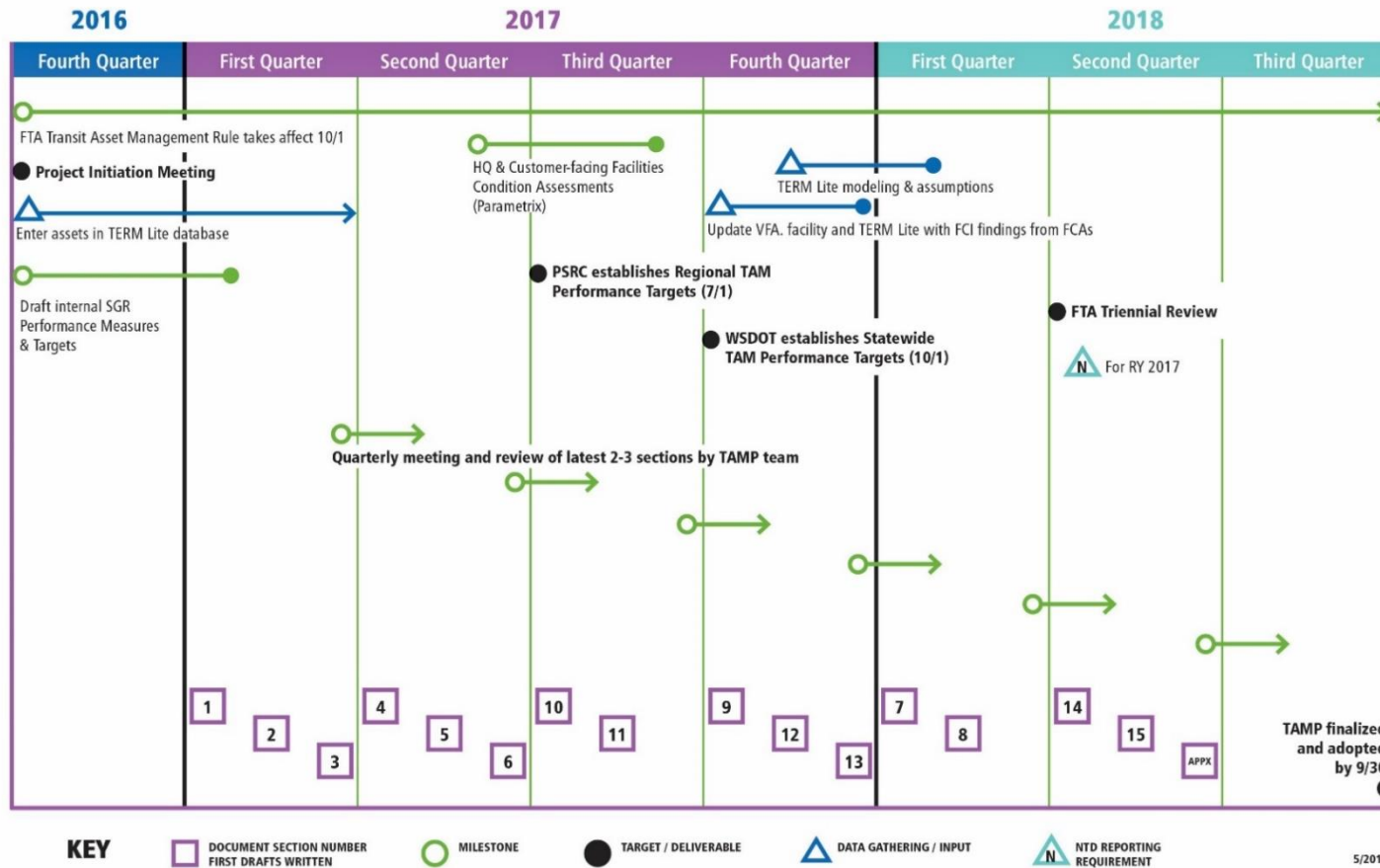
On October 4, 2016, the agency held a TAMP project initiation or “scoping” meeting with key internal stakeholders. The purpose of the meeting was to formally begin the process of developing the agency’s first federally compliant TAMP and to discuss a proposed format and outline. A draft proposal was also put forth by the TAMP administrator to identify 19 elements⁵ that would go into the document and the responsible party or parties for each. The team then agreed to meet quarterly over the next 24 months (from October 2016 through September 2018) when the document is scheduled for completion and adoption. Their purpose is to review and discuss draft TAMP sections as they are written, as well as provide data or information to support the effort. Pierce Transit’s internal stakeholders and key personnel are identified in Section 6.2.

The various milestones in Pierce Transit’s TAMP development process are depicted in **Figure 5.1** on the following page.

⁵ Note that the word “element” was thereafter dropped in favor of “requirement,” in order to not confuse it with the nine TAMP elements identified by the FTA.

Figure 5.1 – TAMP Timeline & Milestones: 2016-2018

Pierce Transit • Transit Asset Management Plan (TAMP) Timeline & Milestones: 2016-2018



5.2 Identifying Financial Requirements

This section is intended to estimate the financial requirements of developing a TAMP over the two-year period. While this is indeed a large undertaking, Pierce Transit believed it could still be accomplished with minimal disruption in the day-to-day workload of staff members' regular and ongoing commitments or projects.

Internal Staff Time and Labor Cost Estimates

Since determining who would be on the TAMP team when the project commenced in October 2016, Pierce Transit has produced an estimate of work hours by position or specialist over the two-year life of the project. While the final costs to create the document will not be known until the work is completed and dedicated hours tabulated, the agency expects total compensation (in gross wages alone) to be approximately \$149,363, based on 14 full-time employees dedicating 3,077 hours to the project. Estimates of TAMP-specific hours and labor costs are depicted in **Table 5.2** on the following page.

Equipment and Technology

In addition to internal staff time or employee resources, Pierce Transit will rely on various computer software programs to record and monitor assets and conditions under the TAMP. The names of the programs and usage costs are listed in Table 5.3 below. A further description of their purpose related to Transit Asset Management is found in Section 6.1. Note that routine maintenance, refueling, and other mechanical equipment are not listed since they are used for normal, day-to-day public transportation agency operations.

Name of Program	Vendor or Supplier (Location)	Annual Operating or Usage License Cost
National Transit Database (NTD) Asset Inventory Module	Federal Transit Administration (Washington, D.C.)	(Required by the FTA but at no charge)
Transit Economic Requirements Model (TERM) Lite	Federal Transit Administration (Washington, D.C.)	(Available to transit agencies at no charge)
VFA.facility	Accruent Facilities Management Software (Austin, Texas)	\$27,565
Enterprise Asset Management (EAM)	Trapeze Group (Mississauga, Ontario, Canada)	\$91,450
Financial Management Software (FMS)	Mitchell Humphrey & Co. (St. Louis, Missouri)	\$62,980
	Total Annual Cost	\$181,995

Consultant Services Utilized

To get an objective, outside and professional opinion, as well as having limited resources, Pierce Transit hired a private sector consultant to conduct a Facilities Condition Assessment of all Headquarters buildings plus all customer-facing properties owned and operated by the agency (e.g., transit centers, transit stations, and park-and-ride lots). As part of the agency's Transit Asset Management Plan (TAMP), a Condition Assessment, which is a rating (e.g., good/fair/poor or a percentage of residual or remaining useful life) of the condition of assets in the inventory is required.

The agency contracted with Parametrix (an engineering, planning, environmental sciences, surveying, and construction management firm based in Puyallup, Washington) to visually assess all Pierce Transit-owned facilities assets to document their conditions and determine the remaining lifecycle of major asset systems. This work was completed in January 2018 using the methodology for defining, gathering, and reporting information outlined in Federal Transit Administration (FTA) Facility Condition Assessment Guidebook, to fulfill the data requirements outlined in Title 49 §5335 of the US Code National Transit Database.

The facilities to be inspected and reported on are listed below.

Pierce Transit Headquarters - Lakewood

- Building 1 - Fleet Maintenance
- Building 2 - Facilities Maintenance
- Building 3 - Service/Vault/Fuel House
- Building 4 - Administrative Offices
- Building 5 - Safety & Training Facility
- Building 6 – Thevenoux Property (9601 40th Avenue SW)
- Building 7 – Radio & Service Supervisors Building (9515 39th Avenue Court SW)
- Building 8 - Warehouse (known as *Screaming Eagle*, very back/north end of parking lot behind Building 7)

Transit Centers

- 72nd Street E & E. Portland Avenue - Tacoma
- Commerce Street Transfer Facility between S. 9th and 10th Streets - Tacoma
- Lakewood Towne Center - Lakewood Towne Center Blvd. SW - Lakewood
- 121st Street E & Pacific Avenue S - Parkland
- South Hill Mall - 39th Avenue SW - Puyallup
- Tacoma Community College - NE corner of S 19th Street and S. Mildred Street - Tacoma

- Tacoma Dome Station (East & West Garages) - Puyallup Avenue between E & G Streets - Tacoma
- Tacoma Mall - S. 47th & S. 48th Streets - Tacoma

Park-and-Ride Lots

- Kimball Drive - SR 16 at Kimball Drive - Gig Harbor
- Narrows/Skyline - 6th Avenue & N. Skyline Drive -Tacoma
- North Purdy (Purdy Crescent) - 144th Street NW at Purdy Drive NW - Purdy
- Point Defiance Intermodal Facility - Northernmost end of N. Pearl Street -Tacoma
- SR 512 at I-5 on S. Tacoma Way - Lakewood

The work schedule is depicted in Table 5.4. The total contracted amount for the work was \$93,540. The final deliverable was a discrete or stand-alone report and is added to the TAMP as **Appendix A**.

Table 5.4 - Pierce Transit - Facilities Condition Assessment Schedule																		
	May 2017			June 2017			July 2017			August 2017			September 2017			October 2017		
Task 8.1: Project Management																		
Kickoff Meeting																		
Coordinate/Status Meetings																		
Status/Progress Reports																		
QA/QC																		
Invoices																		
Task 8.2: Review Documents																		
FTA Materials																		
Transit Headquarters																		
Transit Centers																		
Park & Ride Lots																		
Notes/Issues																		
Task 8.3 Site Visits																		
Transit Headquarters																		
Transit Centers																		
Park & Ride Lots																		
Photos/Notes																		
Task 8.4 Condition Assessment Report																		
Draft Condition Assessment Report																		
Pierce Transit Review/Comments																		
Revise Report																		
Final Condition Assessment Report																		

In addition to the Facilities Conditions Assessment, Pierce Transit may require outside assistance in formatting the TAMP and illustrating the findings (i.e., current conditions and SGR backlog) and recommendations (i.e., how to realistically achieve and maintain a State of Good Repair). That determination will be made by the project team when the document is finalized in September 2018.

Section 6 – Resources and Key Personnel

6.1 Resources

Initially, Capital Planning staff were tasked with determining what tools would be needed to successfully create a TAMP over the two-year period; from when the Final Rule took effect on October 1, 2106, through the required completion and adoption date in September 2018. These were divided into two basic lists: “software” (e.g., identifying what systems we have that could be used for the TAMP) and “people” (e.g., identifying who would be available to gather, enter, and analyze or monitor data, along with submitting content for the document and proofreading).

▪ Software Programs

Various enterprise asset management (EAM) software companies who support transit agencies recognized the need early on to add a State of Good Repair (SGR) module to programs already in use. These upgrades include the ability to perform physical conditions inspections and enter the data immediately through a mobile app, generate performance-based condition scores, and depict age-based decay curves, among others. As these programs are being developed, software vendors understand the need for compiling asset data, inventories, and conditions in a single program that covers equipment, facilities, infrastructure, and rolling stock. Agencies – like Pierce Transit – often rely on multiple, disparate databases for lifecycle management and programming capital projects. Part of the TAMP development process involves looking into a new software program that would more effectively monitor SGR backlogs while ideally combining all three asset categories (i.e., facilities, infrastructure, and rolling stock) into a single database.

For now, Pierce Transit is relying on the following five software programs it has been using for years (as noted in Section 5), but is still confident they can collectively provide all the information needed for the TAMP:

- The Trapeze Group’s *Enterprise Asset Management* as its work order and maintenance system for facilities, equipment and rolling stock;
- FMS - Financial Management Solutions by Mitchell Humphrey which is used to track multiple fixed asset accounting requirements such as book value, federal tax, state tax, and the like;
- The FTA’s *TERM Lite* for all asset categories (as noted in Section 3);
- The FTA’s *National Transit Database (NTD)*, which contains agency funding sources, inventories of vehicles and maintenance facilities, safety event reports, measures of transit service provided and consumed, and data on transit employees; and
- Accruent’s *VFA.facility* for headquarters and passenger use facilities (as noted in Section 3). Unlike the other software programs kept on premise and listed above, this asset management program is cloud-based.

6.2 People: Key Personnel

Pierce Transit's TAMP team is shown in **Appendix B**. This version of a Responsibility Assignment Matrix (RAM) is called a RACI chart or matrix, which stands for "Responsible, Accountable, Consult, and Inform" meaning the type or level of involvement expected from each individual. It is designed to depict team member responsibilities in a text-oriented format. Work to be done is shown in the left column as activities. The assigned resources are shown as individuals in the top row. The acronym is further defined in the legend at the bottom of the matrix.

6.3 TAMP-related Training & Travel

As demonstrated below, Pierce Transit staff has been closely monitoring training opportunities and peer exchanges since the FTA's Final TAM Rule took effect, while participating in as many as possible.

- FTA Webinar 1 - TAM Final Rule (July 26, 2016)
- FTA Webinar 2 – TAM Performance Measures Guidebooks (July 28, 2016)
- FTA Webinar 3 – NTD Asset Inventory (August 2, 2016)
- FTA Webinar 4 – TAM Final Rule (August 4, 2016)
- FTA Webinar 6 – TAM Performance Measures Guidebooks (August 11, 2016)
- FTA Webinar 7 – NTD Asset Inventory Expansion (August 16, 2016)
- FTA Webinar 8 – Building a TAM Asset Inventory (May 23, 2016)
- FTA Webinar 9 – Final TAM Performance Measure Guidebooks: Infrastructure & Facility (June 6, 2016)
- FTA Webinar 10 - Decision Processes for Asset Condition Assessments (September 19, 2017)
- FTA Webinar 11 – TAM Internal Coordination (November 30, 2017)

Capital Planning staff also participated in the following peer exchange roundtable. The agency's CEO and Executive Director of Planning & Community Development were also in attendance:

- FTA/APTA Performance-Based Planning Peer Exchange Roundtable – Seattle (September 27 & 28, 2016)

The TAMP Administrator and Executive Director of Planning & Community Development attended:

- Transportation Research Board 96th Annual Meeting in Washington, D.C. (January 8-12, 2017), primarily focusing on TAM- and SGR-related workshops and meetings.

Capital Planning staff enrolled in the following NTD training and webinar:

- Using the Transit Economic Requirements Model (TERM Lite) – Seattle (June 28 & 29, 2016)

- Asset Inventory Demonstration (Webinar) (September 21, 2017)
- Using the Transit Economic Requirements Model (TERM Lite) – Lakewood (April 11 & 12, 2018)⁶

6.4 Physical Assets: Employees

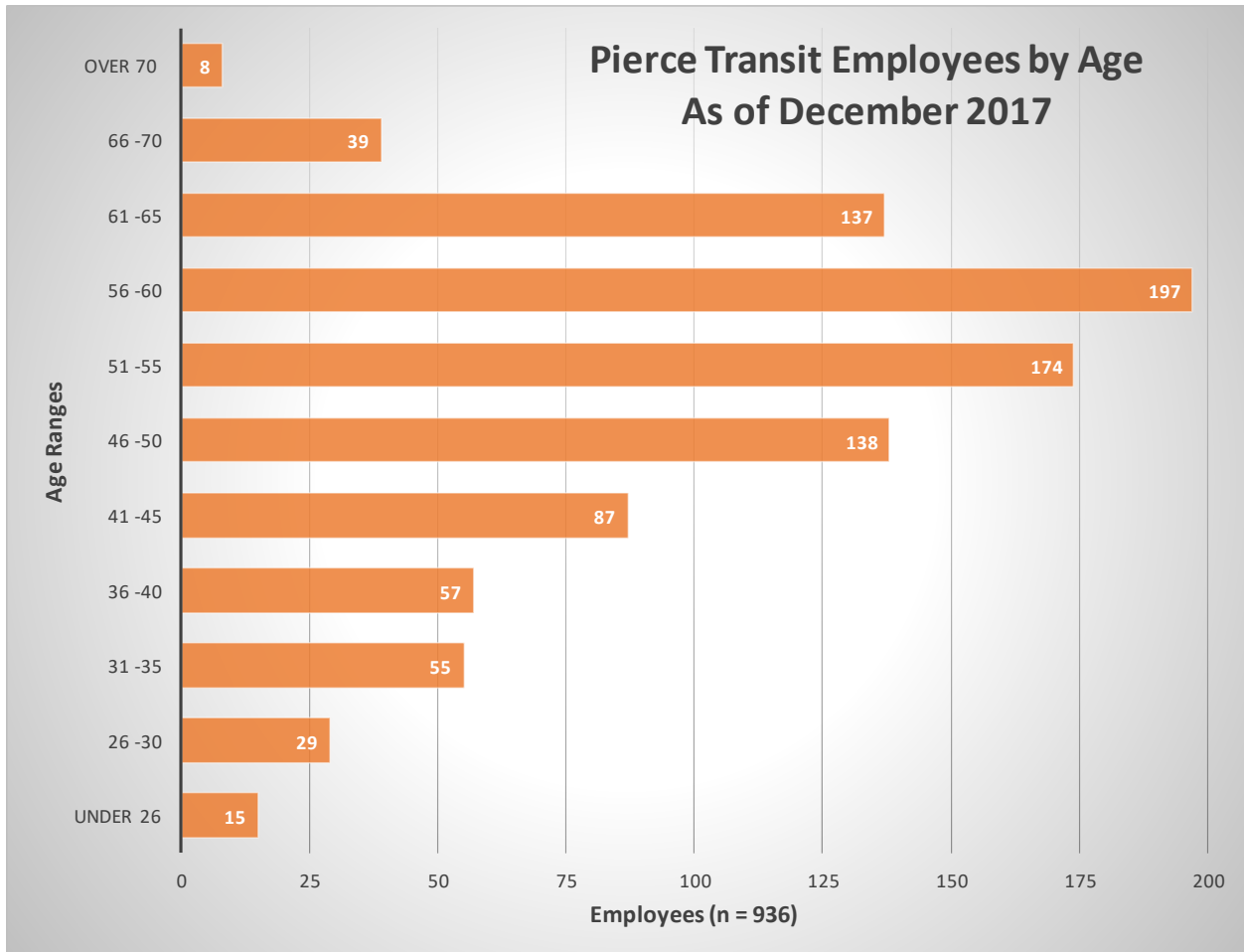
Pierce Transit recognizes the importance of counting its employees as assets too. However, the transit industry is currently faced with an aging workforce as Baby Boomers (i.e., those born between 1946 and 1964) are now beginning to retire. Every spring, the agency’s Employee Services Department (i.e., Human Resources) publishes a report that looks at turnover and trends - and the trend is alarming. Pierce Transit estimates it will lose over one-fourth of the current pool of employees by the end of the current TAMP reporting period. As noted in the following excerpt from the agency’s *2016 Annual Turnover Report*:

“The retirement forecast agency-wide grows to an astounding level of almost 250 employees becoming eligible for retirement by 2021. In 2017 and 2018, we see some lower eligibility numbers, but they start peaking again in 2020 and 2021. In the Operator ranks, 60 employees are eligible to retire by the end of 2017 with an average of 24 others becoming eligible each year from 2018 – 2021. In Maintenance, there are 13 employees eligible for retirement by the end of 2017 with an average of 4 others becoming eligible each year from 2018 – 2021. These are significant numbers considering the size of the Maintenance group and will need to be considered when planning recruitment efforts for that department. In the non-represented (non- union) group there are 8 employees eligible for retirement by the end of 2017. That number will triple to 24 becoming eligible by 2021. Additionally, the main reason for voluntary separations in the non-represented group is another job. We will need to gather additional information from exit interviews so that we can determine if there is something that can be changed to keep non-represented employees from leaving for other job opportunities.”

Pierce Transit employees by age as of the end of 2017 are depicted in **Figure 6.1**. The total number of employees was 936 and their average age was 51.2.

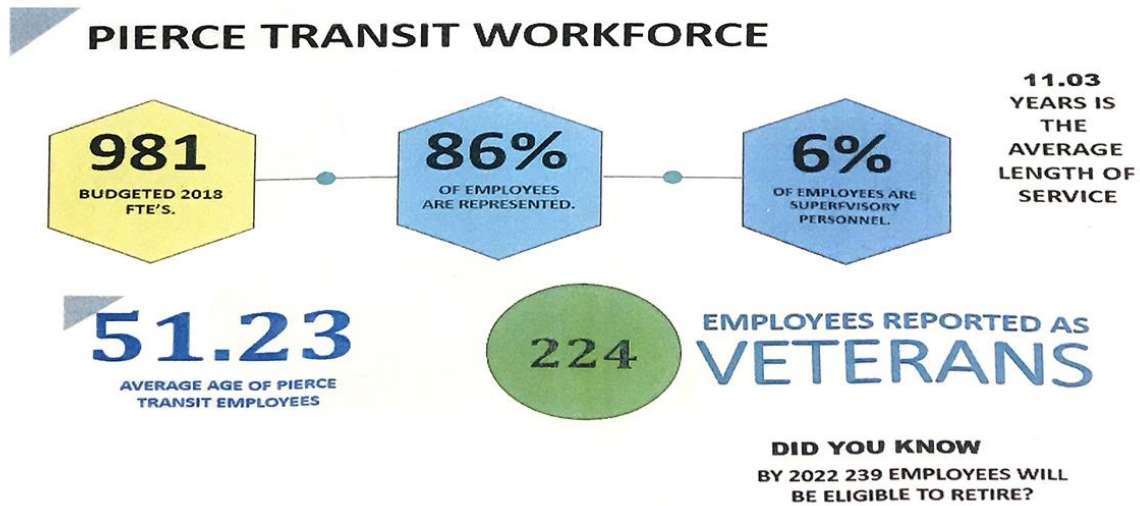
⁶ Hosted by Pierce Transit so attended as a refresher course and intermediate level user.

Figure 6.1



Updated information on the make-up of the current (2018) workforce is depicted in **Figure 6.2** on the following page.

Figure 6.2 – Pierce Transit Workforce: 2018



Another internal concern is an apparently limited interest in public transportation as a career choice among those in their twenties who are graduating from college or newly entering the workforce. According to a 2010 survey and analysis conducted by the Small Urban & Rural Transit Center, Upper Great Plains Transportation Institute at North Dakota State University, “Students in general did not report strong attitudes about internships or careers in transit. However, for those attributes that they did report strong feelings, those attitudes were negative. Internships in public transportation were not viewed as providing opportunities to apply existing skills or to develop new skills, the top factors that influence internship selection. Students thought that a career in public transportation would be uninteresting, unchallenging intellectually, and would not provide the opportunity to be creative. They also do not believe that a career in transit will provide the opportunity to work with technology or provide social prestige.”⁷

In order to face this critical issue head-on, Pierce Transit is using multiple tactics to retain its current workforce while continuing to attract the next generation of transit operators, mechanics, maintenance specialists, capital and service planners, and management at all levels:

⁷ Author’s note: That same year (2010), the American Public Transportation Association created a Blue-Ribbon Panel on Workforce Development, although it does not appear that further work has been done to address the issue since that time. The North Dakota State University report cites the APTA work which began in 2008
Source: <http://newsmanager.commpartners.com/aptapt/issues/2010-08-30/11.html>
But not updated since August 2010.

- **Employee Engagement (“EE”) Survey**

The annual Employment Engagement Survey was brought back in 2015 after being eliminated during the economic downturn. The survey takes employees about 10 minutes to complete and assesses five key metrics:

1. *Employee Engagement*
2. *Diversity and Inclusion*
3. *Leadership Assessment*
4. *Communication*
5. *Agency Priority and Direction*

The survey was developed based on the Gallup organization’s *Q¹² Employee Engagement Survey* which include “the 12 questions that measure the most important elements of employee engagement,” according to their website.⁸ The survey has been taken by hundreds of thousands of employees at organizations across the U.S. and around the world. When Pierce Transit conducted the survey in 2015, that information became the agency’s baseline. In 2017 the agency began working on its new Strategic Plan for 2017 through 2021 and several of the metrics for the strategic objectives will be aligned with questions in the annual employee surveys. To better inform the strategies, projects, and progress toward these objectives, the agency purchased an employee engagement software program in fall 2017 called *CultureIQ* that allows more frequent and instantaneous feedback, to gauge progress and the ability to quickly generate transparent reports on the results. This program is designed for agencies such as Pierce Transit to leverage the true power of the employee survey information, to better inform strategies, and measure the effectiveness of projects.

In addition to the annual survey, the agency’s Communications Manager consistently keeps Pierce Transit employees informed through a variety of internal communication methods. Examples include (but are not limited to):

- CEO Sue Dreier’s weekly “Friday Message” sent to employees electronically and printed or posted for employees that do not have email accounts
- Quarterly All-Employee Meetings (since moved to twice a year beginning in 2018)
- *The BUZZ*, an agency-wide newsletter printed and emailed once a month
- The agency’s Mission, Vision, and Strategic Priorities are posted throughout headquarters buildings and in operators’ lounges offsite
- A large monitor in the Operators’ Lobby is used to push out messages to transit operators, as they don’t have Pierce Transit email accounts
- Key messages on important projects are sent to agency staff on an as-needed basis

⁸ <https://q12.gallup.com/public/en-us/Features>

- **Job Fairs and Other Open Recruitment Opportunities**

In terms of physical job fairs where Pierce Transit has personnel at a booth, the agency only participates in three or four such events per year. They are the annual King County Diversity hiring event and three events through Joint Base Lewis-McChord's Transition Services Program for soldiers leaving the military and their spouses. Pierce Transit's success in more than tripling the candidate pool of new transit operators can be credited to a renewed focus on local partnerships and the creation of a more robust online advertising strategy. Currently, job posting begins with 75 separate organizations' and local colleges' "Help wanted" boards that are regularly updated as positions become available. The agency has also partnered with a local organization called Workforce Central which serves as a community clearing house for all federal and state funded career or job transition programs. This partnership gives Pierce Transit access to a network of over 200 additional community recruitment sources, where the agency also attends monthly employer roundtables. The third source for announcing job opportunities is the addition of several online social media and job board posting tools. These tools assist by posting vacancies instantly to over 150 job boards online. The combination of Pierce Transit's own efforts, the partnership with Workforce Central (and by proxy more close relationships with other local employers and placement entities), and the online posting tools mentioned has aided Pierce Transit in growing the talent pools for all available positions and resulted in an ability to rise above the national candidate shortage for transit operators.

- Advertising on transit vehicles -Spreading the word through "The smile says it all!" campaign that Pierce Transit is continuously hiring on fixed route buses.
- Offering competitive wages and benefits in a county that still has a reasonable cost of living (especially when compared to Seattle and King County to the north).
- Conducting exit interviews when non-represented employees resign.

- **Awards and Recognition Programs**

Pierce Transit encourages the recognition of excellent performance and achievement using Awards and Recognition initiatives that are creative, flexible, and meaningful. When administered and communicated effectively, awards and recognition are an important part of a total compensation program. Under the program, the agency currently selects a (non-represented) *Employee of the Month* and (represented) *Operator of the Month*. In addition, a new *Safe Driving Recognition* program has been proposed, to express the agency's appreciation to transit operators who continuously provide safe public transportation services for an entire calendar year. To foster a culture of safety in the agency's day-to-day business practices, a new *Excellence in Safety* award will be offered quarterly, beginning in late 2017, to non-represented employees who have demonstrated outstanding efforts to keep an accident-free, safe environment in either their workplace or agency-wide. Finally, Pierce Transit continues to

recognize teams quarterly that participate in efforts to improve the efficiency and/or effectiveness of the agency, such as: a savings in time or money; generation of revenue; elimination of waste or duplication; improved service or product; energy conservation; and/or improved working conditions.

- **Annual Turnover Report**

Pierce Transit's Workforce Development Department (i.e., Human Resources) produces a concise but comprehensive report every spring to document and analyze trends in hiring and separations or terminations, including comparisons to national trends. The data and information within are useful when attempting to fill vacant positions, as well as retaining current employees and their institutional knowledge. As indicated previously, the alarming trend in transit agency vacancies nationwide – based on causation or correlation – justifies recognizing this report as an invaluable piece of the agency's overall asset management portfolio.

Section 7 – Lakewood Headquarters Facilities⁹

7.1 Bases, Buildings, and Sites

The project site is the Pierce Transit Lakewood Base, which is made up of four primary areas, the Main Base, South Base, West Base and Building 6 (9622 40th Avenue SW) site, as described below. The entire base, including Pierce Transit’s headquarters and maintenance facility, are located at 3701 96th Street SW, Lakewood, Washington 98499, in Pierce County. A site diagram showing existing conditions and the relative location of these base areas is shown in figure 7-1.

Figure 7-1: Aerial diagram from BMP: EXISTING SITE PLAN Figure 3-1, page 21

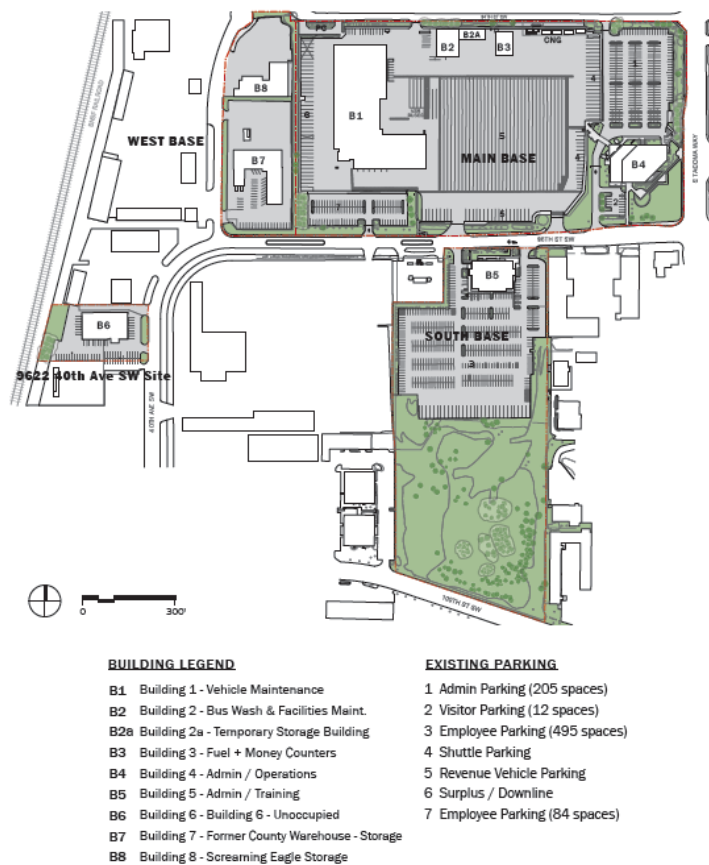


FIGURE 3-1. EXISTING SITE PLAN

⁹ All text and graphics in Sections 7.1 and 7.3 are taken from Base Master Plan provided by Schacht-Aslani Architects and WSP, March 2018 edition, pp. 45 -55. Content has been minimally edited or changed from the source document. However, the initial timetables, design elements, and cost estimates have changed significantly in 2018 since the report was finalized. A list of errata is provided at the end of this Section, based on information in the report that Pierce Transit disagreed with or was found to be incorrect.

The **Main Base** portion of the site is approximately 19.04 acres in size, and bordered by South Tacoma Way on the East, 96th Street SW on the South, 94th St SE on the north and the West Base parcels on the west. The Main Base parcels contain Buildings 1 thru 4 of the original bus base, as well as revenue vehicle parking, administrative employee parking and maintenance and visitor parking lots.

The **South Base** portion of the site is approximately 11.83 acres in size, and bordered by commercial uses to the East and West, an electrical substation to the northwest, 100th St SW to the south and 96th Street SW to the north. The South Base parcels contain Building 5, visitor parking, and the primary employee parking lot. The south portion of the South Base is an undeveloped area that was once the site of a gravel mining operation.

The **West Base** portion of the site is approximately 3.57 acres in size that is bordered by the Main Base to the east, 96th Street SW to the south, 94th Street SE to the north, and 39th Avenue Court SW to the west. The West Base parcels contain surplus vehicle and other storage parking, and two existing warehouse buildings that are used for Pierce Transit storage, and as “campaign bays” for the changeover of communications equipment on individual buses that are taken out of and brought into service.

9622 40th Avenue SW Site is a recently acquired property that is approximately 1.06 acres in size that is bordered by 40th Avenue SW on the east, commercial properties to the north and south, and the BNSF right-of-way to the west. The building is currently unoccupied, but will soon contain the Vanpool office function, staff, and vehicle parking.

Original Cost (Includes all land, buildings, and major improvements): \$93,382,267

BUILDING 1 - VEHICLE MAINTENANCE

Building 1 was originally constructed in 1986. A four-bay addition to the east (Bays 1N, 2N, 11S, and 12S) was constructed in 2002. Building 1 has a total program area of 83,500 square feet including a 3,398square foot parts storage mezzanine and a 667-square foot tire mezzanine.

Building 1 is a single story high-bay steel structure with steel columns, beams and roof structure, and a heavy industrial concrete slab. The exterior envelope includes walls of painted concrete block, areas of Exterior Insulation Finish System (EIFS), insulated storefront windows, and a built-up roof.

Conditioned air is provided by a constant volume ductwork system and conditioned with rooftop packaged^a heat pumps. Shop areas are heated by suspended gas fired furnaces. The 2002 addition utilizes a gas fired rooftop unit that also provides ventilation (standalone), and infrared heaters. Vehicle exhaust is removed via drop down hoses and rooftop utility fans.

Building 1 includes the following functions: bus repair bays, automotive repair bays, body repair and paint, component rebuild, parts storeroom, chassis wash, tire shop and storage,

maintenance offices, mechanic amenities (including lunch room, wellness center, and restroom/locker/showers), and a chassis dynamometer.

Two paint booths are configured end-to-end to accommodate either two 40-foot buses or one 60-foot bus. These are the original paint booths and need to be replaced^b. Pierce Transit had an independent study done in 2017 on the existing paint booths which resulted in several options for consideration. Pierce Transit has decided not to upgrade the paint booths at this time.

The existing parts storeroom is woefully undersized for the current fleet^c. Consequently, parts are stored in various locations in the facility and around the site. Fluids (lubricants and coolant) used in Building 1 are stored in underground storage tanks just east of the existing lube/compressor room. There are four tanks, one for engine coolant, one for automatic transmission fluid, and two for engine oil. The pumps that draw from these tanks are located in the lube/compressor room. These tanks should be replaced with above ground storage tanks in a designated room within building 1 as part of the master plan^d.

Bus Repair Bays

Most repair bays are designed for back-in/pull-out, except for the bays extending to the east, which are in a drive-through configuration. The bus repair bays include 11 pit bays, 7 lift bays, and 5 flat bays. None of these bays are designed to accommodate articulated (60-foot) buses. Bays 2N and 11S are located end-to-end in a drive-through configuration and provide the only bay where articulated buses can be maintained, however out of necessity, articulated buses are also pulled into the drive-through pit bays (5N/8S, 4N/9S, and 3N/10S) and straddle the pits^e.

Existing repair bays are typically 18 feet wide, which is acceptable but does not meet the current industry standard of 20 feet wide. The tire bay, chassis wash bay, and chassis dynamometer bay are all designed to accommodate only up to 40-foot buses (i.e. not articulated buses).

The number and type of bays are not adequate to serve the current fleet's needs. Note that when only one specialty bay is needed, it should be sized to accommodate articulated buses. The analysis shows that the facility is short 14 articulated bus bays and four bays for non-revenue vehicle/Vanpool repair^f.

BUILDING 2 – BUS WASH AND FACILITIES MAINTENANCE

Building 2 was constructed in 1986 as part of the initial base development. The building contains one drive-through, 4-brush bus washer with water reclaim and the shops, offices, and storage associated with the Facilities Maintenance department. Building 1 has a building area of 6,440 square feet.

Building 2 is a single story, high-bay steel structure on a light industrial concrete slab. The exterior envelope includes walls of painted concrete block, areas of (EIFS), insulated storefront

windows, and a built-up roof. Conditioned air is delivered via constant volume mechanical system with heating and cooling, and rooftop equipment.

Bus Wash Bay

The existing single bus wash bay is only 70-feet long. The standard for modern bus washers is a minimum length of 80-feet. With only one bus washer, when it is out-of-service, there are no back-up wash facilities. With a fleet of almost 300 buses, there should be a minimum of three bus washers.

Facilities Maintenance

The Facility Maintenance shops, storage, and offices are too small to adequately support the increased workload of the group since the facility was built. These functions should be relocated out of this congested area to improve vehicle access to the shop and storage and to improve safety by eliminating non-revenue vehicle traffic mixing with bus traffic.

BUILDING 3 – FUEL AND MONEYCOUNTING

Building 3 was constructed in 1986 as part of the initial base development. There are two canopy-covered fuel positions and one outdoor fuel position. The building also contains enclosed conditioned space for fare retrieval/money counting, restrooms, and storage.

Building 3 is a 4,290-square foot single story high-bay steel structure with a light industrial concrete slab. The exterior envelope includes walls of painted concrete block, areas of Exterior Insulation Finish System (EIFS), insulated bulletproof windows, with a built-up roof. Conditioned air for the money counting areas are delivered via constant volume mechanical system with heating and cooling, rooftop equipment.

The existing fuel positions are sized to accommodate up to 40-foot buses. Articulated buses extend out from under the canopy cover. The industry standard is to provide one fuel position for every 75 buses. This allows for an average dwell time of six to seven minutes for fueling, checking fluids, emptying the farebox vault, and cleaning the interior of the bus. The 75 buses can be serviced with an 8-hour shift. With three fuel positions, the facility should accommodate a total of only 225 buses. The only way to service the existing fleet of about 290 buses is to reduce the dwell time, which means that interior cleaning must be done in the bus parking area under less than ideal conditions.

CNG compressor equipment and storage is located along the north wall just east of Building 3. Ideally, this investment can be preserved by reusing the equipment in-place in the master plan. Diesel and gasoline are stored in underground storage tanks immediately east of Building 3^g. This is not an ideal location due to the fact that one or more fuel lanes would be impacted if remedial action or replacement of the tanks was necessary.

The original cyclone vacuum equipment system that was used to assist in cleaning the interior of the bus is still in place but is not operational. The bellows are located at the front door of the

bus at fuel positions 1 and 2. This equipment should be removed, which would provide a clear area at the front door location. With this old vacuum equipment removed, the fare collection vaults could be moved to be located directly outside of the front door of the buses in the fuel lanes. This will expedite revenue retrieval and make the nightly servicing more efficient.

Gasoline/ Compressed Natural Gas Facility

The agency has a dedicated Compressed Natural Gas (CNG) facility located on the Main Base that generates fuel for CNG vehicles. This facility is served by Puget Sound Energy. The CNG facility was built in 2005 and underwent major upgrading and refurbishing in 2012 that included the addition of a third natural gas compressor^h. Major equipment at the CNG site includes three natural gas compressors; a natural gas dryer for pre-treatment of the natural gas prior to compressing and dispensing; compressed natural gas buffer storage bottles; underground storage tanks and fuel dispensing units – three for municipal vehicles and one for public access. The emergency power system includes a 1,000kW emergency generator with three automatic transfer switches, one for each compressor.

No changes are proposed to the primary location of the existing CNG facility. As new fueling buildings are brought online, the fuel dispensing will be relocated to the new facility. The existing public access dispenser is no longer in active use and will be demolished with the construction of a New Detail Clean facility.

BUILDING 4 – ADMINISTRATIVE, EXECUTIVE & OPERATIONS

Building 4 was constructed in 1986 as part of the initial base development. It contains several administrative and operator areas, including Employee Services, Finance, Risk Management, Transit Development, Transportation Services, Community Development, Executive, Finance/Procurement & PMO, and Information Technology (IT). It also includes the executive suite, lobby and reception desk. Operator areas, including dispatch, lunchroom, locker room and amenity areas are also located here.

Building 4 is a 33,800-square foot two-story steel frame building with a steel frame mechanical pent-house, on a light industrial concrete slab. The exterior envelope consists of precast concrete panels, and EIFS wall panels, insulated aluminum framed storefront windows, and a built-up roof system with deck insulation and no ballast. Exterior balcony areas are concrete pavers.

Conditioned air is provided via a variable air volume (VAV) system served by a central 72-ton air handler with direct expansion cooling coils. The data center is cooled with two dedicated 30-ton rooftop packaged AHU. The building is fully sprinklered with a clean agent fire suppression system in the IT server room. A diesel emergency generator is also present.

Building 4 is organized around a central core that contains stairs, utilities and restrooms. The perimeter office areas are divided into suites that are then further divided by individual offices. The unusual geometry of the building makes the workstation layout slightly less efficient. The

operators' lobby areas and dispatch function underwent a major renovation in 2015. Other areas vary in their condition and age.

There are five shared conference rooms distributed throughout the building. These vary in size from six to 18-person capacity. Conference rooms and collaborative space is at a premium in the building. In addition, one of the conference rooms is regularly booked for extended periods for the “shakeup” (a process in which bus operators select new routes) and for scheduled meetings.

Some suites are undersized for their departments and others are oversized. The suite configuration limits flexibility in this way, making it difficult for departments to grow and shrink. Offices vary greatly in size throughout the building. Some departments occupy spaces originally intended for other uses (for example the Budget Office is in a former conference room).

BUILDING 5 – ADMINISTRATIVE & TRAINING

Building 5 was constructed in 2006 on the South Base. It contains several administrative and training functions, including Specialized Transportation, Transportation Services, Marketing, Lean & Workforce Development, Vanpool, and Public Safety (Transit Police). It also includes three large meeting rooms, a public lobby, and a lounge/lunchroom.

This 25,800-square foot two story steel structure has exterior walls of cast in place concrete, corrugated metal panels and insulated glass areas. The roofing is single ply membrane. Conditioned air is delivered via variable air volume ductwork, with one package HVAC unit located on the roof. The building includes an emergency generator.

Building 5 is organized around a central passageway with support spaces along the passageway and access points into the various suites that have been created for open office use. Similar to Building 4, this building lacks adequate conference and collaborative spaces. There are two conference rooms on the second floor that are heavily used.

Training rooms on the first floor provide space for large group meetings, board meetings that are open to the public, and special needs assessment. One conference room has been repurposed into a computer lab.

There is no central reception for this building. Visitors utilize the lobby area on the northeast corner and must call up to the individual they wish to see. That person then comes down to the lobby to let them in. The lobby also contains an unused public service counter – the Bus Shop closed in 2013.

BUILDING 6 – FUTURE VANPOOL FACILITY

Building 6 was constructed in 1978 and was recently acquired by the agency for program expansion. Building 6 is located near the Main Base at 9620 40th Avenue SE in Lakewood and includes a one-acre property that is primarily paved.

The building is a 10,400-square foot pre-manufactured steel truss building, with metal panel exterior cladding, concrete slab on grade, and high and low bay areas. Conditioned air is provided by individual rooftop mechanical units for each zone within the building.

Building 6 is not currently occupied. However, its proposed future uses include Vanpool program offices and vehicle parking. A separate utilization study has been conducted concurrent to the master plan to explore the potential layout of the building interior and parking areas. A copy of the report is included in the Base Master Plan's Appendix L.

EXISTING WEST BASE BUILDINGS

There are two existing warehouse buildings on the West Base, the "Screaming Eagle" building (No. 8) to the north and the former Pierce County Building (No. 7) to the south. Screaming Eagle is used for storage and occasional flex space for the entire agency. The former Pierce County Building has low rise and high-bay portions, with the high-bay portions occasionally used. Its primary functions are radio equipment storage, repair, and installation.

7.2 Comprehensive Capital Facilities Conditions Assessment

As mentioned briefly in Section 5, in 2017, the agency hired a private sector consulting firm (Parametrix, Inc.), specializing in architecture and engineering inspections, to conduct a facilities condition assessment of all headquarters buildings plus all customer-facing properties owned and operated by Pierce Transit (e.g., transit centers, transit stations, and park-and-ride lots). The consultant used the services of a sub-consultant for the fire protection components. The scope of work identified all the major building systems and components, estimated their remaining service life or lifecycle, and approximate replacement value. The work was completed using the methodology for defining, gathering, and reporting information outlined in the Federal Transit Administration (FTA) *Facility Condition Assessment Guidebook*, to fulfill the data requirements outlined in Title 49 §5335 of the US Code National Transit Database.

From the Parametrix analysis, each building was given a Facility Condition Index (FCI) score as a relative indicator of overall condition for decision making purposes.

The FCI score is calculated by dividing the maintenance, repair, and replacement deficiencies of the facility by the current replacement value of the facility. A higher number indicates deficiencies greater than replacement cost. A lower number indicates an item with a longer remaining useful life.

Reference standards provide a translation between overall FCI score and building condition as follows: Good (<0.05), Fair (0.05 to 0.10), and Poor (>0.10). The following figure (7-2) summarizes the FCI scores assigned to each building on the base.

Figure 7-2: 2017 FCI Scores Summary Table

	<i>YEAR CONSTRUCTED (AGE)</i>	<i>SQUARE FEET</i>	<i>FCI SCORE</i>
<i>Building 1</i>	1986 (32 years)	82,500	0.14 (Poor)
<i>Building 1 (Addition)</i>	2002 (16 years)	(Included above)	(Not rated)
<i>Building 2</i>	1986 (32 years)	6,440	0.14 (Poor)
<i>Building 3</i>	1986 (32 years)	4,290	0.15 (Poor)
<i>Building 4</i>	1986 (32 years)	33,800	0.08 (Fair)
<i>Building 5</i>	2006 (12 years)	25,800	0.03 (Good)
<i>Building 6</i>	1978 (40 years)	10,400	(Not rated)
<i>West Base Buildings</i>	1977 (40 years) 1995 (22 years)	16,000	(Not rated)

Parametrix’s final report, including condition assessment summaries, key findings, recommended corrective actions, cost estimates, and the TERM Lite scale ratings are provided in their entirety as Appendix A.

7.3 Base Master Plan Update: Goals, Recommendations and Cost Estimates, Next Steps

In 2017 Pierce Transit contracted with Schacht-Aslani Architects and WSP USA, Inc. to update the existing Base Mater Plan to horizon year 2040. Under the Scope of Work, a set of overriding goals was identified by the agency and confirmed by the stakeholder group during the development of the Base Master Plan Update. These goals and objectives provided a framework for decision making throughout the process and provided a way to compare options and alternatives. The identified goals were:

- Optimize the use of existing assets, including land.
- Improve the efficiency, safety, and productivity of the facility in a cost-effective manner.
- Provide flexibility to adapt to industry changes and evolving partner agency needs.
- Be open to new and innovative business practices and work environments.
- Utilize green design principles in site facility and design.

Working with the group of stakeholders identified by both transit agencies (i.e., Pierce Transit and Sound Transit) to represent each of the various functions and needs of the base, the planning team reviewed the existing constraints, identified needs and objectives of each department or area, and developed and adjusted a series of planning alternatives. These alternatives were evaluated with the stakeholders and with the executive teams for both transit agencies and developed further for review. Finally, a preferred alternative was selected. This alternative was developed in detail with project scope, implementation, and costs defined.

The preferred alternative meets the program goals and objectives in an efficient and pragmatic way. The selected scheme places a high priority on retaining existing buildings and infrastructure to minimize disruption to ongoing operations and retain existing capital investment. It was designed to improve efficiencies, update aging infrastructure, and plan for growth, including a changing fleet composition of buses (e.g., 60-foot articulated coaches for a future Pacific Avenue/SR 7 Corridor Bus Rapid Transit) and other service and support vehicles.

Using a phased approach (from 2018 through 2028), the consultant team identified 14 sub-projects, each of which is described in the *Preferred Alternative* section of the document (depicted on the following page), grouped into four major renovation phases. A detailed Implementation Schedule, as developed by the team, showed a way in which these projects could be completed. Although the document cautions that the schedule assumes an aggressive timetable, representing the fastest route to completing all the sub-projects identified in the final report. A summary version is shown as **FIGURE 1-2** below.

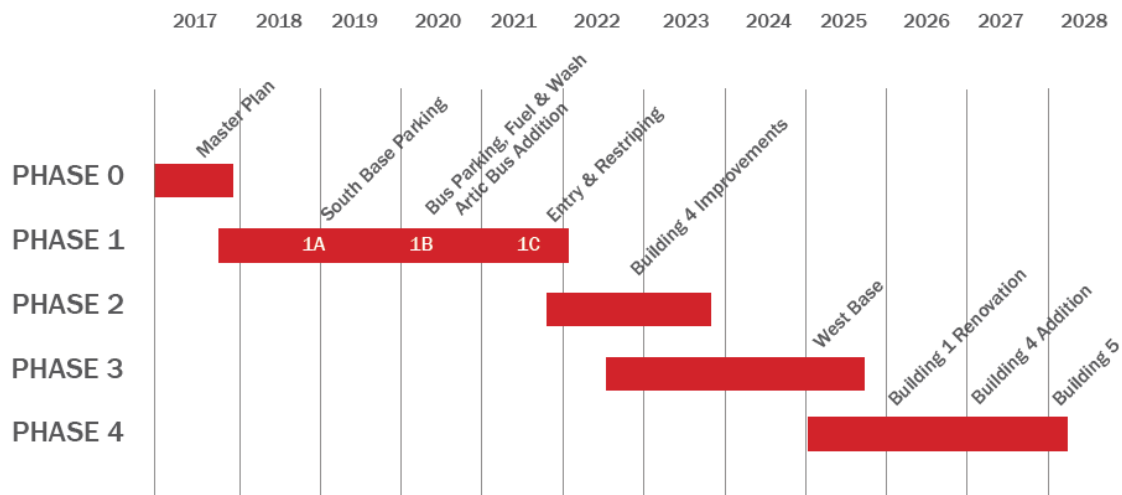


FIGURE 1-2 IMPLEMENTATION SCHEDULE FOR THE PREFERRED ALTERNATIVE

A conceptual cost estimate for each sub-project was developed, and a detailed breakdown of the assumed construction costs, including projects and soft costs, was provided. Each estimate was provided in 2017 dollars. Then an escalation factor was applied based on the Implementation Schedule to calculate the total project cost over time for all phases. The total escalated project cost of all the sub projects is \$165.48 million. A summary is provided as **FIGURE 1-3** showing the costs in 2017 for each sub-project and a subtotal by phase.

ESTIMATED PROJECT COSTS	2017 Cost	Escalated from Cost by Year
Phase 1	\$41,979,927	\$45,667,939
1A: Expand South Base Parking	\$5,155,742	\$5,414,138
1A: Building 4 Parking Improvements	\$953,377	\$1,007,549
1B: Expand Bus Parking + New Fuel & Wash + 6 Electric Bus Charging Stations	\$20,742,792	\$22,637,553
1B: Articulated Bus Bays Addition to Building 1	\$6,253,470	\$6,775,849
1B: Demo Public CNG & Build New Detail Clean Facility	\$3,914,062	\$4,293,785
1C: Bus Lot Reorientation & Restriping, Entry Improvements	\$646,612	\$718,743
1C: Regrade & Pave VSR, Bad Order, Surplus Parking	\$4,331,939	\$4,820,322
Phase 2	\$5,897,146	\$6,882,592
2A - Skybridge	\$991,921	\$1,131,534
2B - Building 4 Workplace Improvements	\$4,905,225	\$5,751,059
Phase 3	\$56,829,403	\$70,250,405
3A - Building 4 Renovation	\$56,402,394	\$69,721,701
3B - Building 4 Addition / Comprehensive Renovation	\$427,008	\$528,703
Phase 4	\$33,030,933	\$42,674,264
4A - Building 1 Renovation	\$19,680,695	\$25,070,362
4B - Building 4 Addition & Renovation	\$9,666,675	\$12,665,962
4C - Building 5 Renovation	\$3,683,563	\$4,937,940
TOTAL	\$137,737,408	\$165,475,200

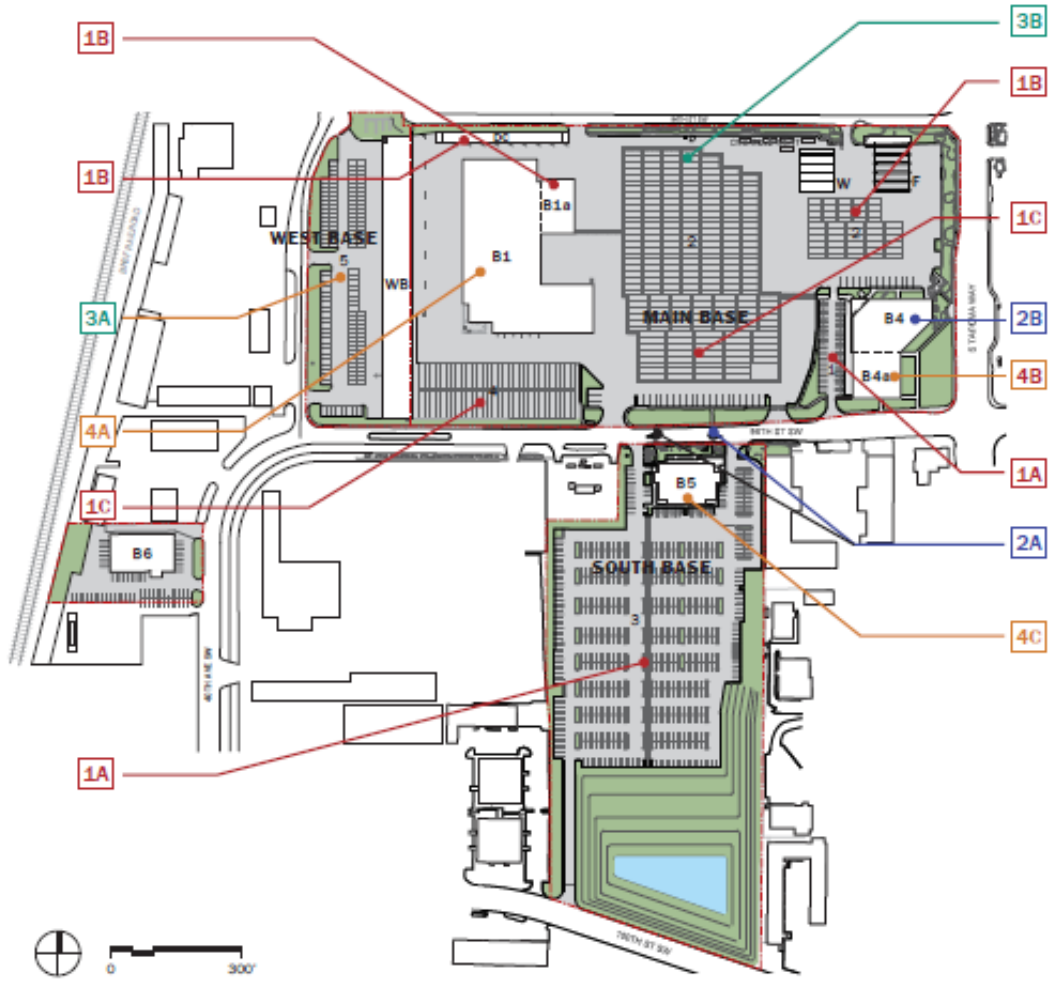
FIGURE 1-3 COST ESTIMATE TABLE FOR THE PREFERRED ALTERNATIVE

After accounting for revenue vehicles' replacement costs, the second largest expenditure in the Six-Year Capital Plan covering 2018-2023 is for implementation of the Base Master Plan. Programmed amounts by year (as shown in Figure 1-3 above) are depicted in **Table 7.1**. The substantially lower, currently budgeted amounts (\$24.11 million through 2023) are reflected in the various TERM Lite funding scenarios in Section 13 as an *expansion* asset. Funding expected from Sound Transit accounts for the \$51.33 million difference (i.e., amounts programmed versus lesser amounts used in TERM lite scenarios).

Fiscal Year	Amount
2018	\$15,670,084
2019	\$7,418,138
2020	\$130,000
2021	\$39,055,189
2022	\$130,000
2023	\$8,651,976
2024	\$4,665,210
Total	\$75,450,597

The next step in the process was to hire an architect and engineering firm to begin the Preliminary Engineering/Design phase, including refining the cost estimates and recommendations for phasing the project over the next decade. The initial recommendations have been identified as *Base Master Plan Implementation - Phase 1* priorities, including parking lot expansions or reconfigurations, building renovations or expansions, and new adjacent facility construction. Collectively these projects will improve transit vehicle circulation and safety, plus augment efficiencies through a greater capacity for maintenance and operations of replacement and expansion revenue vehicles. After completing a competitive bid process in summer 2018, Pierce Transit selected and awarded the \$6.89 million contract to Huitt-Zollars, Inc., to commence with the work in fall 2018. An illustrative example of the Preferred Alternative as initially recommended is shown as **Figure 6-1** on the following page.

Internal discussions and continued planning during 2018 have resulted in a revised approach to meeting some of the needs identified in the BMP process while still meeting the overall goals and intent. The expansion to Building 1 recommended for Phase 1 has been revised to become an interior modification to Building 1’s inspection pits to fill them in to allow for maintenance of articulated buses. Development of a new maintenance facility building on West Base was accelerated to provide expanded maintenance space, plus accommodate articulated bus maintenance. These modifications better prepare Pierce Transit for implementation of Bus Rapid Transit while the agency also continues its partnership with Sound Transit for operations and maintenance of a significant portion of their Regional Express bus fleet. Still, the 2018 Base Master Plan provided a useful roadmap to meeting the agency’s short- and long-term operations and maintenance needs, and as design work continues there will be ongoing refinement of the best ways to meet those needs, including revised and updated cost estimates by phase.



PHASES

1A	Building 4 Parking Improvements Expand South Base Parking
1B	Demolish Public CNG and Build New Detail Clean Facility Articulated Bus Bay Addition to Building 1 Expand Bus Parking and New Fuel & Wash and Electric Bus Charging Stations
1C	Regrade and Pave VSR, Bad Order, Surplus Parking Bus Lot Reorientation Restriping and Entry Improvements
2A	Pedestrian Crossing Improvements
2B	Building 4 Work Place Improvements
3A	West Base Facility
3B	Demolish Existing Building 2
4A	Building 1 Renovation
4B	Building 4 Addition and Renovation
4C	Building 5 Renovation

BUILDING

B1	Building 1 - Vehicle Maintenance
B1a	Building 1 Addition - Artic Bays
B4	Building 4 - Admin / Operations
B4a	Building 4 Addition - Admin/Ops/Com
B5	Building 5 - Admin / Training
B6	Building 6 - (Unoccupied)
WB	West Base Maintenance Facility
DC	Detail Clean Facility
W	4-Bay Wash Building w/chassis Wash
F	5-Bay Fuel Building

PARKING

1	Admin/Visitor Parking (67 spaces)
2	Revenue Vehicle Parking (14' spaces)
3	Employee Parking (647 spaces)
4	VSR/Surplus/Downline
5	Vanpool/Facilities/NRV/Shuttle Parking (187 spaces)

FIGURE 6-1 THE PREFERRED ALTERNATIVE WITH ALL PHASES AND IMPROVEMENTS SHOWN COMPLETED

7.4 Facilities State of Good Repair (SGR) Performance Measures & Targets

Pierce Transit’s State of Good Repair Performance measures and targets for capital facilities, as adopted on January 31, 2017, are shown in Table 7-2.

Asset Category	Measured by	Performance Measure	Target
Facilities	Condition	Percent of capital facilities with a condition rating below 3.0 on the TERM Lite scale.	Rehabilitate and restore at least 75 percent of capital facilities to a condition rating of 3.0 or above on the TERM Lite scale by the end of calendar year 2021 (which is the end of the TAM horizon period).

Author’s note: Some discrepancies or incorrect information cited in this section from the final Schacht-Aslani Architects & WSP USA, Inc. report are listed as **Errata** below for clarification purposes.

- a. The rooftop units only serve the office areas. Those areas are the only ones that have heating and cooling. The Maintenance shop area has heat only.
- b. The paint booths themselves are not going to be replaced; just refurbished. The paint booth dedicated HVAC units and associated controls will be replaced. The project is budgeted in 2019-2020.
- c. While the consultant made that determination, Pierce Transit does not necessarily agree that it is accurate.
- d. The agency has no plans to relocate at this time. There is no space on base for above-ground tanks and the required containment.
- e. 2N/11s bays were designed and constructed with Sound Transit funding specifically to service up to 10 articulated coaches.
- f. Pierce Transit is unaware of any plan that indicates the need for 14 additional articulated bays. The agency’s understanding is that one bay can service up to 10 coaches.
- g. There is no CNG equipment along the north wall of this building.
- h. The first CNG compressors were installed in 1992, a third was installed in 2000. In 2005 the first Ariel compressor assembly from ANGI was installed. The current configuration has been in place since 2012.

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Section 8 – Customer Facing and Passenger Facilities

Pierce Transit owns, operates, or maintains 13 customer-facing and passenger transit facilities, located throughout Pierce County, and highlighted below. As part of the same contract mentioned in Section 7, the private sector consulting firm Parametrix, Inc., was tasked with inspecting these 13 facilities in 2017, making recommendations for repairs or upgrades that would bring them to a State of Good Repair, and providing preliminary cost estimates for the work. Their final report, including condition assessment summaries, key findings, recommended corrective actions, cost estimates, and the TERM Lite scale ratings, are provided in their entirety as **Appendix A**.

8.1 Transit Centers, Stations, and Transfer Facilities

- **72nd Street Transit Center** - The 72nd Street Transit Center is located at 1319 on the northwest corner of E. 72nd Street and Portland Avenue E in Tacoma. This facility has a 68-stall Park-and-Ride lot and is served by five bus routes. After negotiating a lease with the Puget Sound Marketing Company for \$700 per month, temporary operations at this location began in 1981. The terms of the annual renewable lease were reduced to \$450 per month in 1986. The property was eventually purchased for \$716,000. The transit center as it exists today was constructed in 1994 thru 1995 for \$1.35 million. In 2019, a midlife renewal and rehabilitation will be completed. The project includes shelter repairs and upgrades. Also included is replacing the existing light fixtures with new LEDs, replacing damaged asphalt and concrete surfaces, replacing pavement markings, replanting the existing landscaping, and other associated repair work to bring the parking, driving, and walkway surfaces back to a State of Good Repair. Additional site lighting will be added where needed. **The project cost estimate is \$510,000.**
- **Commerce Street Transfer Facility** - Located along Commerce Street between S. 9th and S. 13th Streets in Tacoma's downtown core, Commerce includes seven passenger boarding zones, and a bus turnaround/layover facility that is served by 17 Pierce Transit, three Intercity Transit Express routes (603, 605, and 612 to Lacey and Olympia¹⁰), and two Sound Transit Express routes (590/594 to downtown Seattle). The facility was built as result of the Commerce Connections and Public Spaces Project and completed in 1993. The project was initially conceived to be the first of six downtown Tacoma revitalization projects, which were to extend south to the bus zone on Pacific Avenue and S. 24th Street. A Fact Sheet on the facility shows \$14.07 million as the total cost, but that figure cannot be verified for historical accuracy. The facility is scheduled for a mid-

¹⁰ As of the September 22, 2018 service change, Intercity Transit is consolidating Routes 603, 605, and 612 into a single route with a simplified stop structure. The revised Route 612 will now terminate at the Tacoma Dome Station. The revised Route 612 changes the bus route and schedule to improve the consistency of Intercity Transit Express commuter service and connections with regional transit service in Tacoma's Central Business District.

life rehabilitation and complete systems upgrade beginning in 2019, although the cost estimate is not yet known.

- **Lakewood Towne Center Transit Center** - This facility is in the northern peripheral area of the Lakewood Towne Center. It is served by eight Pierce Transit routes and one Sound Transit Express bus route (574 to Sea-Tac International Airport). The project is currently budgeted for a restoration and renewal project in 2019 **estimated at \$740,000**. The work includes roof repairs to the shelters, including painting the metal structures. It also will remove and replace many cracked and uneven sidewalks, regrading the passenger islands, and constructing new ADA-complaint access ramps. Existing lighting will be upgraded to new, energy efficient LED fixtures as well.
- **Parkland Transit Center** - This neighborhood Transit Center near the Pacific Lutheran University campus is located on the northwest corner of Pacific Avenue and S. 121st Street in Parkland. Pierce Transit Routes 45 and 55 make trips through this facility, which includes a 62-stall Park-and-Ride lot. The transit center opened in November 1984 on property leased from the Franklin Pierce School District for \$1.00 per year for 20 years with another 10-year option. Initially designed to accommodate six buses, the transit center was expanded in 1989 to accommodate up to eight buses at \$392,000. At that time, it was completely resurfaced from asphalt to eight inches of concrete. In the fall of 1990, Pierce Transit purchased the property from the School District for \$270,000. The transit center was completely refurbished in 2013-2014 at a cost of \$358,000. The project included improved pedestrian and ADA-compliant access, new and additional passenger shelters, existing shelters refurbishment (including roof and gutter repairs), new landscaping, improved lighting and security elements.
- **Point Defiance Bus Layover Facility** – Located at 5810 N. Pearl Street, between the Point Defiance Park entrance and the Vashon Ferry Terminal, the facility was jointly developed and constructed in 1992 by Pierce Transit, Tacoma’s Metropolitan Parks District, and the Washington State Department of Transportation (WSDOT). It is served by Pierce Transit Routes 10 and 11.
- **South Hill Mall Transit Center** - The South Hill Mall Transit Center is located at 503 39th Avenue SW in Puyallup, on the south end of the South Hill Mall. The facility, owned by Sound Transit, was constructed in 1998 and is approximately 1.5 acres. Three Pierce Transit routes serve this facility (4, 400, and 425), as well as Sound Transit Express Route 580 to Lakewood. The facility was completed in 1999 at a cost of \$2.7 million. **The agency has a 20-year midlife repairs and upgrades project estimated at \$822,000 scheduled for 2019.**

- **Tacoma Community College Transit Center** - Located on the Tacoma Community College campus on the northeast corner of S. 19th and Mildred Streets, this facility is served by eight Pierce Transit routes and one Sound Transit Express route (595 to Gig Harbor and Downtown Seattle). Adjacent to the transit center (to the east) is a 95-stall Park-and-Ride lot. The facility opened in 1984. A summer/fall 2018 renewal project includes shelter repairs and upgrades. Also included is replacing the existing light fixtures with new LEDs, replacing damaged asphalt and concrete surfaces, removing and replacing the asphalt in the Park-and-Ride lot, replacing pavement markings, replanting landscaping, and other associated repair work to bring the parking, driving, and walkway surfaces back to a State of Good Repair. Additional site lighting will be added where needed. **The project's budget is \$1.5 million.**
- **Tacoma Dome Station** – Outside of the Lakewood (headquarters) base, “TDS” as it’s known internally, is Pierce Transit’s largest capital asset. This facility is located two blocks north of the Tacoma Dome on Puyallup Avenue between East E Street and East G Street. It is served by seven Pierce Transit, four Sound Transit, and three Intercity Transit bus routes. It consists of a 2,337-space parking garage, of which 40 spaces are reserved for short-term parking, connected to a covered waiting area for local and regional express bus routes. Other amenities include bicycle lockers and racks, plus a secure bike parking and storage area or “SPA,” 24-hour security, and a customer service outlet known as *The Bus Shop*. In 2017, a specially marked pick-up location for Uber and Lyft customers was installed on East G Street, on the east side of the station. The Tacoma Dome Station is also Tacoma’s hub for Sounder Commuter Rail, Sound Transit’s Tacoma Link Light Rail, and Greyhound Bus. In addition, Amtrak will be moving to its new passenger rail station adjacent to Freighthouse Square in late 2018. The project was initially developed in two phases; the east garage opening in 1997 (at \$22.6 million) and the west garage in 2001 (at \$23.7 million).

The station is now undergoing a major midlife renovation, scheduled to complete in spring 2019. Details of the work currently underway are provided in the Parametrix assessment. **The total cost estimate for the repairs and upgrades is \$5.67 million**, of which \$1.89 million was provided by a Federal Transit Administration (FTA) grant.

- **Tacoma Mall Transit Center** - The Tacoma Mall Transit Center is located across S. 48th Street on the south side of the Tacoma Mall, just east of S. Oakes Street. Seven Pierce Transit and one Intercity Transit bus route (620) to Olympia serve this facility. The facility was constructed for \$767,000 and opened in 1985 on property leased from the Tacoma Mall Corporation for \$1.00 per year for 30 years. The lease agreement between Pierce Transit and Simon Property Group has been extended for an additional fifteen (15) years, commencing on January 1, 2016 and ending on December 31, 2030. The

annual lease payment is \$50,000 with a 3 percent annual escalation. The City of Tacoma is currently studying the possibility of relocating the transit center to its geographic center or a location closer to S. 38 Street as part of initial efforts to redevelop the mall and surrounding neighborhood into a more pedestrian friendly, mixed use environment and activity center. On May 15, 2018, the City Council adopted the *Tacoma Mall Neighborhood Subarea Plan*, along with a package of amendments to the Tacoma Municipal Code to implement the 575-acre Subarea Plan. The Plan and associated actions become effective on May 27, 2018. For more information, visit www.tacomamallneighborhood.com

The summer 2018 construction season included a midlife renewal at this heavily utilized transit center adjacent to the mall. The project included shelter repairs and upgrades. Also included is replacing the existing light fixtures with new LEDs, replacing damaged asphalt and concrete surfaces, replacing pavement markings, replanting the existing landscaping, and other associated repair work to bring the parking, driving, and walkway surfaces back to a State of Good Repair. Additional site lighting was added where needed. **The project's budget is \$1.19 million.**

8.2 Park-and-Ride Lots

- **Kimball Drive** - Located at State Route 16 in Gig Harbor, the facility was constructed in 1997 and offers 306 parking spaces. The facility is served by Pierce Transit Routes 100 and 102, along with Sound Transit Express Route 595 to downtown Seattle. The facility was expanded to its current configuration in 2001 at a cost of \$2.49 million. **The agency has a 25-year midlife repairs and upgrades project estimated at \$1.63 million.**
- **North Purdy (aka Purdy Crescent)** – Located at 6519 144th Street NW (at Purdy Drive NW) in Gig Harbor, the two-acre facility was constructed in 1991. The facility is owned by WSDOT and has 200 parking stalls. It is served by Pierce Transit Routes 100, 102, Sound Transit Express Route 595 to downtown Seattle, and the Kitsap Transit Purdy Connection to the Port Orchard Ferry Terminal. The facility opened in 1991 at a cost of \$617,000. **The agency has a 25-year midlife repairs and upgrades project estimated at \$1.77 million and scheduled for 2019.**
- **Narrows/Skyline** – Located at 6th Avenue and N. Skyline Drive in Tacoma, the facility was constructed in 1986 and provides parking 195 spaces. It is owned by the City of Tacoma and served by Pierce Transit Route 100 and Sound Transit Express Route 595 to downtown Seattle. The facility was constructed in 1985 for \$111,000 on land donated by the City of Tacoma. Pierce Transit operates and maintains the site through an agreement with the City of Tacoma. **A midlife renewal project is planned for 2019, although the cost estimate for the work is not yet known.**

- Washington State Route 512** – Located at 10617 S. Tacoma Way, just west of Interstate Highway 5 in Lakewood, this WSDOT-owned facility was constructed in 1988 on eight acres and has 498 parking spaces. It is served by Pierce Transit Routes 3 and 4, along with Sound Transit Express Routes 574 to Sea-Tac International Airport, 580 to Puyallup, 592 to DuPont and downtown Seattle, and 594 to Tacoma and downtown Seattle. In December 1987, Pierce Transit entered into an agreement with the Washington State Department of Transportation for a 450-stall parking lot and transit station. As defined by the agreement, Pierce Transit was responsible for developing final design contract documents for the transit station portion of the park-and-ride lot. WSDOT assumed responsibility for construction of the facility, including both the transit station and park-and-ride lot. Upon completion of the facility in October 1988, Pierce Transit assumed maintenance responsibilities for the entire facility. The only costs listed in the fact sheet, as incurred by Pierce Transit, were \$58,000 for the Planning, Design, and Engineering phases.

As noted in the Parametrix report, the SR 512 Park-and-Ride and Transit Center is undergoing a complete renovation in 2018. The project includes shelter repairs and upgrades. Also included is replacing the exiting light fixtures with new LEDs, replacing the asphalt surfaces in the transit center with concrete, removing and replacing the asphalt in the Park-and-Ride lot, and other associated repair work to bring the parking, driving, and walkway surfaces back into a state of good repair. Additional site lighting will be added where needed. **The total amount budgeted for the repairs, resurfacing, and upgrades is \$2.59 million.** Work should conclude in winter 2018/2019.

Midlife Renewal Projects Summary

Restated, funds are budgeted in 2018 -2019 for necessary repairs and refurbishments at five key locations, including Tacoma Dome Station, SR 512 Park-and-Ride, 72nd Street Transit Center, Tacoma Mall Transit Center, and Tacoma Community College Transit Center and Park-and-Ride, and Lakewood Transit Center. **The total cost estimate for the combined repairs and upgrades is \$11.7 million¹¹.**

Replacement values and current condition ratings from the VFA.facility database are shown in **Appendix C.**

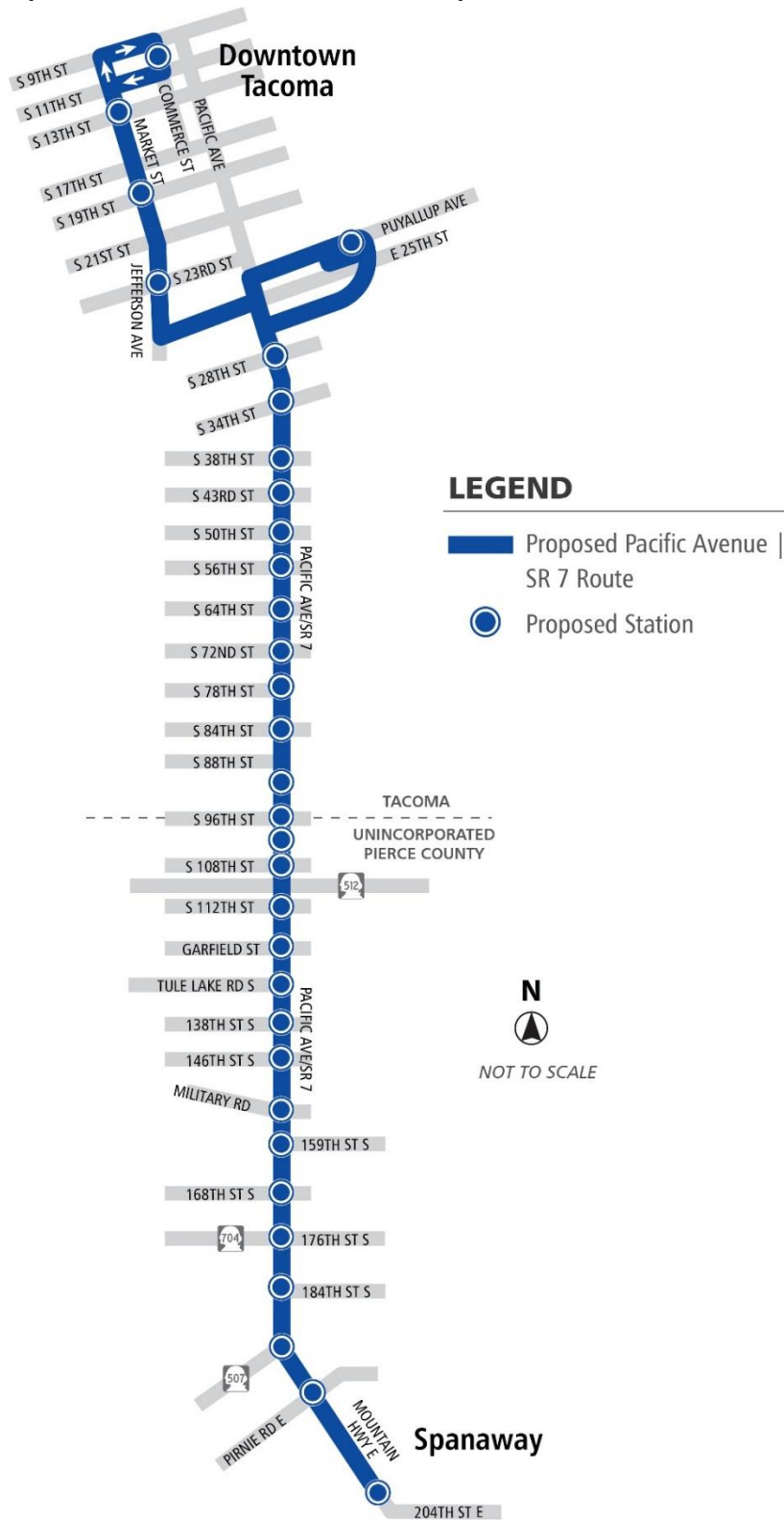
8.3 Pacific Avenue/Washington State Route 7 Corridor Bus Rapid Transit Stations

Since February 2017, Pierce Transit has contracted with WSP, USA, Inc. (originally Parsons Brinckerhoff) to assist in the evaluation of High Capacity Transit (HCT) options for the 14.4-mile

¹¹ Although note that this amount is substantially higher than the cost estimates for facilities repairs and upgrades as listed in the Parametrix report. While Pierce Transit agreed with their findings and recommendations overall, the agency feels their cost estimates for the proposed work were unrealistically low or under reported in many cases.

Pacific Avenue/SR 7 Corridor from downtown Tacoma south to Spanaway. The intent of the project is to develop and evaluate options that will improve existing fixed route transit service and ridership in the corridor in a cost-effective manner. The *Mode Evaluation* report considered four HCT modes. Ultimately, based on 12 goals under the project's *Purpose and Need* statement, as well as feedback from the public, the project team determined that Bus Rapid Transit (BRT) is the most appropriate mode, given the current and expected level of ridership. BRT also best meets the nexus of existing land use and population distribution with the goals for improved transit speed and reliability plus future redevelopment investment – especially mixed use and transit oriented - planned along the corridor in both the City of Tacoma and unincorporated Pierce County sections. As part of developing the Locally Preferred Alternative (currently underway), the consultant determined that stations should be located at key intersections along the corridor, including connections to other Pierce Transit or Sound Transit routes, Centers of Local Importance (COLIs), or other destinations. While the Locally Preferred Alternative (LPA) will determine the exact number of stations and types (e.g., curbside running or median running), 32 locations have been identified initially as depicted in the diagram on the following page. Since peer BRT systems in the Pacific Northwest have averaged \$220K-\$500K per station, \$400K is being used as Pierce Transit's initial cost estimate in TERM Lite under system expansion assets. Although the system will operate in Right-of-Way owned and maintained by the City of Tacoma or the Washington State Department of Transportation (WSDOT), additional BRT infrastructure needs will be identified in 2019 when the project enters the Preliminary Engineering/Design phase.

Figure 8.1 Proposed Pacific Avenue/SR 7 Bus Rapid Transit Route and Station Locations



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Section 9 – Equipment: Maintenance, Information Technology, Communications, Safety, and Security

9.1 Facilities and Vehicles Maintenance

Pierce Transit Facilities Maintenance and Vehicle Mechanics use many different tools as part of their daily duties and responsibilities. Namely, keeping the agency’s facilities and vehicles in their best possible operating conditions - focusing on safety and reliability.

Facilities Maintenance Mechanics are responsible for preventative maintenance on commercial transit building components, systems, and equipment such as heating, ventilation, and air conditioning (HVAC), plumbing, electrical, fire protection, bus shelters, fueling stations and dispensing systems, and bus wash systems. In addition, their wide range of duties include inspecting, testing, and repairing shop equipment such as lathes, hydraulic hoists, grinders, vises, drill presses, battery chargers, hose reels, vehicle lifts and cleaning systems, parts cleaners, fire doors, roll doors, and telescoping doors. Many are skilled in plumbing and electrical repairs and installations too, as well as general carpentry, masonry, and welding.

Journey Level Mechanics are responsible for repairing, adjusting, and replacing all parts of natural gas, diesel, and gasoline engines, transmissions, drive trains and differentials, plus lubrication, cooling, exhaust after treatment, and air or hydraulic systems. They are specialists in diagnosing malfunctions and adjusting fuel, electrical, programmable logic controls (PLCs) and mechanical system to specifications. They also remove, rebuild, and replace automatic transmissions in buses. Other duties include inspecting, adjusting, troubleshooting, and repairing bus door operation, air-ride systems, steering systems, and wheelchair lifts.

While most of the facilities and vehicles maintenance and repair equipment falls well below the \$50,000 threshold to be listed as part of this TAMP, Pierce Transit does own and operate certain equipment that is both costly and specialized to the trade, as highlighted and depicted below. This equipment is listed in the agency’s TERM Lite database as well.

JRI Industries “Jenfab” Heavy Duty/Industrial Parts Cleaning Systems – Two new cabinet washers were purchased and installed in 2018, which replaced an aging (Alkota) large industrial parts washer. This equipment is on a 10- to 12-year lifecycle.

Asset ID ¹²	Original Purchase Price	TERM Lite Rating
(To be assigned)	\$89,461	5.0

¹² As listed in the FMS database.

“DynoMotive” Chassis Dynamometer - A dynamometer (aka rolling-road or dyno) is a mechanical device for measuring power and torque of an automobile, motorbike, truck, transit bus, or even an agricultural machine, such as a tractor. The torque produced by an engine is converted to traction force by transmission (gearbox, differential) at wheels. Chassis dynamometers can be used beyond just for simple torque and power measurement. Very common usage is fuel consumption and emissions measurement according to governmental emissions testing cycles, or to determine real fuel consumption under load. Technical schools and universities use dynamometers for investigations in combustion physics, chemical comparisons of fuel, or just to simulate the road while testing the bus for various purposes. Modern chassis dynamometers have a power absorption system that is intended to simulate real loads for a bus’s engine. There are two main sources of this load. The first is through its own inertia of rotating car parts, wheels, dyno rollers, shafts, etc. Inertia, while accelerating with a bus at dyno, counterforces. It is therefore better when dyno rollers are heavy and have a bigger diameter as this increases inertia.¹³ The unit was purchased and installed in 2002.

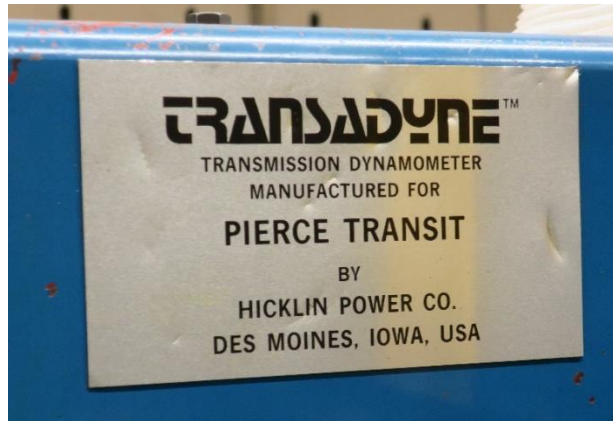
Asset ID	Original Purchase Price	TERM Lite Rating
15660	\$135,215	4.0

Hicklin Power Co. “Transadyne” Transmission Dynamometer - The dyno is a machine that holds the transmission and drives the front pump with a powerful electric motor via a special adapter. The dyno also has several pressure gauges that help monitor the line pressure and other pressure readings in the transmission. As the electric motor comes up to speed (along with the front pump that it’s attached to) the transmission starts to generate line pressure. Readings on the gauges are compared with minimum factory specifications. The electric motor also drives the input shaft. The transmission can be run through the gears manually, assuring that all the clutch packs are being applied properly. A technician will also use electronic testing equipment to check the resistance in the solenoid. More modern transmission dynos will include a computer and monitor to help aid in the testing process. Dyno testing guarantees that a remanufactured transmission works properly.¹⁴ It also verifies that repairs are completed on a remanufactured transmission component. Pierce Transit uses this equipment to test Allison, Voith, and ZF heavy-duty transmissions from its vehicles. The unit was purchased and installed in 1987.

Asset ID	Original Purchase Price	TERM Lite Rating
12586	\$63,750	4.0

¹³ Source: <https://vtechdyno.eu/dynoblog/chassis-dynamometer-how-does-it-work.html>

¹⁴ Source: <http://etereman.com/blog/transmission-care/dyno-testing-a-re-manufactured-automatic-transmission-and-why-its-important>



Stertil-Koni Mobile Column Vehicle Lifts - These allow Pierce Transit to safely lift a wide range of heavy duty vehicles quickly and efficiently. Four hydraulic lifts are used in tandem to raise a 40-foot coach and six are used for a 60-foot articulated coach. The cable-controlled versions have a lifting capacity of 6.5 tons to 17.5 tons per column. Fourteen units were purchased in 2014. The units' expected replacement cycle is 7 to 10 years.

Asset ID	Original Purchase Price	TERM Lite Rating
19089	\$120,340	4.7



9.2 Information Technology Infrastructure

Pierce Transit relies on a variety of advanced technological systems to operate daily. Core Business Systems such as Human Resources/Payroll, Finance, Regional Fare Integration (e.g., ORCA¹⁵), Fleet Maintenance, bus and paratransit scheduling, and telecommunication systems

¹⁵ The ORCA card (an acronym for *One Regional Card for All*) is a contactless, stored-value smart card system for public transit in the Puget Sound region of western Washington. The card is valid on most transit systems in the Seattle metropolitan area, including Sound Transit, local bus agencies (e.g., King County Metro, Pierce Transit, Kitsap

allow staff to effectively meet operational requirements. The agency also has a complex Radio/Computer Assisted Dispatch System consisting of 20 radio servers, 24 CAD servers and 16 radio tower sites that it shares with its radio system partner, Pierce County, to provide voice and data communications to staff and vehicles. This 700 MHz Radio System connects Pierce Transit and Pierce County with other regional government and public safety agencies as they join the system as subscribers.

There are over 400 Agency computer users; an Agency Wide-Area-Network consisting of well over 100 servers (many of which are virtual); numerous firewalls, switches and routers; printers; and onboard vehicle and desktop computers. These systems operate 24 hours a day, 7 days a week.

Capital projects that have a significant technical component or require integration with existing technology systems are included in this category. The 2018 Capital Budget includes funds for maintenance and upgrade of several critical systems, as well as replacement of infrastructure that has reached the end of its useful life. Some of these projects include replacements of the Vanpool Information System, Customer Resource Management System, and the Agency Enterprise Data Backup System. We'll begin the SHUTTLE Interactive Voice System acquisition and implementation and continue to move forward on the next generation version of ORCA, the regional fare system, in 2021-2022.

Hardware

Computers used throughout the agency are currently standardized. All agency computers, both laptops and desktops, were upgraded to new machines in late 2017. The Operating System is Microsoft Windows 10. However, there is a small group of Macintosh computers used in the Marketing Division, which are running the most current version of the Mac Operating System.

Servers are also standardized. Pierce Transit uses a combination of stand-alone rack mounted servers and blade servers. Servers are set up and configured based upon the core business systems vendors' requirements.

Over the past several years, the technology pendulum has swung back towards centralized computing, and with the maturity of Windows Terminal Services and Citrix Services, the concept of thin-client computing has been recognized as an industry standard. Thin-client computing places all the processing, memory and storage (hardware) requirements on a central server or server farm. The desktop device becomes more of a display terminal than a

Transit, Everett Transit, and Community Transit), Washington State Ferries, Seattle streetcar, the King County Water Taxi, and Kitsap Fast Ferries. It was launched in April 2009 and is managed by the Central Puget Sound Regional Fare Coordination Project, a board composed of local transit agencies.

The card can be loaded with "E-purse" value (i.e., used as a stored-value card), similar to a debit card, and monthly passes. Cards are sold and reloaded at participating grocery stores, customer service centers, and ticket vending machines at transit stations. ORCA cards offer free transfers between transit systems within a two-hour window.

Source: https://en.wikipedia.org/wiki/ORCA_card

computing device. This leads directly to independence from the type or power of the desktop hardware, allowing a standard computing environment to be deployed to a multitude of desktop devices. As such, the agency has taken advantage of this capability and use it to allow remote access to the network for remote or “on-the-road” staff to access the network to accomplish their daily tasks while working away from Pierce Transit facilities.

Virtualization has also come of age in the last couple of years. One powerful server can run several “virtual” servers – allowing the agency to replace quite a few units in the server room. The virtual server acts as a “real” server in all aspects, except it does not exist in physical form. This provides for a “greener” or environmentally-friendly approach to maintaining the agency’s hardware infrastructure. While Pierce Transit still has just as many servers to host the business systems, this reduces the need for physical servers by almost two-thirds. The agency is currently supporting 248 servers on the local network – 160 of which are virtual servers. The virtual servers include numerous production servers, all core business test servers, and disaster recovery servers.

Industry Lifecycle Practices

Technology hardware: 40 percent of companies are on a 4-year cycle, 30 percent are on a 3-year cycle, and 30 percent are on other - longer or shorter - cycles. Experts favor a four-year cycle. Longer cycles may leave hardware out of warranty and unsupported, sub-optimize worker productivity, or present budget problems (e.g., when external events create a need for wider change).

Many State and Local Governments have made policy decisions that implement a 3- to 5-year replacement goal for desktop and server class machines. Most of them have established a 4-year replacement goal, although this varies due to several factors. The States with the 3-year goal had funding available to remain on the leading edge of technology. This funding was due to extra revenue sources, such as fossil fuel extraction and production revenues in Alaska. States and Local Governments with extended replacement goals (i.e., five years) simply could not afford a more frequent replacement cycle – and many stated that five years was their goal - but their actual practice was not to replace machines until failure because no funds were available for an agency-wide replacement. Those with a 4-year replacement cycle felt they were getting the most “bang-for-the-buck” with their equipment. They continued to fully utilize their equipment until vendor support was no longer available or until other, external systems required upgrade of the equipment.

Security Issues

Seven major security issues support shorter life cycle replacement times for desktop personal computers and servers, as listed below:

1. Outdated hardware systems are vulnerable to attacks at sign-on.

2. Older systems don't have adequate locking and password functions.
3. Security fixes and vulnerability patches are often no longer available for older systems.
4. Older operating systems often don't contain the necessary tools to identify and remedy system compromises.
5. The risk of system compromise via Instant Messaging attacks is greater with outdated equipment.
6. The overall security risk for older systems is increased due to a lack of available technical support and defensive measures.
7. Software (operating systems and utilities): Upgrade operating systems strategically. That is, based on advantages and risks presented by the upgrade, not with every new Windows operating system (OS) release.

Lifecycle Recommendations

Recommended Person Computer Refresh Rates

- The recommended use per model is four (4) years, based on analysis of industry and government practices.
- The recommended on-site warranty period is four (4) years, which keeps machines under warranty during their useful life.
- The recommended period for removal of technology equipment from service is four (4) years. After that period, parts and patches are no longer available.

Pierce Transit's Information Technology Department will review the refresh rate recommendation every year, based on budget conditions and other impacting issues. It will also investigate new technologies and make recommendations as they become available.

Recommended Server Refresh Rates

Most hardware vendors commit to four years of parts availability for servers. Most servers have no "book" value three years after their date of purchase. However, pursuing a server replacement based on a depreciation schedule can cause tremendous churn depending on the number of servers being used in the Agency. It may cause the staff to be so consumed with server replacement projects that administrative productivity suffers. To avoid these problems server refresh should be coordinated with an operating system life cycle.

- Most hardware vendors commit to four years of parts availability for servers; therefore, four years is the reasonable upper limit for the life of a deployed server.
- Minimize the impact of an infrastructure change by upgrading in small groups rather than Agency-at-once.

The Information Technology Department will review the refresh rate recommendation every year, based on budget conditions and other impacting issues. It will also investigate new technologies and make recommendations as they become available.

Pierce Transit Hardware Lifecycle

Desktops – Four-year Lifecycle

Most Operating Systems on Pierce Transit workstations are Microsoft Windows 10. There are a few older Operating Systems to support isolated systems that are nearing the end of or are beyond their life cycle replacement (e.g., Windows 7). All desktop workstations are purchased with three years' on-site warranty and an extended fourth year on-site warranty. Two common reasons for desktop equipment to be replaced are because the software necessary to operate new applications will not perform on older equipment, or the vendor no longer supports the software on the desktop equipment. However, it is not uncommon for desktop workstations to be used for a full four-year period. These were replaced agency-wide in December 2017.

Asset ID	Original Purchase Price	TERM Lite Rating
17120	\$168,210	4.9

Servers – Four-year Lifecycle

As mentioned previously under "Hardware," all servers are purchased with three years' on-site warranty and an extended fourth year on-site warranty. The most common reason for upgrading the server is the software that is hosted on the server is being upgraded and the new version cannot run on the older equipment. However, it is not uncommon for servers to be used for a full four-year period.

Asset IDs	Original Purchase Price	TERM Lite Rating
17099, 17118, 19068, 19071	\$502,651	4.8

Printers & Plotters – Four- to Six-year Lifecycle

All printers and plotters are purchased with three years' on-site warranty and an extended fourth year on-site warranty. An additional two-year on-site warranty has been purchased for plotters that are moderately used in the agency, thereby extending their useful life to six years. The plotters in the Marketing Department are very heavily used and are maintained on the four-year replacement cycle. It is not uncommon for heavily used printers and plotters to be kept for a full four-year period. It is not uncommon for moderately used plotters to be kept for a full six-year period.

Asset ID	Original Purchase Price	TERM Lite Rating
19062	\$58,280	4.7

Data Storage Devices – Four-year Lifecycle

Data storage devices are purchased with three years' on-site warranty and an extended fourth year on-site warranty. The Storage Area Network (SAN) equipment is purchased with

three years' on-site warranty and an extended fifth year on-site warranty. However, it is not uncommon for data storage devices to be used for a full five-year period. These are scheduled for replacement in 2018.

Asset IDs	Original Purchase Price	TERM Lite Rating
17057-A, 17130, 18014, 18014-1, 19094	\$885,202	3.5

Local Area Network Equipment – Four-year lifecycle

Local Area Network (LAN) equipment is purchased with three years' on-site warranty and an extended fourth year on-site warranty. However, it is not uncommon for LAN equipment to be used for a full four-year period.

Asset ID	Original Purchase Price	TERM Lite Rating
15800, 17092, 17111, 17115, 17126, 18008, 19065, 19066, 19067	\$1,384,009	4.9

Software

Recommended Software Replacement

Software (operating systems and utilities): Pierce Transit's policy is to upgrade operating systems strategically. That is, based on advantages or risks presented by the upgrade, not with every new Windows operating system (OS) release.

Software lifecycle is predicated on the type of software and the hardware platform being used. Any one of the following factors may require the replacement or updating of software:

- Hardware equipment changes
- Operating system changes
- User needs
- Software vendor support requirements
- Legislative requirements
- Manufacture updating and terminating support for older versions

It is best to minimize the percentage of end users affected by an infrastructure change by planning upgrades in small groups rather than attempting to change the entire agency at one time. At a minimum, operating system software upgrades should be timed to coincide with

normal hardware refreshes or when applications/middleware is undergoing a major upgrade. In designing the migration strategy, it must be taken into consideration that software vendors may discontinue support for their software at a different schedule than the operating system vendor.

Core system software is upgraded differently for each system. This is due to the method a vendor uses to release patches and version upgrades, as well as how the upgrades affect end users. Software patches are included in all maintenance support agreements with the vendor. Version upgrades are included in some maintenance support agreements, and some vendors charge separately for version upgrades. While some upgrades need to be accomplished soon after release, such as upgrades to a Payroll System – which include legislative and income tax related updates, others only need to be upgraded before the vendor eliminates support for the version installed. System versions are normally released once each year, and while each version changes the way the system operates incrementally or minimally, over several years and continuous version changes the system can change to a point where functionality is entirely different, and employees or end users must be totally retrained.

Asset IDs	Original Purchase Price	TERM Lite Rating
15597, 15807, 15807-1, 15808, 17018, 17030, 17057, 17057-B, 17095, 17013, 18011, 18013, 19070, 19070-A, 19087, 19093	\$2,000,622	4.8

Notes on additional, individual assets not listed above:

1. Traffic Signal Priority (17015-1, 17015-2, 17073, 19097) is for equipment at intersections and on buses – the software is Software as a Service (SAAS) and not hosted at Pierce Transit.
2. ORCA Regional Fare System (22008) is for equipment, servers, computers and software.
3. CCTV (19089) is for the entire system – both hardware and software.
4. Panic Alarm (17107) is for entire system – both hardware and software.

9.3 Communications Technology Infrastructure

Communications technology began with a small footprint to cover Pierce Transit buses through a startup 700 MHz radio system in 2006. The system was overhauled in 2014 and became even more reliable by covering Pierce County and some outlying areas as well. In January 2015, Pierce Transit entered into an agreement with Pierce County to provide the maintenance, operation and governance of a county-wide radio system to be called the *Pierce Transit-Pierce County Combined Communications Network (CNN)* of shared radio and microwave systems to carry voice and data traffic. The newer system retained the 700 MHz radio, but added cellular capability to improve communications.

The system was effective enough that Pierce Transit could partner with Pierce County’s Combined Communication Network (CCN), where all aspects of Pierce County public infrastructure are able to utilize this network, as well as their own. Pierce Transit’s coordination allowed their vehicle operators a larger footprint to work in.

Hardware

Currently, Pierce Transit owns and operates a Motorola 7.x 700 MHz public safety radio communication network including prime site, six 8-channel simulcast sites, dispatch center equipment and a master site. This system can converse with Pierce County’s Communication Combined Communication Network. The maintenance of the 700 MHz communication network is shared between Pierce County and Pierce Transit. The following sites comprise the 700 MHz network:

1. Mineral Hill Remote Site (48°44’36.65” N, 122°10’05.47” W)
2. Purdy Prime and Remote Site (46°44’36.65” N, 122°10’05.47” W)
3. CMF Prime Site (4812 196th Street East, Spanaway, WA 98387)
4. Eatonville Prime Site (46008 Alder Cutoff Road, Eatonville, WA 98326)
5. Three Sisters Site (47°07’00.35” N, 121°53’33.59” W)
6. Top Hat Site (206 SW 112th Street, Seattle, WA 98146)

There are 10 repeater sites that are Pierce Transit’s responsibility as well.

The following is a breakdown of the capital that makes the 700 MHz network:

1. DC Power Systems
2. Generator Backup for 24-hour/7 days per week/365 days per year operations
3. Generator Backup for general use
4. Infrastructure for support equipment
5. Infrastructure System
6. Transmission Buildings
7. HVAC systems for Transmission Buildings
8. Transmitting Towers

Asset IDs	Original Purchase Price	TERM Lite Rating
17137, 17138, 17140, 17146, 17148, 17151, 22005, 22005-2	\$38,867,393 (Mobile Communications System at \$35,968,406 + Antennae at \$2,898,987)	3.0

Industry Lifecycle Practices

Currently, the hardware involved in the development of the 700 MHz network is Based on a 50-year life cycle. The software portion requires upgrading every 5 to 7 years. A robust Planned

Maintenance program has been developed to ensure that the life cycle of the machinery is optimized.

Security Issues

This system is linked to other communications that comprise the CCN. As such, the integrity of the system requires the utmost in site security. All sites and repeaters have a high-level security system and are continuously monitored to ensure integrity of the network is maintained at all times and is available during unforeseen emergencies in Pierce County and adjacent areas.

Lifecycle Recommendations

Core system software is upgraded differently for each system. This is due to the method the vendor uses to release patches or version upgrades, and how the upgrades affect end users. Software patches are included in all maintenance support agreements with the vendor. Version upgrades are included in some maintenance support agreements, and some vendors charge separately for version upgrades. While some upgrades need to be accomplished soon after release (such as upgrades to a Payroll System – which include legislative and tax related updates), others only need to be upgraded before the vendor eliminates support for the version installed. System versions are normally released once each year, and while each version minimally changes the way the system operates, over a number of years and through ongoing version changes, the system can eventually be altered so much that functionality is entirely different, requiring employees to be totally retrained.

9.4 Other Notable Equipment

One of the largest capital purchases of note was a total replacement of the fixed route buses' fareboxes in December 2014. At the time, the fare boxes in use since the late 1980s were well past their useful life with DOS-based software that was no longer supported by the vendor. Replacement parts were difficult to come by too. The 182 new **SPX/Genfare Fast Fare Fareboxes** are "smart," meaning capable of also accepting debit or credit cards along with other cashless technologies. Accepted fare media are cash, coins, tokens, stored value cards that are magnetically read (i.e., single use tickets or all-day passes embedded with magnetic strips, thereby eliminating the issuance and acceptance of paper transfers), smart cards (e.g., ORCA), and mobile phones. The life expectancy of the new fareboxes is 15-20 years.

Asset ID	Original Purchase Price	TERM Lite Rating
17124	\$3,423,543	4.7



As part of the migration to battery-electric rolling stock, Pierce Transit recently took delivery of three *Proterra Catalyst E2* 40-foot coaches for implementation in fixed route revenue service in fall 2018. Three **ChargePoint Express 200** Electric Vehicle (EV) charging stations were installed on the bus lot at headquarters specifically for these new buses. These 50kW output stations charge at a maximum rate of 200 RPH (miles of Range Per Hour). The full, final price shown below includes shipping, permitting, and installation.

Asset ID	Original Purchase Price	TERM Lite Rating
TBD	\$637,211	5.0



9.5 State of Good Repair (SGR) Performance Measures & Targets

Pierce Transit’s State of Good Repair Performance measures and targets for equipment, as adopted on January 31, 2017, are shown in Table 9-1.

Table 9-1: State of Good Repair (SGR) Performance Measures & Targets for Equipment			
Asset Category	Measured by	Performance Measure	Target
Equipment	Age	Percentage of non-revenue, support, and service vehicles that have met or exceeded their Useful Life Benchmark (ULB).	No more than 10 percent of non-revenue, support, and service vehicles will be kept in operation beyond their ULB by the end of calendar year 2021.
	Condition	Percentage of equipment with a condition rating below 4.0 on the TERM Lite scale.	Update, replace, or upgrade all equipment to a condition rating of 4.0 or above on the TERM Lite scale by the end of calendar year 2021.
	Maintenance Agreement*	Percentage of equipment currently in operation or utilization that requires a scheduled update, replacement, or upgrade in order to properly function to its full capabilities without interruption.	Continue to meet all manufacturers’ or suppliers’ schedules and requirements regarding updates/upgrades to or replacement of Security, Communications, and Information Technologies equipment, in order to properly function to its full capabilities without interruption.

*Indicates specific performance measurements and targets for equipment under a maintenance agreement that routinely receives software upgrades or is replaced on a regular basis.

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Section 10 – Equipment: Non-Revenue/Service & Support Vehicles

Pierce Transit currently owns and operates a fleet of non-revenue vehicles designated for administrative staff, as well as service supervision and support functions. These include Administration, Construction, Facilities, Marketing, Maintenance, Relief, Safety & Training, Special Events, Supervisor, and Warehouse (Delivery).

10.1 Supervisory, Administration and Support Vehicles

The agency owns 76 automobiles, vans (passenger and cargo) and light-duty trucks, of which 13 have been surplused or decommissioned (depicted in rows shaded in blue below)¹⁶. A concise inventory is provided in **Table 10-1**.

Make	Model	Year	Units	Assigned Department/Other User(s)
Chevrolet	Astro Van	2003	2	Transit Development Administration, Vanpool, Relief
Dodge	Grand Caravan	2003	1	Marketing
Chevrolet	Silverado 1500	2004	1	Marketing
Dodge	Grand Caravan	2005	2	Administration, Safety – Accident Investigation
Ford	Taurus Wagon	2005	1	Risk
Toyota	Prius	2005	1	Dispatch, Relief
Toyota	Prius	2005	1	Administration
Ford	E-450	2005	1	Information Technologies
Dodge	Caravan	2005	1	Risk
Ford	E-350 XL	2005	1	Service Impacts
Toyota	Prius	2006	2	Administration
Chevrolet	Express	2007	2	Service Supervisor, Operations Safety & Training Van
Dodge	Caravan	2007	1	Planning
Chevrolet	EX/SV	2007	1	Information Technologies, Vanpool
Ford	Escape Hybrid	2009	5	Supervisor
Ford	Escape Hybrid	2010	3	Public Safety
Dodge	Grand Caravan	2014	39	Supervisor, Relief
Mobility Ventures	MV1	2015	2	SHUTTLE (paratransit) Supervisor
Dodge	Promaster Cargo Van	2017	1	Marketing
Chevrolet	Express 3500	2017	1	Special Events Van

¹⁶ Pierce Transit’s current business process includes surplus vehicles that: 1) Have met their useful life and are in the process of being replaced as part of a current capital project; 2) Have been totaled by the Washington State Transit Insurance Pool; and/or 3) Are identified as part of a fleet reduction. During the recession of 2007-2009, the agency chose to continue to utilize vehicles that had met their useful life, albeit for other purposes. For example, Vanpool vehicles’ useful life at the time was seven years or 120,000 odometer miles. However, some vans were determined to still be in good enough condition that they were shifted to non-revenue purposes, such as becoming the Fleet Lot van. That type of non-revenue vehicle is on a longer, ten-year or 150,000-mile replacement schedule.

Ford	Fusion Energi	2017	2	Administration
Dodge	Grand Caravan	2017	5	Supervisor

10.2 Maintenance Vehicles

Pierce Transit also owns 40 special purpose maintenance vehicles, of which seven have been surplused or decommissioned (depicted in rows shaded in blue below). A concise inventory is provided in **Table 10-2**.

Table 10-2: Maintenance Vehicles				
Make	Model	Year	Units	Designated Use/Other Use(s)
GMC	Topkick	1995	1	Facilities Boom Truck
Chevrolet	C2500	2003	1	Maintenance Radio Truck
Ford	F-450 XL	2004	1	Fleet Shop Truck
Dodge	Grand Caravan	2005	1	Radio Shop
Dodge	Grand Caravan	2005	2	Fleet Lot Vehicle
Chevrolet	Silverado 1500	2007	1	Facilities Pick-up Truck
Ford	Econoline Van	2007	1	Facilities
Chevrolet	Silverado 1500	2007	1	Facilities Pick-up Truck
Dodge	Grand Caravan	2007	2	Fleet Maintenance/Former Relief
Ford	E-Series Wagon E-350	2007	1	Spill Response Vehicle (Van)
Ford	F-350 Super Duty	2008	3	Facilities Flatbed Truck/Pressure Washer
Ford	F-450 Super Duty	2008	1	Facilities Flatbed Truck
Ford	E-350 Econoline	2008	1	Facilities
Ford	Expedition XLT	2008	1	Radio Shop
Ford	F-350 Super Duty	2011	1	Sound Transit Service Truck
Chevrolet	Silverado (Service Body)	2012	1	Sound Transit Service Truck
Izusu	Broom Badger	2014	1	Sweeper
Dodge	ProMaster Cargo Van	2016	7	Warehouse, Facilities
Ford	F-150	2016	8	Facilities Pick-up
Ford	F-450 XL Super Duty	2017	2	Fleet Shop Truck, Facilities Switch-N-Go
Ford	F-150	2017	1	Facilities Pick-up
Dodge	ProMaster Cargo Van	2017	1	Facilities

10.3 Non-Revenue Vehicle Replacement Schedules

Pierce Transit's non-revenue vehicle replacement schedules are shown in **Table 10-3**. Default Useful Life Benchmarks (ULBs), as assigned by the FTA, are not applicable to transit agencies' service and support vehicles, so are not shown.

Table 10-3: Non-Revenue/Service and Support Vehicle Replacement Schedules	
Vehicle Characteristics	Replacement Schedule
Sedans, vans, wagons, pickups < 1 ton	10 years or 150,000 miles - whichever comes first
Sweepers	9 years or 100,000 miles - whichever comes first

Step Vans	15 years or 150,000 miles - whichever comes first
Specialty Trucks: 1-ton up to 5-ton	15 years or 150,000 miles - whichever comes first
Heavy Duty Boom Trucks, Heavy Duty Trailers, Tugs	20 years or 100,000 miles - whichever comes first
Scissors Lift, Forklift	20 years or 5,000 hours - whichever comes first

10.4 State of Good Repair (SGR) Performance Measures & Targets

Pierce Transit’s State of Good Repair Performance measures and targets for non-revenue vehicles (i.e., administration, supervisory, service, support), as adopted on January 31, 2017, are shown in **Table 10-4**.

Asset Category	Measured by	Performance Measure	Target
Equipment	Age	Percentage of non-revenue, support, and service vehicles that have met or exceeded their Useful Life Benchmark (ULB).	No more than 10 percent of non-revenue, support, and service vehicles will be kept in operation beyond their ULB by the end of calendar year 2021.

10.5 Preventative Maintenance Program Overview¹⁷

The purpose of a Preventative Maintenance Program is to increase the longevity of vehicles, minimize down time, improve the safety and overall condition of buses, vans, support vehicles, equipment and facilities, and improve productivity and efficiency of the Office of Maintenance while simultaneously reducing costs. The best way to accomplish that is through an aggressive preventative maintenance program to detect problems or potential problems and take corrective actions.

The Agency provides well-maintained buses, vans, support vehicles, equipment and facilities through an efficient and effective maintenance program that meets our mission statement and supporting precepts:

Mission Statement

Pierce Transit improves people’s quality of life by providing safe, reliable, innovative and useful transportation services that are locally based and regionally connected.

To accomplish its goals and objectives, Maintenance will implement a plan of action that provides the necessary tools and resources while avoiding waste. Five basic resources are available:

- Workforce recruitment, development and assignment
- Equipment life cycle costs

¹⁷ Source: 2017 Fleet Maintenance Triennial Review, p. 1

- Implementation of methods and processes
- Materials utilization
- Proper allocation of Agency funds

Proper management of these will maximize effectiveness and positively impact the ability to meet the level of service expected by the public.

Regardless of how good the written objectives of the Maintenance Program are, the crucial elements of success are the competent and knowledgeable people who manage and administer the program. Pierce Transit is committed to recruiting, training and retaining knowledgeable and motivated employees who will ensure the success of the preventative maintenance program.

Section 11 – Rolling Stock: Revenue Vehicles

Pierce Transit currently owns and operates an active fleet of 674 revenue vehicles, including 192 fixed route buses, 379 Vanpool vehicles, 100 SHUTTLE (paratransit) body-on-chassis vehicles, and three seasonal trolleys operating in the summer months at two locations (Downtown Tacoma to Point Defiance Park and Gig Harbor). A complete inventory of both revenue and non-revenue vehicles, including TERM Lite condition ratings, is provided as Appendix D.

11.1 Fixed Route Motorbuses

The agency currently operates 192 buses (excluding Sound Transit-owned vehicles dedicated to their regional express routes). At present, the fleet consists of 25-foot, 30-foot, and 40-foot buses. The 25-foot and 30-foot buses are deployed on routes appropriate to their size and maneuverability. A concise inventory is provided in **Table 11-1**, including the 26 currently surplus vehicles (indicated by rows shaded in blue).

Make	Model	Size (Feet)	Fuel Type	Year	Units
Gillig	Phantom	40	Diesel	1999	15
Gillig	Phantom	40	Diesel	1999	8
New Flyer	C40LF	40	CNG	2002	18
New Flyer	C40LF	40	CNG	2004	20
New Flyer	C30LF	30	CNG	2004	15
New Flyer	C40LF	40	CNG	2005	10
New Flyer	C30LF	30	CNG	2005	10
New Flyer	C40LF	40	CNG	2006	15
New Flyer	C40LFR	40	CNG	2007	10
New Flyer	C40LFR	40	CNG	2008	11
Gillig	G30D102N4	40	Diesel	2010	9
Gillig	G30D102N4	40	Diesel	2013	6
Gillig	G30D102N4	40	Diesel	2014	6
Gillig	G27D102N4	40	CNG	2015	10
Gillig	G27D102N4	40	CNG	2016	10
Ford	E-450 Mini Bus	25	Unleaded Gasoline	2016	9
Gillig	G27D102N7	40	CNG	2017	7
Proterra	Catalyst E2	40	Electric	2018	3 ¹⁸

¹⁸ The agency is looking to add three battery-electric buses to the fixed route fleet in 2020-2021 with a goal of 30 (15 percent) within 5-10 years.

11.2 Historic/Vintage Motorbus

The agency also owns a completely restored 1948 *Fageol Twin 41-S* (40-foot coach) that was originally owned and operated by Tacoma Transit. The bus features an all-aluminum body and is powered by a six-cylinder mid-mounted gasoline motor with a two-speed automatic transmission. Although it is used for display at special events throughout Pierce County only – not for transporting passengers nor used in revenue service. Its insured value is \$25,000, with market or resale value estimated at \$100,000.



11.3 Paratransit Vehicles

Pierce Transit’s SHUTTLE program provides Americans with Disabilities Act (ADA) paratransit service to qualified individuals who are not able to utilize Pierce Transit’s regular fixed route services. Using lift equipped body-on-chassis or cutaway vehicles, SHUTTLE provides an on-demand, door-to-door service that is comparable to fixed route service in a geographic area and hours of service within each area. The current fleet consists of 100 vehicles. A concise inventory is provided in **Table 11-2**, including the 38 currently surplus vehicles (rows shaded in blue).

Make	Model	Fuel Type	Year	Units
Ford	E-450 Super Duty	Unleaded Gasoline	2012	38
Ford	E-450 Super Duty	CNG	2014	10
Ford	E-450 Super Duty	Unleaded Gasoline	2014	22
Ford	E-450 Super Duty	Unleaded Gasoline	2016	30

11.4 Vanpool Vehicles

The Vanpool program complements Pierce Transit’s network of local and express services, providing commute alternatives to many destinations that cannot be effectively served by fixed route services. A vanpool is a group of 5 to 15 people sharing a ride in a 7-, 12-, or 15-passenger van. The Agency also administers a special use van program which provides vehicles to local communities and organizations as a way of meeting their specialized transportation needs. The current fleet consists of 379 vans. A concise inventory is provided in **Table 11-3**, including the 46 currently surplus vehicles (rows shaded in blue). All vehicles run on unleaded gasoline.

Make	Model	Seating Capacity	Year	Units
Ford	Econoline-450	12	2005	1
Ford	Econoline-350 Super Duty	12	2006	1
Ford	Econoline-350	12	2006	4
Ford	Econoline-450	12	2007	1
Ford	Econoline-450	12	2007	1
Chevrolet	EX/SV	15	2007	5
Chevrolet	EX/SV	12	2008	1
Chevrolet	EX/SV	12	2008	6
Ford	Econoline 3 Wagon	12	2008	2
Ford	Econoline 3 Wagon	12	2008	9
Ford	Wagon	12	2008	1
Ford	Wagon	12	2008	11
Ford	Express	12	2008	2
Ford	Express	15	2008	5
Chevrolet	Express	12	2010	40
Chevrolet	Express	15	2010	23
Chevrolet	Express	15	2010	1
Chevrolet	Express	15	2012	18
Chevrolet	Express	12	2012	2
Ford	E-350 XL	12	2013	17
Ford	E-350 XL	15	2013	2
Chevrolet	Express	12	2014	2
Chevrolet	Express	15	2014	24

Chevrolet	Express	15	2014	1
Chevrolet	Express	7	2014	1
Ford	Econoline-350 Super Duty	12	2014	4
Ford	Econoline-350 Super Duty	15	2014	2
Dodge	Grand Caravan	7	2015	9
Ford	Transit Connect	7	2015	20
Ford	Transit Connect	7	2015	1
Chevrolet	Express 2500	12	2015	23
Ford	Transit Connect	7	2016	25
Chevrolet	Express 3500	12	2016	24
Chevrolet	Express 3500	15	2016	35
Chevrolet	Express 3500	15	2016	1
Dodge	Grand Caravan	7	2015	13
Chevrolet	Express 3500	12	2017	29
Chevrolet	Express 3500	15	2017	12

11.5 Seasonal Special Service Trolleys

Pierce Transit currently operates two seasonal routes during the summer months (on or around June 1st through Labor Day weekend): The Gig Harbor Trolley and Downtown to Defiance Trolley (i.e., from Tacoma Dome Station to Point Defiance Park at Tacoma’s north end). The Gig Harbor Route (101) uses 28-foot vehicles which are a vintage trolley style body on a bus chassis. It was launched as demonstration project in 2013 originally and operationalized as a recurring, annual seasonal service in 2014. The complete inventory is shown in **Table 11-4**.

The Downtown to Defiance Route (15) uses 30-foot CNG coaches (listed in the Fixed Route Vehicles inventory) wrapped in the same red and yellow color palette and unique branding as the Gig Harbor Trolley vehicles. It was launched as a two-year demonstration project in 2017.

Make	Model	Fuel Type	Year	Units
Chance Coach, Inc.	AH-28 Streetcar	Diesel	2000	3

11.6 Compressed Natural Gas Tanks Life Cycle & Labeling

Compressed Natural Gas (CNG) tanks carry a 20-year life cycle and are stamped with an expiration date from the manufacture, as shown in the image below. CNG tanks in general cannot be certified for additional use beyond the expiration date. This is a Federal Motor Vehicle Safety Standard, covered within FMVSS 304 *Compressed Natural Gas Fuel Container Integrity*. This Standard applies to containers designed to store CNG as motor fuel on-board any motor vehicle. It specifies requirements for the integrity of CNG motor vehicle fuel containers. (See Code of Federal Regulations, National Highway Traffic Safety Administration, USDOT, Title 49, § 571.304, *S7.4 Labeling*, October 1, 2011)



11.7 Revenue Vehicle Replacement Schedules

Pierce Transit's revenue vehicle replacement schedules are shown in **Table 11-5**. Default Useful Life Benchmarks (ULBs) by vehicle type, as assigned by the FTA, are included for reference in the last column.

Table 11-5: Revenue Vehicles Replacement Schedules					
FTA Code	Vehicle Type	Vehicle Use	Vehicle Characteristics	Replacement Schedule	Default ULB (Years)
BU	Motorbus	Fixed Route	30-, 40-, and 45-foot Coaches	16 years, 640,000 miles	14
CU	SHUTTLE	Demand Response/Paratransit	14-passenger, 5 wheelchair stations, cutaway (body-on-chassis)	8 years or 150,000 miles – whichever comes first	10
MV	Vanpool	Rideshare/Commute Trip Reduction	7-passenger minivan	8 years or 120,000 miles – whichever comes first	8
VN	Vanpool	Rideshare/Commute Trip Reduction	12- And 15-passenger full sized van	8 years or 120,000 miles –	8

				whichever comes first	
CU	Community Connector	Small Bus	25-foot cutaway (body-on-chassis)	8 years or 150,000 miles – whichever comes first	10
RT	Rubber-Tired Trolley	Gig Harbor Seasonal Services	30-foot streetcar (historic vehicle replica)	14 years or 280,000 miles – whichever comes first	14

11.8 State of Good Repair (SGR) Performance Measures & Targets

Pierce Transit’s revenue vehicle (i.e., rolling stock) replacement schedules, as adopted on January 31, 2017, are shown in Table 11-6.

Table 11-6: State of Good Repair (SGR) Performance Measures & Targets for Rolling Stock				
Asset Category	Measured by	Revenue Vehicle Type	Performance Measure	Target
Rolling Stock	Age	Fixed Route Motorbus	Percentage of revenue vehicles within a particular asset class that have met or exceeded their ULB.	No more than 35 percent of fixed route buses will exceed their 16-year ULB by the end of calendar year 2021.
		Rubber Tired Trolley		
		SHUTTLE (Paratransit)		No more than 10 percent of revenue vehicles will be kept in operation beyond their ULB by the end of calendar year 2021.
		Community Connector (Small Bus)		
		Vanpool		

Section 12 – Capital Investment Needs and Implementation Strategy including Decision Support Tools

This section's purpose is to accumulate and recap findings and funding gaps from Sections 7 thru 11 covering Pierce Transit's Facilities, Equipment, and Rolling Stock. (12.1)

It also provides a plan showing the activities necessary to achieve the asset management goals (including all aspects of change management). (12.2)

And finally, it includes a description of the analytical processes or decision support tools that Pierce Transit uses to estimate capital investment needs over time and develop the agency's implementation prioritization. A decision support tool is a methodology to help transit providers make decisions, such as prioritizing projects based on condition data and objective criteria. The agency's current decision support tool is a process lead by the Project Management Office. (12.3, 12.4)

This section closes with an outlined schedule of roles, responsibilities, accountabilities, tasks, and dependencies. (12.5)

12.1 Findings and Funding Gaps

▪ Facilities

As indicated in Sections 7 and 8, Pierce Transit contracted with Parametrix, Inc. in May 2017 to conduct a comprehensive Facilities Condition Assessment of all headquarters buildings plus all customer-facing properties owned and/or operated by Pierce Transit (e.g., Transit Centers, Transit Stations, and Park-and-Ride lots). The consultant was advised to conduct the work using the methodology for defining, gathering, and reporting information outlined in the Federal Transit Administration's *Facility Condition Assessment Guidebook*, to fulfill the data requirements outlined in Title 49 §5335 of the US Code National Transit Database. While conducting site visits or field assessments, the consultant visually inspected equipment, existing mechanical (e.g., conveyance, plumbing, HVAC, fire protection), electrical systems, structural aspects (e.g., substructure, shell, interiors) and site conditions (e.g., roadway/driveway, landscape and irrigation, site utilities). Photographs of all assets or systems were taken as part of the site condition summary reporting as well. Overall, Pierce Transit was in agreement with the individual elements or systems specifically identified for repair, replacement, or renewal. However, and as demonstrated in the tables on page 3, the agency determined that Parametrix's cost estimates for the recommended work were unrealistically low or undervalued in many areas. The most obvious cost discrepancy was evident in the consultant's assessment of the Tacoma Dome Station and parking garages. For example, their *Key Findings* in the report showed a mere \$579,900 for all recommended repairs or corrective actions. Coincidentally, this facility – Pierce Transit's largest and most valuable existing asset outside of its headquarters – was already budgeted for a major, comprehensive midlife renewal to begin in spring 2018 at \$5.67 million, almost ten times Parametrix's cost estimate.

These discrepancies in the consultant’s reporting has lead Pierce Transit to reassess its needs regarding objectively determining the true costs of recommended repairs and renewals under short-term capital requirements going forward. The need for a new, user-friendly software program to continuously monitor the agency’s assets and conditions, to monitor and maintain them in a State of Good Repair, is detailed in Section 15.

Beyond the Parametrix assessment completed at the end of 2017, Pierce Transit has identified \$45.9 million in new facilities plus repairs and upgrades to existing facilities in **Appendix F - Prioritized List of Capital Requests: 2019-2024**. The agency’s internal process for proposing projects and selecting them for funding in the six-year capital planning horizon is provided in subsection 12.4. Projects programmed in the **2018 Capital Budget**, as adopted by the Board of Commissioners in December 2017, are shown in **Appendix E**.

- **Equipment**

As detailed in Section 9, equipment for most Tier 1 transit agencies falls under four general categories or umbrellas: 1) *Facilities*; 2) *Vehicles* (revenue and non-revenue); 3) *Information Technology*; and 4) *Communications*. Additionally, equipment can be further categorized as tangible (e.g., heavy machinery, service and support vehicles) or intangible (e.g., software, cloud-based systems and databases). While Pierce Transit’s ten equipment needs over the next six years sum to just under 19 percent of the 25 agency-wide projects’ total costs (i.e., \$15.64 million out of a total of \$83.02 million), consistency purchasing or upgrading and utilizing the latest IT and communications equipment is critical to the agency’s mission. Of that total, \$687,000 is requested for non-revenue vehicles replacement. These proposed projects are provided in **Appendix F** as well.

- **Rolling Stock**

As shown in Section 11, Pierce Transit strictly follows the adopted replacement schedules of January 2017 by revenue vehicle type, based on FTA guidelines¹⁹, in order to maintain its entire fleet in a State of Good Repair. The number of revenue vehicles planned by service type and their related cost estimates are shown in **Table 12-1**.

¹⁹ *Default Useful Life Benchmark (ULB) Cheat Sheet*. As sourced from *2017 Asset Inventory Module Reporting Manual*, page 53.

Service Type and Vehicle	FTA Vehicle Type Identifier	Units	Cost Estimate (Million)
Fixed Route – Motor Bus (Includes both 40-foot fixed route and 60-foot BRT)	BU	85	\$84.9
SHUTTLE (Paratransit) - Cutaway	CU	54	\$6.1
Vanpool - Passenger Van	MV	214	\$8.7
Trolley (Seasonal/Summer Service)	RT	0	\$0
Total			\$99.7

12.2 Asset Management Goals & Related Activities

The fiscal repair, replacement, and expansion information derived from the TERM Lite database is based on various revenue scenarios over a 20-year planning horizon. TERM Lite was the primary software-based decision support tool used in development of this TAMP as capital investment needs were identified; both fiscally constrained and illustrative. Its primary utility was in determining the level of funding Pierce Transit would need to achieve a State of Good Repair by 2021, as well as the level of funding needed to maintain it over the next 20-year planning horizon.

- **Change Management**

Pierce Transit has committed to fully developing its change management model and embedding that model in its decision-making processes. In 2018, the agency began the first phases of implementing Prosci’s²⁰ change management model and will continue that implementation in the early part of 2019. This implementation includes the certification of Pierce Transit’s Lean and Change Management Administrator in Prosci’s model as well as the certification of that employee in Prosci’s Train-the Trainer model. By mid-summer 2019, this change management professional will begin the process of training employees throughout the agency in change management philosophies and processes. Once training is complete, change management practices will begin to be embedded in Pierce Transit’s decision-making processes.

²⁰ Founded in 1994, Prosci is committed to a research-driven and results-oriented approach to change management. Prosci’s training, tools and methodology are based on best practices research with over 4,500 international organizations and are used by more than three-quarters of Fortune 100 companies. Headquartered in Fort Collins, Colorado, with offices in Australia and Canada and partners around the globe, the Prosci methodology has become one of the most widely used approaches to managing the people side of change in business and government. For more information, visit <https://www.prosci.com/change-management>

With the everchanging environment, change management strategies and plans can be utilized to drive project results and outcomes. In 2007 a benchmarking study was completed that demonstrated the great need for and value of change management (Prosci, 2007). According to that study, organizations that apply change management are six times more likely to meet or exceed project objectives. Prosci's model was chosen by Pierce Transit because of its integration of the people side of change, project management, and change management. This model uses five building blocks of change: Awareness, Desire, Knowledge, Ability, and Reinforcement to influence change at the individual level and then at the organizational level.

12.3 Process and Criteria for Selecting and Funding Projects: Project Management Office

In the first quarter of every year, the Project Selection process is kicked off by the Project Management Office (PMO). The first step is development of the *Capital Request* form. The agency defines a Capital Asset as an item that has over a one-year useful life and is valued over \$5,000. Repairs and replacements that cost over \$50,000 and extend the life of the asset by more than one year are considered a partial replacement of assets and fall under capital costs. Upgrades and additions to assets are capital costs if they estimated over \$5,000 (including taxes) and have a useful life over one year.

The Project Oversight Group (POG) includes the Executive Director of Finance, Executive Director of Maintenance, Chief Information Technology Officer, Safety Manager, Facilities Manager, Senior Planner, PMO Manager, and the Project Controls Administrator who supports the POG. The POG finalizes the *Capital Request* form and establishes scoring criteria connected to the agency's Strategic Goals. Once the *Capital Request* form, scoring criteria, process, and timeline are finalized, the PMO sends out an agency-wide call for projects and holds its yearly kick-off meeting, including training, to formally begin the process.

Over the next month, proposers (i.e., the eventual project manager) collaborate with subject matter experts to develop their individual capital requests and identify the type of request: Healthy/Safety/Legal; Replacement/State of Good Repair; or Identified in the Information Technology Department's replacement plan.

The *Capital Request* form includes:

- How the project aligns with Pierce Transit's Mission and Strategic Goals.
- The problem or opportunity with a summary of anticipated results.
- A benefit analysis showing how the cost estimate was developed, where it will generate a cost savings, and any underlying assumptions connected to revenue generation, cost savings, or other benefits.
- Preliminary cost estimates are developed with line item milestone costs, capital and operating costs, applicable taxes, and a contingency reserve.
- Ongoing operating cost impacts post-execution.
- Staff availability and impacts, identifying whether a new FTE will be required to support the project once it is complete.
- Additional equipment that may be needed to support the project deliverable.

- Cost assumptions.
- Proposed funding sources and if there may be an opportunity for future grant or partner agency funding.
- A preliminary risk assessment.
- Resource requirements.
- Other systems that may be affected and in what way.
- Life expectancy of the deliverable being proposed.

When the proposer has completed the draft *Capital Request*, Project Managers (PMs) in the PMO review the request to determine if there are any unidentified costs and if cost estimates are reasonable. Once the Capital Requests have been reviewed by the PMs, they are submitted to the PMO who compile and distribute the requests to resource managers. A meeting is held with the Resource Managers to discuss their areas’ involvement in the project and estimate how many hours each area will be required to work on each. The resource hour requirements are compiled into a spreadsheet which shows the total resources needed for the project. Capital Requests are finalized with the resource requirements and are then distributed to the POG for a full review.

The POG reviews the Capital Requests. A subsequent meeting is held with the proposers to allow the POG to ask questions and get further clarification. Proposers then follow-up by answering any questions on scope, cost-benefit analysis, or other approaches that may be suggested.

Scoring of the Capital Requests is done by each POG member and those scores are compiled so that the requests can be ranked. After the initial scoring and ranking process (shown in **Table 12-1**), the POG takes a holistic or subjective look at the agency’s entire project portfolio to identify gaps, missed opportunities, risks, and resource constraints, prior to developing the pre-budget portfolio.

Table 12-2: Capital Request Scoring Chart (2019)

Criterion	Weight	Description	Rating Scale (1-9)
Health/Safety/Legal	5	Is the project required to meet legal, compliance, or regulatory mandates? Would Pierce Transit or its customers be exposed to a risk or impact if the project was not completed?	0 = not required/mandated, no risk to PT or customers if not completed 1 = little risk to PT or customers if not completed 5 = some risk to PT or customers if not completed 9 = required or mandated, high risk to PT or customers if not completed
Strategic Alignment	5	To what extent is the project aligned with Pierce Transit’s overall strategies?	0 = does not align 5 = aligns with some strategies 9 = aligns with all strategies

Revenue Generation/On-going Cost Savings	4	Will this generate future revenue, or reduce cost for Pierce Transit?	0 = No cost saving, no revenue generated 1 = \$0-\$75k combined revenue generation/cost saving over lifecycle 3 = \$75k-\$150k combined revenue generation/cost saving over lifecycle 5 = \$150k-\$225k combined revenue generation/cost saving over lifecycle 7 = \$225k-\$300k combined revenue generation/cost saving over lifecycle 9 = >\$300k combined revenue generation/cost saving over lifecycle
Replacement/SOGR	3	Is this a Replacement of an existing system/asset? Is this required for SGR?	0 = Not a Replacement/not needed to meet SOGR 1 = Replacement can be delayed/Asset is still within SGR 5 = Replacement recommended/Asset is at end of useful life 9 = Replacement needed, high risk of asset failure/Asset exceeds useful life
Grant funded	2	Is this project likely to be grant funded?	0 = no grant funding 1 = <10% chance of receiving grant funds 3 = 10%-25% chance of receiving grant funds 5 = 25%-50% chance of receiving grant funds 7 = 50%-75% chance of receiving grant funds 9 = >75% chance of receiving grant funds
On-going expense	2	Does this require additional on-going expense (local funding)?	-9 = Additional FTE(s) and/or >\$300k additional on-going expense over lifecycle -7 = \$225k-\$300k additional on-going expense over lifecycle -5 = between \$150k-\$225k additional on-going expense over lifecycle -3 = between \$75k-\$150k additional on-going expense over lifecycle -1 = between \$0-\$75k additional on-going expense over lifecycle 0 = No additional on-going expense

Pierce Transit strives for an open, competitive, and objective process amongst its internal stakeholders. As such, the benefits of utilizing a documented portfolio selection process are listed below.

- Each idea gets equal consideration.
- Resources are considered up front.
- Known path for getting authorization and support.
- Ensures initiatives are aligned with strategy.
- See the effect on other projects of approving a project.
- Creates a comprehensive portfolio for funding opportunities.

The pre-budget portfolio becomes an input to the annual budget process. The final budget is ultimately approved by the Board of Commissioners at its December meeting. There is, however, not a specific amount of funding available for new capital projects from year to

year. Once the pre-budget portfolio is submitted to the Budget process, it is compiled in an updated Six-Year Plan. The portfolio may be revised by project priority based on the six-year financial sustainability for the Agency. Reserves may be utilized over the six-year period to provide for capital infrastructure after the required reserves amounts are set aside.

The agency’s criteria for what qualifies as a *project* are listed below.

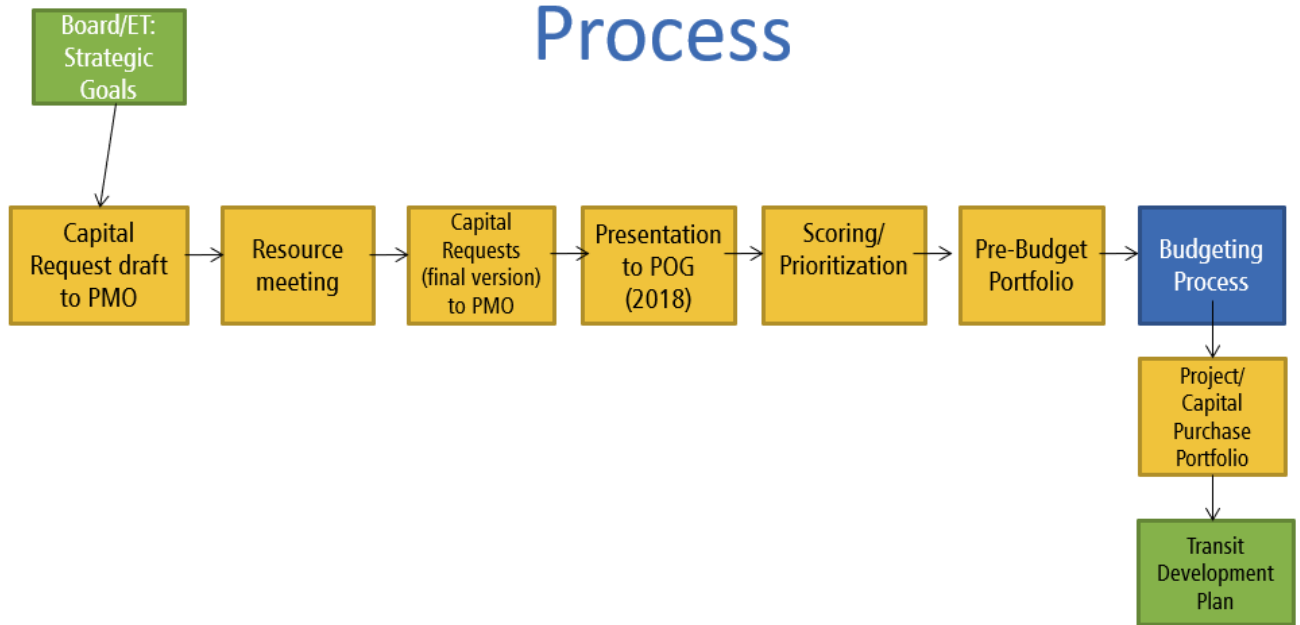
- Has a defined start and end date (i.e., it must follow a schedule).
- Provides a benefit to the agency by supporting strategic goals.
- Has defined deliverables.
- Results in a change, meaning something new is created or something existing is improved.
- Will have resources assigned to it.
- Has more than one stakeholder involved.
- Is not routine work.

When projects are requested outside of the yearly project selection process, if a project requires additional funding, or if there are changes in scope, the requests are presented to the POG for their consideration. For a new capital request, or for budget amendments, the Board of Commissioners must approve amending the Capital Budget to add the project or amend the budget. The entire process – from concept to approval – is depicted in the diagram on the following page.

The discretionary amounts available for capital projects vary from year to year are provided in **Table 12-3** below, based on the most recent Six-Year Plan adopted in December 2017. These same amounts were utilized in the two fiscally constrained scenarios in TERM Lite (i.e., Scenarios 2 and 3).

Table 12.3: 2018 Capital Budget & 2019-2023 Project Forecast (in Millions and includes carryover)						
2018	2019	2020	2021	2022	2023	Total
\$86.25	\$50.52	\$44.08	\$102.36	\$140.33	\$17.53	\$441.09

Project Selection Process



12.4 Additional Project Selection Process and TAMP Refinement Resources

Pierce Transit is including a project in the 2019 capital budget to develop a *Request for Qualifications/Request for Proposals* for a new Enterprise Asset Management software system that will include capabilities for Lifecycle Asset Management. The goal is to find a solution that will combine current disparate processes and databases into one system that can be more effectively managed for asset management activities and information. This proposed system will be further detailed in Section 14.2.

12.5 Outlined Schedule of Roles, Responsibilities, Accountabilities, Tasks, and Dependencies

While numerous staff members at Pierce Transit contributed to the TAMP from different departments, each with their own area of expertise, **Appendix B** in the appendices provides a RACI matrix to depict each person’s level of involvement over the two-year document development period.

Section 13 – Project-based Prioritization of Investments

This section’s objective is to demonstrate that the agency’s priorities going forward are objective and based on good data and observations or merit and not just a simple “worst first” prioritization. The investment prioritization herein includes a list of the proposed projects and programs that Pierce Transit estimates would achieve and maintain its State of Good Repair goals. It includes a ranking of the projects and programs based on priority through a 20-year horizon year (i.e., 2038); both budgeted (programmed) and unfunded (“vision”). And finally, output from the TERM Lite database on various estimate investment levels to achieve and maintain a continuous State of Good repair for both existing and expansion asset categories. The data and information are based on three primary sources:

1. Adopted Six-Year Capital Plan: 2018-2023, included as **Appendix E** and described under Section 13.1
2. Prioritized List of Capital Projects: 2019-2024, included as **Appendix F** and described under Section 13.2
3. TERM Lite database output and future funding scenarios, included in the appendices and described under Section 13.3

13.1 Adopted Six-Year Capital Plan

On December 11, 2017, the Pierce Transit Board of Commissioners formally adopted the Six-Year Capital Plan covering 2018 thru 2023. The plan is fiscally constrained and includes 27 Facilities projects valued at \$165.0 million; 46 Equipment projects (including non-revenue service and support vehicles) valued at \$44.9 million; and 6 Rolling Stock (revenue vehicles) replacement projects valued at \$34.0 million. In addition, funding is allocated for the agency’s inaugural Pacific Avenue/ SR 7 Bus Rapid Transit corridor project under *Infrastructure*, for a grand total of \$441.09 million.²¹ A *project*, as used above, can include multiple assets or units.

13.2 Prioritized List of Capital Projects (aka Pre-Budget Portfolio)

The plan is not fiscally constrained and includes 12 Facilities projects valued at \$45.9 million; 10 Equipment projects (including non-revenue service and support vehicles) valued at \$15.6 million; and 4 Rolling Stock (revenue vehicles) replacement projects valued at \$21.4 million, for a grand total of \$83.02 million. This "pre-budget portfolio" spreadsheet (shown as **Appendix F**)

²¹ Note that this project and the \$196 million reflected in the Plan would be for all phases of corridor-wide Bus Rapid Transit infrastructure. This amount is not listed in TERM Lite since the entire project is predicated on receiving \$60 million in matching funding from the FTA under the Small Starts program within the next few Federal Fiscal Years. The only related projects in the TERM Lite assets inventory are for BRT stations and 60-foot articulated coaches since they have already been awarded matching funding by the FHWA and FTA. The agency’s working cost estimate for all phases of the BRT corridor project, including new rolling stock, is just under \$150 million and will be revised for the 2019 Budget.

was published on June 11, 2018 and includes all 28 projects as originally proposed for Fiscal Year 2019. The agency’s five Executive Directors are currently in the process of finishing the overall budget for Fiscal Year 2019, including identifying projects for funding. This process includes determining how much to include as capital expenses versus how much in operating costs the agency predicts, insurance costs, and other expenditures. These amounts are then compared with expected income, sales tax and fare revenues, and grants, to come up with a final, annual balanced budget every December.

Transit Development Plan “Vision” Projects

Another document where unfunded/unprogrammed capital projects are listed is in Appendix C of the Six-Year Transit Development Plan, produced every year. The TDP, as it’s known, is required of all transit agencies by the Washington State Department of Transportation and identified in the Revised Code of Washington (RCW) 35.58.2795.²² The TDP is formally adopted by Pierce Transit’s Board of Commissioners in late spring or early summer and submitted to the Puget Sound Regional Council Metropolitan Planning Organization (located in Seattle) for reference. It should be noted that these projects are often conceptual or illustrative (i.e., “vision” projects) and are not fully vetted with upper management, meaning initial cost estimates are sometimes unknown.

13.3 TERM Lite Scenarios and Funding Requirements

As stated in Sections 3 and 6, the FTA’s TERM Lite database was utilized throughout the TAMP development process, especially since the agency was unable to find a new, all-inclusive Enterprise Asset Management software system by the spring of 2018.

The current active inventory in TERM Lite includes 193 “records” or assets. Although a single record can include indefinite quantities of the exact same asset, such as *Motorbus – 40-foot – CNG powered – 2016 Gillig Model G27D102N4*, of which Pierce Transit has ten in its fleet.

Then, based on information provided firsthand by the TERM Lite database training specialists, Pierce Transit ran the model multiple times using three discrete funding scenarios through a 20-year planning horizon (2019 – 2038):

1. *Unconstrained*, meaning “money is no object,” to see how quickly the assets not currently in a State of Good Repair (i.e., the current backlog) could be repaired, renewed, or replaced, and maintained.
2. *Constrained and Maintaining Current Spending* levels, as documented in Appendix X. For the outer years 2024 – 2038, a continuous average of \$73.51 million per year was used, based what funding is available in the Six-Year Plan (i.e., a historical annual

²² Please visit: <http://app.leg.wa.gov/rcw/default.aspx?cite=35.58.2795> for the RCW as cited and <https://www.piercetransit.org/documents/> for the most recent Transit Development Plan: 2018-2023.

reinvestment rate). Fiscally constrained run scenarios allow transit agencies to assess the impacts of alternative funding levels on a future backlog and conditions.

3. *Constrained and Maintaining Backlog* using the *Backlog Target Seek* function. Based on the same annual funding amounts for capital projects as in Scenario 2, this third scenario affords the agency ten years to achieve its State of Good Repair. In other words, to learn what level of investment will reduce the current size of the backlog by half (50 percent) within ten years and then maintaining it through 2038. This scenario is also referred to as “Improve and Maintain by a Target Year.”

Prioritization Criteria Options Overview

Along with *Expenditure Constraints* and *Backlog Target Seek* mentioned above, one of TERM Lite’s optimization functions is the *Prioritization Criteria Settings* tab. This input form allows the user to establish asset-by-asset ratings (on a 1 to 5 scale) for four of the five criteria (excluding *Asset Condition*) as well as weighting for all five criteria. Transit agencies can simply accept the default prioritization criteria weights (listed in Figure 13.1 below) prior to running the model. Or they have the option to reweight the four criteria, remove any of the criteria they feel are not applicable, and add a fifth one that is user defined, such as including a specific Strategic Plan goal or objective, as long as they total 100 percent. In the interest of consistency with peer transit agencies nationwide, Pierce Transit did not divert from the default settings in its various model runs and scenarios output for this exercise.

Figure 13.1: Default Priority Criteria Settings and Weights in TERM Lite Database	
Asset Condition	65%
Safety & Security	10%
Reliability	20%
Operations & Maintenance Cost Impact	5%
User Defined	0%

The database also has a *Multi-Criteria Prioritization* function which allows users to evaluate assets on an individual basis, albeit using the same criteria listed above. The *Multi-Criteria Decision Analysis Approach* scores each criterion on a 1 to 5 scale with 5 being the highest priority. Scores are then weighted, summed, and converted to a 100-point scale where the higher the score, the higher the priority for investment or reinvestment in that asset. This approach is completely independent of the *Prioritization Criteria Settings function* described above, plus more refined, so is recommended for a future analysis. An example of the output, albeit *grouped by asset type*, is provided in the appendices and is titled **Backlog Needs and Prioritization Rankings by Element as of: 2018**.

A Note on Using Inflation Factors in TERM Lite Analysis

Another option when running the various TERM Lite scenarios is whether to adjust asset costs for inflation or not. By comparison, VFA.facility inflates Pierce Transit’s entire *Facilities*

asset portfolio by 2.0 percent per year, based on local construction cost conditions and the Consumer Price Index.

The TERM Lite team of instructors offer the following advice regarding when transit providers should and should not use inflation as part of an analysis:

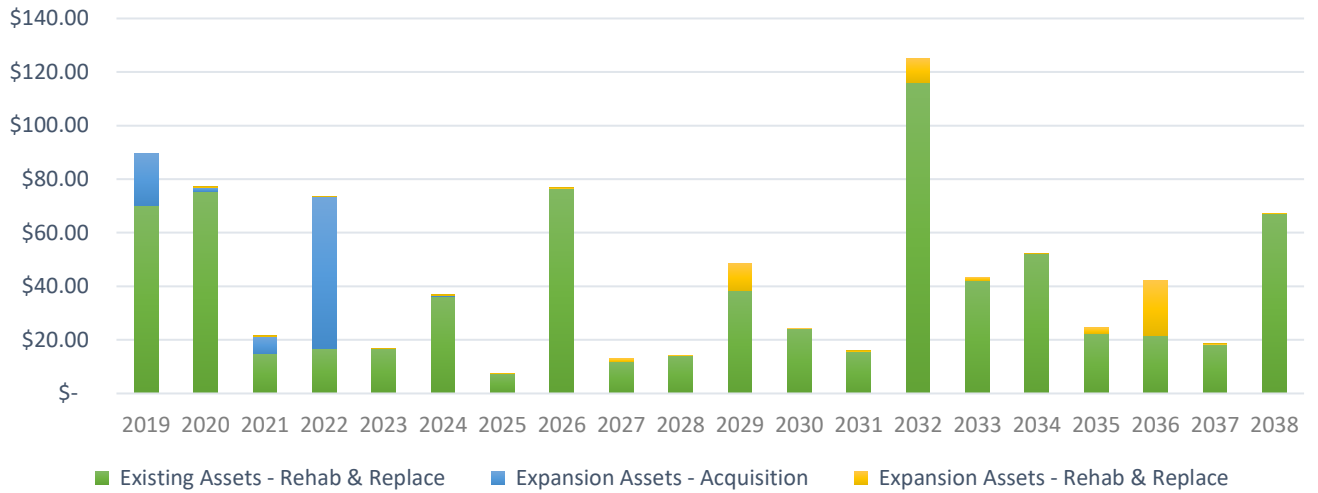
- **CONSTANT DOLLARS** - When performing analysis on backlog, we are typically more concerned with the question, “Is my backlog going to increase or decrease with a given funding scenario?” To see the *real* impact of funding on backlog, we remove inflation and display all costs (both revenue and expenses) in CONSTANT DOLLARS. This way, when we see an increase in backlog from one year to the next, we know that our backlog is increasing and not just appearing to grow because of inflation. When analysis is performed in REAL DOLLARS (i.e., with no inflation factor), it is sometimes necessary to add inflation before presenting the results to someone who is expecting to see inflation. For example, someone who is preparing a budget and is expecting that adjusting for inflation is included in the funding request.
- **THEN-YEAR or YEAR of Expenditure (YOE) DOLLARS** - You may prefer to perform your analysis with inflation included. If you do, select the out-year inflation rate in the parameters of TERM Lite. This will cause your backlog to appear higher because it includes the compounding effect of inflation each year. For example, if you have one asset in the backlog continuously carrying forward for 10 years, but nothing else entering the backlog, your backlog will appear to grow even though it is just that same asset the whole time. It is not wrong, but just another way of presenting the numbers. Most importantly, if you are performing forecast analysis with inflation included in the costs, be sure that your expenditure constraint (funding) also includes inflation.

For this analysis, the inflation factor was *not* used (i.e., left at the zero percent default setting) and all scenarios are presented in constant dollars.

Investment Expenditures by Existing Versus Expansion Assets

The first three comparative charts depict *Investment Expenditures by Existing Versus Expansion Assets* for all three funding scenarios mentioned previously over a 20-year planning horizon. All funding is shown in millions of dollars. Expansion assets include new 40-foot electric vehicles plus 60-foot Bus Rapid Transit vehicles and stations, but no fixed guideway or on-street (Infrastructure) elements yet. Specific large-scale project recommendations and cost estimates under the Base Master Plan are forthcoming, albeit listed in the TERM Lite inventory as expansion assets: Phases 1 - 2 (Construction) and 3 (Preliminary Engineering/Design) only, at a combined cost of \$24.11 million. Total funding requirements – both at the 10-year SGR target and full 20 -year planning horizon - are provided in **Table 13.2** for existing and expansion assets for comparison.

**Scenario 1: Unconstrained Funding -
Investment Expenditures by Existing versus Expansion Assets (Millions)**



**Scenario 2: Constrained Funding (Maintain Current Spending) -
Investment Expenditures by Existing versus Expansion Assets (Millions)**



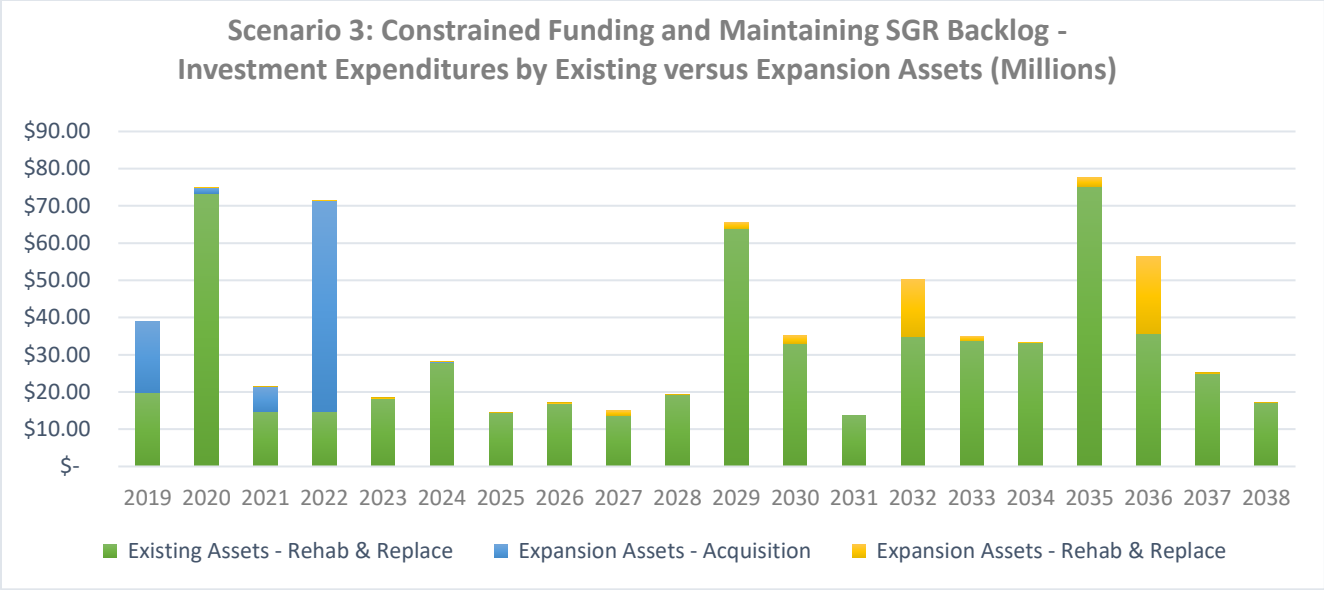


Table 13.2: Comparison of Investment Expenditures under Three Funding Scenarios – Current vs. Projected (Millions)

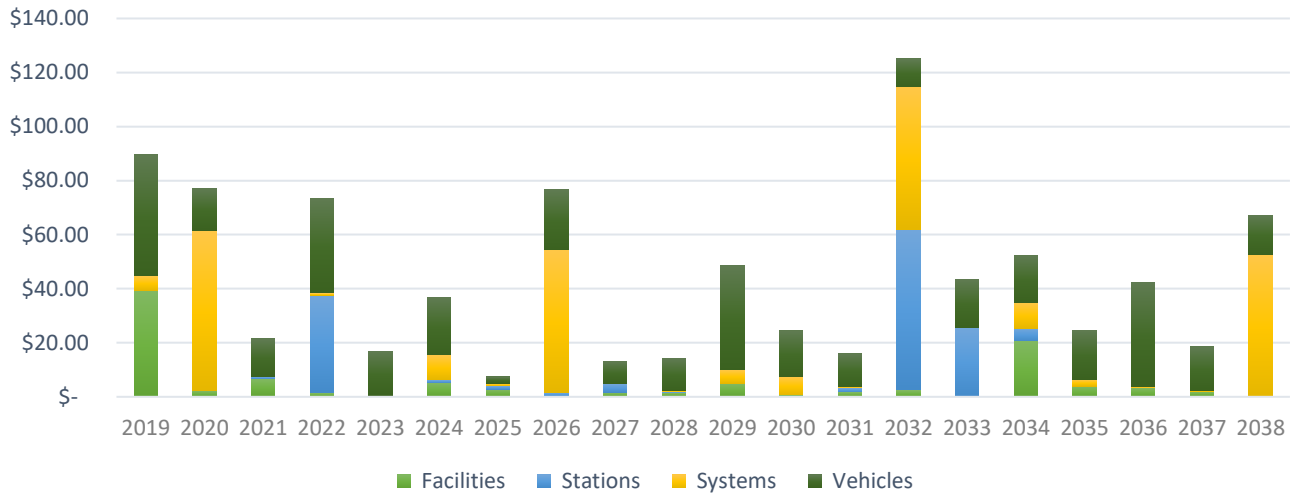
Asset Type	Scenario 1		Scenario 2		Scenario 3	
	Current Needs	2028 Needs (10-year)	Current Needs	2028 Needs (10-year)	Current Needs	2028 Needs (10-year)
Existing – Rehabilitate & Replace	\$70.31	\$14.20	\$50.46	\$13.77	\$19.77	\$19.27
Expansion - Acquisition	\$19.22	\$0	\$19.22	\$0.07	\$19.22	\$0
Expansion – Rehabilitate & Replace	\$0	\$0.07	\$0	\$0	\$0	\$0.07
Grand Totals	\$89.53	\$14.27	\$69.69	\$13.84	\$38.99	\$19.34

Under the two fiscally constrained scenarios (2 and 3) above, the data show at least \$19 million is recommended to commit to achieving a SGR within ten years under both existing and expansion asset categories (where Δ = \$5.5M). Based on the 193 assets in the TERM Lite database, the 2018 or current SGR Backlog was determined to be:

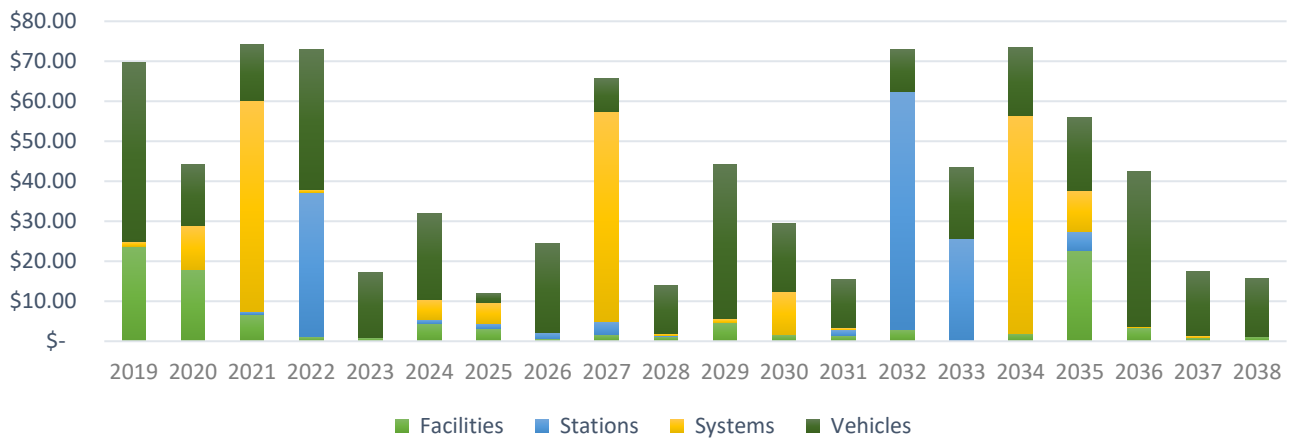
- Vehicles: \$38.51 million + Facilities: \$13.55 million + Systems: \$1.20 million = **\$53.26 million**

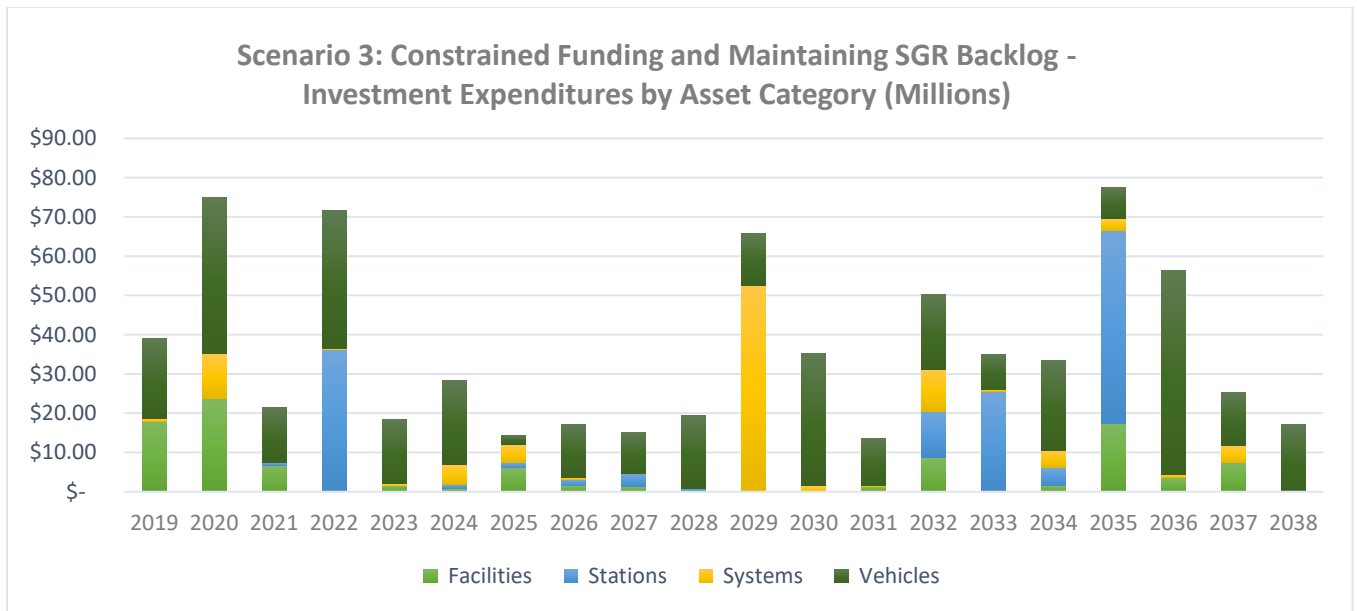
The second set of comparative charts depict *Investment Expenditures (Needs) by Asset Category* under all three funding scenarios mentioned previously over a 20-year planning horizon. All funding is shown in millions of dollars. **Table 13.3** provides a comparison of investment needs for all four asset categories (i.e., Facilities, Stations, Systems, Vehicles) in both 10- and 20-year planning horizons under all three funding scenarios (i.e., an unconstrained and two constrained).

**Scenario 1: Unconstrained Funding -
Investment Expenditures by Asset Category (Millions)**



**Scenario 2: Constrained Funding (Maintain Current Spending) -
Investment Expenditures by Asset Category (Millions)**





Asset Category	Scenario 1		Scenario 2		Scenario 3	
	Current Needs	2038 Needs (20-year)	Current Needs	2038 Needs (20-year)	Current Needs	2038 Needs (20-year)
Facilities	\$39.45	\$0.14	\$23.73	\$1.23	\$18.01	\$0.14
Stations	\$0	\$0	\$0	\$0	\$0	\$0
Systems	\$5.33	\$52.62	\$1.20	\$0	\$0.69	\$0
Vehicles	\$44.75	\$14.49	\$44.75	\$14.49	\$20.29	\$17.04
Grand Totals	\$89.53	\$67.25	\$69.68	\$15.72	\$38.99	\$17.18

The data from Scenarios 1 and 2 are almost identical at the SGR mid-point (2028), although a \$51.53 million difference over the full 20-year horizon (2038) is projected. Maintaining the entire backlog at 50 percent from Year 11 (2029) onward under Scenario 3 increases the reinvestment amount needed in 2013 by a mere \$1.46 million when compared to Scenario 2.

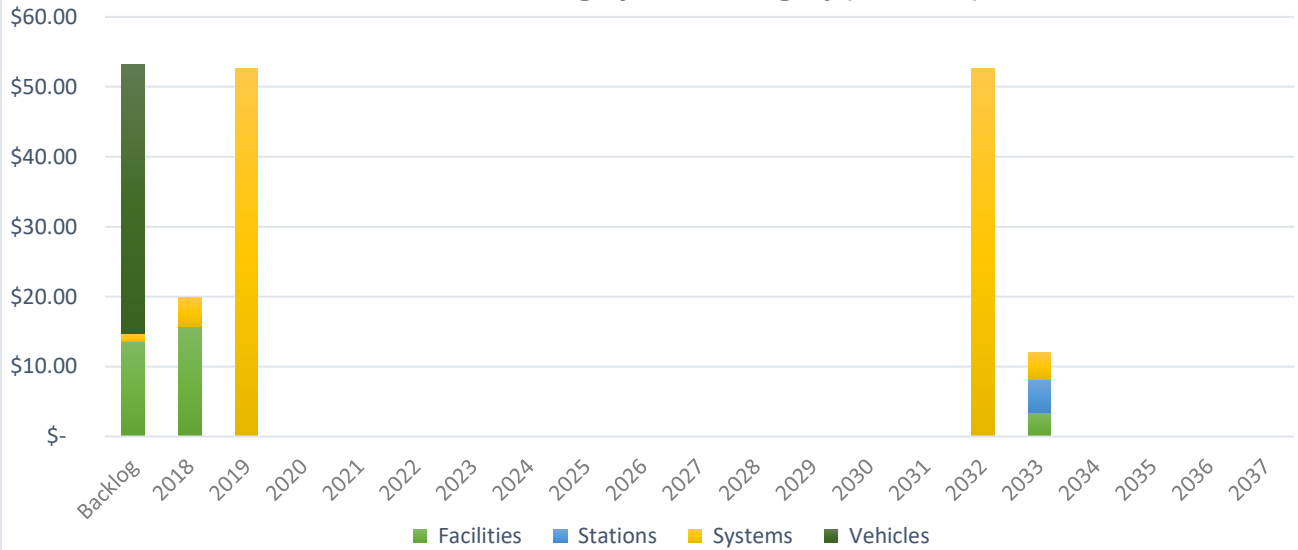
The full **Expenditures Forecast Summary Report by Asset Category: 2018-2038** for all three funding scenarios are provided in the appendices.

State of Good Repair (SGR) Backlogs

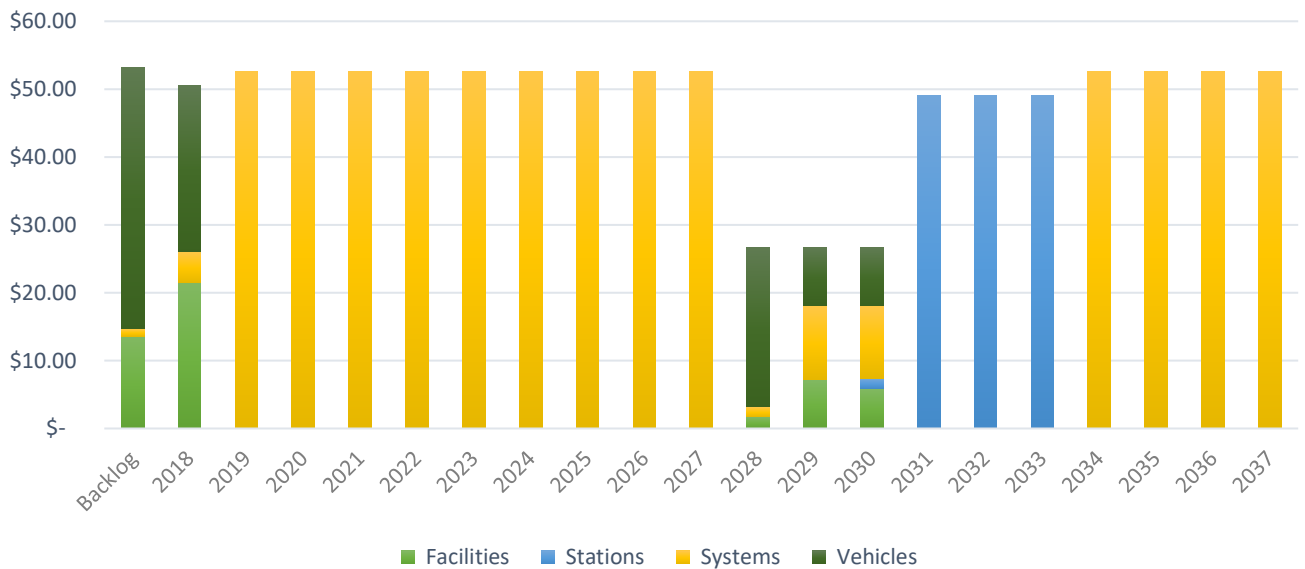
Funding requirements to address the SGR backlog – both today and in the future - are depicted in the two charts below. Scenario 1 is not shown since unconstrained or unlimited funding would be used to immediately eliminate the current and entire \$53.26 million backlog.

The full **SGR Backlog Summary Report by Asset Category: 2018-2038** for the two constrained funding scenarios (2 and 3) are provided in the appendices.

Scenario 2: Constrained Funding (Maintain Current Spending) - SGR Backlog by Asset Category (\$ Million)



Scenario 3: Constrained Funding and Maintaining SGR Backlog - SGR Backlog by Asset Category (\$ Million)



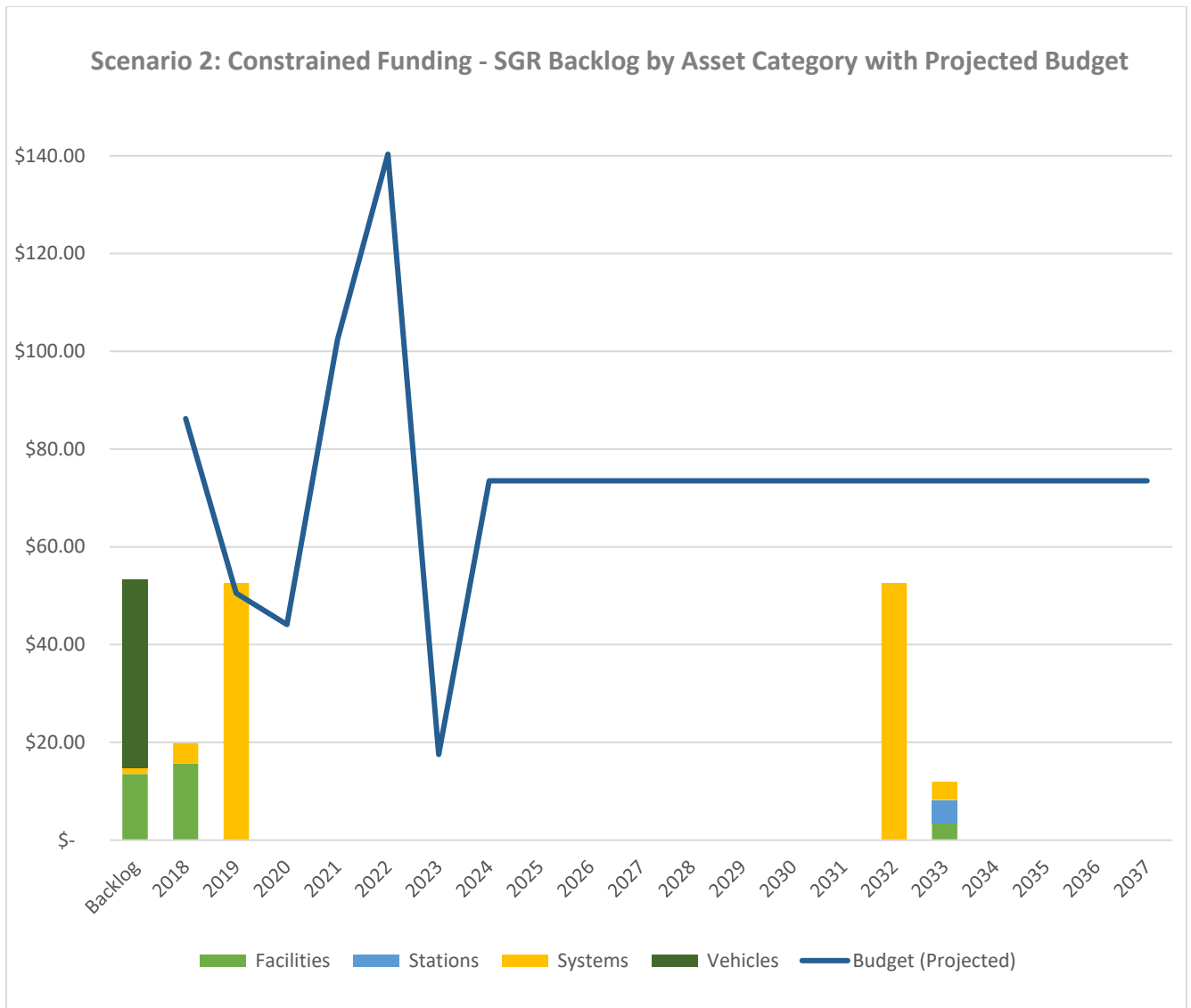
13.4 Funding Recommendations to Address and Maintain State of Good Repair Backlog

Based on estimated funding for capital projects over the short term (i.e., 2018 thru 2023), it appears the agency's current State of Good Repair backlog, as determined by TERM Lite, can begin to be eradicated by 2022 or within the current TAM horizon period. Assuming the 2019 projects are fully funded when the budget is adopted in December 2018, discretionary funding increase dramatically in 2021 and 2022, based on current projections. That information is presented graphically on page 11. Assuming the majority of the funding is already dedicated to or earmarked for Base Master Plan - Phase 1 construction projects once the Preliminary Engineering/Design phase and environmental review process are complete, using SGR as a primary metric for capital project selection in 2021 and 2022 is strongly recommended. The agency should plan on using the new EAM system to rank and score project proposals based on achieving and maintaining SGR above all other selection criteria, at least in the short-term. Ideally, the new system would use costs, not conditions, as the primary drivers of reinvestment decisions.²³ These include:

- Cost of maintenance
- Safety priority
- Cost of in-service failures
- Cost of customers' time
- Cost of money (financing)

Although, as mentioned previously, the various asset management software programs available on the market today allow transit agencies to customize project prioritization criteria using weighted averages to tailor them to the needs of the business (e.g., operating environment and service characteristics, geography and topography, climate, usage by facility or vehicle type, and many other agency-specific factors). This assures that the project selection process is thorough, proactive, and objective, in lieu of relying on a simple "worst first" process, based on subjectivity and perceived wants over actual needs.

²³ Source: FTA – Forecasting Asset Conditions with Decay Curves, Keith Gates, P.E. – Presented April 16, 2012



Largest Assets Identified with Total Replacement Costs

The TERM Lite *Asset Inventory Tool* can be used to sort individual assets by total replacement cost among many other criteria. This was especially useful in identifying and analyzing specific asset categories with enormous reinvestment requirements. In some cases, the amounts are even higher than the annual amounts budgeted for capital projects. By example, *Systems* shows a \$52.62 million SGR backlog in 2019-2027 and again in 2034-2037 under Scenario 3. By comparison, the average replacement cost for individual transit assets nationally, regardless of category, is \$4.0 million in today's dollars. The nine assets in the agency's TERM Lite inventory with a total replacement value above \$10 million are provided in **Table 13.4** for reference. It is worth noting that these highest value assets are seldom – if ever – replaced in their entirety or all at once (e.g., passenger facilities are not replaced but are rehabilitated and renewed every

ten years or so). It is therefore recommended to not consider them a liability in accounting and instead address the backlog incrementally as budgeting allows.

Table 13.4: Highest Valued Assets (> \$10 Million) in TERM Lite Database (Millions)

Asset Category	Asset ID	Description	Quantity	Total Replacement Cost (Estimated)
Systems	9	Base Radio Stations (Motorola)	1	\$47.83
Stations	131	Transit Station (Tacoma Dome Station)	1	\$44.67
Stations	129	Transit Center (Commerce Street Transfer Area)	1	\$23.18
Vehicles	183	Bus (60-foot Articulated for BRT)*	17	\$18.70
Facilities	190	Lakewood Base Master Plan Projects – Phase 1*	1	\$16.37
Stations	185	BRT Stations – Elevated, Side Platform*	38	\$15.20
Vehicles	17	Bus (40-foot - 2004 New Flyer – CNG)	20	\$12.98
Facilities	24	Maintenance (Headquarters Building 1)	1	\$12.96
Vehicles	16	Bus (40-foot - 2002 New Flyer – CNG)	18	\$12.14

*Expansion asset yet to be acquired.

Section 14 – Key Activities over the Four-Year TAM Horizon Period: 2018-2021

This section documents the key asset management activities that are planned to be accomplished over the remainder of the year, then in 2020, 2021, and 2022. This portion of the plan will serve to provide further guidance on the selected TAM implementation path, as described in Section 4.3.

14.1 Risk Management Program Activities: 2018-2019

Pierce Transit's Risk Management program involves establishing an appropriate infrastructure and culture necessary to apply a logical and systematic methodology to establishing the context, and identifying, analyzing, evaluating, treating, monitoring and communicating risks associated with any activity, function or process – in a way that will enable the agency to minimize losses and maximize gains.

The Risk Management Department is part of the Administration Division, but works closely with the Operations, Maintenance, and Safety Departments throughout the agency. The Risk Management Department also collects and analyzes loss and injury data agency-wide. Leveraging this data and lessons learned, Risk Management provides recommendations for process improvements to reduce risk and exploit opportunities.

Pierce Transit's primary risk is motor vehicle accidents (MVA). MVAs account for 90 percent of liability losses and 40 percent of workers' compensation costs. Accordingly, Pierce Transit has engaged in several state-of-the-art technology projects aimed at reducing this primary risk:

- Lytx/DriveCam – A driver feedback coaching system has been installed on all rolling stock (i.e., 506 vehicles excluding Vanpool vehicles), including non-revenue Service & Support vehicles. This project went live August 13, 2018. **Project cost: \$445,461 + \$178,578 annual monitoring subscription charge after the first year.**
- Collision Avoidance Warning System/Automatic Emergency Braking – This is a technology grant from the FTA to outfit and field test buses with a detection, warning and automatic emergency de-throttling/braking system. This system provides headway monitoring, forward collision warning, and left side pillar collision warning. And when so equipped, braking when a collision is eminent. **Project cost: \$2.16 million.**
- AT&T Fleet Telematics Solution Pilot – Outfitting 10 Vanpool vehicles in a proof of concept for safety and vehicle maintenance performance monitoring in real-time over a 90-day trial period. This is a cloud-based GPS and telematics solution that provides fleet managers with data and a web interface to manage both their drivers and vehicles by extracting actionable intelligence from trip data. Examples include harsh braking and driving, seat belt usage, fuel consumption, vehicle faults, battery voltage, and other engine data. **Project cost: \$2,000.**

- SEON 360 Camera Left Side Windshield Pillar Pilot – Mounting a camera on the exterior top left corner of the bus and LED display on the windshield pillar (to the operator’s left) that comes on at lower speeds – rendering the windshield pillar invisible during left turns. **Project cost: \$800 per motorbus** and is currently in the initial pilot phase.
- ArowGuard - Driver Protection System Pilot – Pierce Transit is currently testing the ArowGuard Slide System (adjustable window) driver protection door on 40-foot Gillig Coach #271. **Project cost approximately \$1,900–\$2,500 per motorbus.**
- Motorbus Driving Simulator – Pierce Transit has contracted for a bus driving simulator with Transit Training Solutions. The contract includes review and assessment of revised training curriculum, integration of simulation into curriculum and training trainers. **Project cost: \$507,518.**

The Risk Management and Safety Departments are tracking Key Performance Indicators to assess the effectiveness of measures being implemented to prevent or mitigate collisions and injuries. This feedback loop will advise further activity, procurement, or a revision of focus driven by performance.

14.2 Integrated Enterprise Asset Management (EAM) System Requirement: 2018-2019

As previously explained in Sections 3.4 and 12.5, the first of the internal recommendations as an outcome of developing this TAMP was consensus on the immediate need for a comprehensive, all-inclusive, and user-friendly Enterprise Asset Management (EAM) System. As of 3rd Quarter 2018, Pierce Transit is still relying on disparate systems for different asset categories, such as Trapeze, FMS, VFA.facility, and TERM Lite. While the first three listed have served their initial purpose since implementation, none have the capability or functionality to generate real-time and detailed “State of the Asset” reports and dashboards across multiple divisions or platforms agency-wide (e.g., Facilities, Maintenance, Operations, Fleet, Capital Planning). Given that FMS is being replaced and VFA.facility is obsolete, this an opportune time to move forward with a consolidated EAM system that serves as a repository for all assets individually, based on observed conditions and replacement, repair, or rehabilitation needs. Recognizing this, a survey of different systems offered by transit-focused software vendors was conducted in spring 2018 and information was gathered from peer transit agencies on which systems they use. More importantly, if it is one they would recommend to Pierce Transit as a Tier 1 Agency under TAMP. The next step would be to conduct a nationwide (including Canada) open and competitive, *Request for Qualifications/Request for Proposals* process beginning in 4th Quarter 2018 with a goal of having a contract signed and the new system in place by 2nd Quarter 2019. More on the role of a proposed EAM or Transit Asset Database Specialist to manage the system is provided in Section 14.3.

14.3 Transit Asset Data & Planning Analyst Position (New FTE): 2020

Unlike peer agencies surveyed throughout the Central Puget Sound Region, Pierce Transit does not have a staff member or team of experts specifically dedicated to asset management

and related reporting, beyond what is required annually in the National Transit Database (NTD). As such, the agency should define and document a path forward, including considering creating a new position (FTE), such as *Transit Asset Data & Planning Analyst*. Ideally, the person would be the agency's "superuser" or subject matter expert for the new, consolidated EAM system mentioned in Section 14.2. Like peer agencies nationwide, once the FTA's Final Transit Asset Management Rule took effect on October 1, 2016, Pierce Transit had to quickly identify a department and staff members to create this document over the next 24 months. Then, after one of the primary TAMP advisors and contributors left the agency in September 2017, staff continued to gather information from many different specialists, systems, and sources over the following year. The ongoing difficulty lied in ownership between various departments; namely Budget & Finance, Capital Planning, and Facilities Maintenance, regarding who had the background, skill set, and staffing availability to create the document by leading the effort. While Capital Planning took the lead, it was still a large group undertaking. Ultimately, Pierce Transit should make the determination for a new FTE through Workforce Development as soon as possible. Especially now, so that the process and findings from the TAMP are not simply documented and put aside or on a shelf. Instead it should serve as a starting point for continuous monitoring over time and a full update of the TAMP in 2022 under the FTA requirement. More on that recommendation is provided in Section 15.

14.4 Using Asset Management to Guide Future Decision Making & Project Selection Processes: 2019-2021

Pierce Transit is likely no different than other public transportation operating agencies throughout the United States of America when it comes to the mission of providing safe, dependable, and viable open-door, shared ride services across a vast age and socioeconomic spectrum of current and potential clients. People across the nation who choose a career in public transportation are dedicated and skilled professionals that take pride in their work and contribute to the agency daily. This is particularly apparent in agencies such as Pierce Transit who were forced to cut personnel and services in tandem with maximizing every available resource during the recession that began in earnest in 2008. Some ten years later, while rebounding and seeing an incremental growth in ridership, the agency still strives to make prudent investment decisions that will extend the useful life of its entire capital assets portfolio.

Continuing to grow the business – especially fixed route and commute trip reduction (Vanpool) – in an era when transit ridership is generally declining nationwide is a perpetual challenge. There will always be fluctuations, vagaries, or things beyond anyone's control when projecting future funding and revenue streams. This is compounded by the fact that the agency only receives .006% (or 6/10 of 1 percent) of the maximum .009% in local sales and use taxes allowed under the Washington State Department of Revenue. It will never be easy, but Pierce Transit will always face it head-on.

It is the agency's objective that this TAMP provided some insight into not only its current asset inventory and conditions, but known or planned expansion assets arriving in the immediate

future, such as for Pacific Avenue/SR 7 Bus Rapid Transit system currently in development and the soon to be reconfigured and enlarged Lakewood Headquarters Base, as identified in the Master Plan Update of 2017.

A summary of eight asset management related recommendations to be implemented over the next three calendar years (2018 thru 2021) is provided below.

- Combine the data and information from the two Enterprise Asset Management systems, plus TERM Lite, into a new system (to be selected in early 2019). Recognizing that a commitment to continuously update and maintain the new system is critical to its ongoing utility (e.g., adding new equipment, vehicles, and facilities, project closures, improved conditions or scores, etc.). The different software vendors Pierce Transit has contacted for information all recommend another and more refined facilities conditions assessment (i.e., down to the secondary and tertiary systems levels), last conducted when the VFA facility database was developed specifically for Pierce Transit in spring 2011.
- Let the new system's output and findings be a highly valued and objective voice as projects are ranked and scored for funding internally, beginning with the spring 2019 call for proposals at the PMO level.
- Dedicate two years of surplus capital projects funding to anything identified in the SGR backlog that is not already in the proposed budget for 2019. Then set aside funding annually to proactively address it again in 2028.
- Assuming any headquarters or customer-facing facility is not currently scheduled for a major or minor midlife rehabilitation and renewal project, use the Parametrix reporting from January 2018 as a guide to assess current conditions and determine its reinvestment priority. The TERM Lite Asset Inventory can be a useful tool as well.
- To ensure that no one operates within a silo, work with all departments throughout the agency to assure consistency and continuity in SGR backlog project selection.
- Keep Workforce Development (i.e., Human Resources) in all discussions, recognizing that human capital and institutional knowledge are perhaps a transit agency's two most precious and seemingly no longer easily replaceable assets.
- Assure that safety is always at the forefront of project-based decisions.
- Combine the previous seven recommendations to allow the agency's Transit Asset Management process to evolve and mature, with details provided in Section 15.

Section 15 – Strategies to Monitor, Update, and Evaluate the TAMP for Continuous Improvement

This closing section will outline how this plan and related business processes will be revisited, evaluated, and updated as needed, to ensure that the organization is embracing continuous improvement of the asset management initiative.

15.1 Embracing Asset Management as Part of the Culture at Pierce Transit

If this document achieved but one goal, it would ideally be that asset management is a practice to embrace and improve upon in any way possible. Pierce Transit has almost a thousand employees who do this daily; many without even knowing it. Perhaps a special award, category, or recognition program could be added to the two that were reintroduced in June 2018: *Effectiveness & Efficiency Quarterly Award* and *Excellence in Safety Quarterly Award*? This third award would focus on transit asset management and best practices. There are undoubtedly many good ideas among employees from all departments for how Pierce Transit's process could be improved and refined over time. The suggestion is to formally recognize when someone brings forward an innovative idea on how to more accurately assess an asset's condition, restore, refurbish, renew, or repurpose it (especially if it could be salvaged), among other best management practices. The award could also go to someone who recognized and called out an asset that was failing, especially before the end of its useful life (i.e., planning for repairs instead of responding to failures). And finally, someone on the administrative, planning, or budget side of the business could harbor an idea for better data management, analysis, and reporting.

As indicated in Section 13, let Transit Asset Management be a valued criterion in the project selection process over the next four years with a laser focus on State of Good Repair.

15.2 Continuously Monitoring and Updating Asset Inventories

While stated previously, it is worth reiterating that agency must commit to regularly updating the multiple asset inventories and monitoring their conditions.

- For *Facilities*, the agency should immediately write and release an RFP/RFQ, with the objective of finding a new EAM vendor. Many now offer tablet-based, real-time IoT platforms that automatically link to the master database when an asset's status changes. Assuming a facilities conditions assessment is recommended as the new database is created, the vendor's findings, including TERM Lite scores and SGR recommendations, will be used to fulfill NTD reporting requirements in April 2019. The agency should then agree and commit to self-assessments of all facilities biennially with an independent, outside and objective assessment every fourth or fifth year (i.e., once every TAMP reporting cycle).

- For *Rolling Stock* and non-revenue/service and support vehicles (i.e., Equipment), this should be done at least quarterly or whenever new vehicles are delivered and used vehicles are either surplus or sold. Keeping the TAMP administrator or author up to date on the inventory will assure asset condition reports and funding requirements produced by the new database are totally accurate.
- Other, non-vehicular *Equipment* should also be easy to track, as long as the agency's TAMP administrator is always notified when new equipment is brought in or installed and old equipment is removed, sold, or disposed of. This would include anything valued at \$50,000 or more. In other words, the process for Equipment should be the same as for continuously monitoring the Rolling Stock asset category.

15.3 Lessons Learned from TAMP Development: 2016-2018

This document's purpose was to learn if there exists a nexus between Pierce Transit's day-to-day operations and nationally recognized transit asset management best practices. While larger transit agencies often have dedicated teams of specialists with years of experience specializing in TAM technical writing and reporting, and smaller Tier II agencies were able to participate in group plans, Pierce Transit as a Tier I agency was required to produce its own, inaugural Transit Asset Management Plan with little input from FTA Region 10 in Seattle. The lessons learned or "If we had only known when we began what we know today" are many and will be used as a starting point when the document is updated in 2022. The impetus for the program is the same agency-wide: *What measures can Pierce Transit take to assure that asset management is fully integrated, beyond just the employees responsible for producing this TAMP?* Here are some suggestions:

- Identify a "champion" or subject matter expert early in the process. Even if it requires an outside consulting firm who has worked with medium-sized motorbus transit agencies in the past, it would have been beneficial to get an objective, professional opinion as the various sections were being written. In other words, don't hesitate to ask for outside help so that the finished product is useful and referred to often over its four-year lifespan, as is *Destination 2040* (the Pierce Transit Long Range Plan adopted in 2016).
- Based on information received from the largest agencies nationwide, many with heavy or light rail assets, consider a pre-certification gap analysis in the documentation under the ISO 55000 standard.²⁴
- Meticulously document the process, such as conversations, agendas, and meeting minutes where TAMP was the topic and assignments were shared. Because the agency was new to this FTA requirement, it would have been prudent to get all commitments for providing content or data in writing from the various authors, contributors, or team

²⁴ For more information on the international standard, please visit: <https://www.assetmanagementstandards.com/>

members. It also would have better defined roles and responsibilities as the document was being produced.

- Ask for periodic feedback from peer transit agencies with similar fleet sizes *statewide* and not just in the immediate metropolitan area. Although the Puget Sound Regional Council MPO made a notable effort in establishing a TAMP working group, including conducting regular meetings and roundtable discussions, there was an obvious lack of information available specific to document formatting and content, such a template to follow. In fact, only King County Metro²⁵ had a complete, final, and formally adopted document to share with the group by the end of 2017 as an example of a comprehensive TAMP.
- Regarding the update, start early, work on it regularly (not just sporadically) and target the summer of 2022 for completion of a final draft (e.g., June 30, 2022), thereby allowing for a full 90-day internal review process next time.
- Utilize the power of the many Lean Six Sigma-trained employees at Pierce Transit in asset management decisions going forward. It was recognized as the TAMP was being created that the process was not always as efficient and effective as it could have been with better guidance and more collaboration, ultimately resulting in a higher quality final deliverable.²⁶
- And finally, “digitize our assets.” Writing in Metro Magazine, Timothy Butler, founder and CEO of Tego (a Massachusetts-based asset tracking solutions software company), advises, “The act of bringing life to physical objects, such as those that can communicate directly with operations personnel to facilitate preventative and predictive maintenance, incite a higher level of asset utilization, create better asset visibility and planning, and allow for more accurate reporting. Essentially ‘making assets smart.’”



²⁵ As the eleventh largest transit agency in the United States, according to APTA, King County Metro has a team of asset managers who work on this process and documentation full-time. Their annual *Transit Facility Condition Needs Report*, including a *Six-Year Recommended Needs List* and various *TAMP Program Plans*, has been recognized nationally by the FTA as well as peer agencies for its detailed content and clarity.

²⁶ For more information, please visit: <https://goleansixsigma.com/what-is-lean-six-sigma/>