



SOLICITATION ADDENDUM #1

Addendum Issuance Date: August 9, 2024
Solicitation Number: RFP PTD24-005
Offer Due Date: Revised by this addendum to Thursday,
September 5, 2024, at 2:00 p.m. MST (Local
Time)
Title: Fixed Route-Services – West Transit Facility

City of Phoenix
Public Transit Department
302 North 1st Ave.
Suite 900
Phoenix, AZ 85003
PTDProcurement@phoenix.gov

I. Solicitation Modifications.

- A. The solicitation is modified by addition of Exhibit 46, “Zero-Emission Bus Transition Plan,” which is separately posted on the City’s solicitation website and incorporated into this Solicitation by reference here.
- B. The solicitation is modified by addition of Exhibit 47, “Life Miles,” which is separately posted on the City’s solicitation website and incorporated into this Solicitation by reference here.
- C. The solicitation is modified by replacement of “Attachment A - Fee Schedule” with “Revised Attachment A – Fee Schedule,” which is separately posted on the City’s solicitation website and incorporated into this Solicitation by reference here, to correct the estimated revenue miles for monthly services on the City’s options for six month-to-month extensions.
- D. The solicitation is modified by revision and replacement of **Section 4.3.1.2** (“Automobile Liability”) as follows to remove UM/UIM coverage requirements:

4.3.1.2 Automobile Liability

Bodily injury and property damage coverage for any owned, hired, and non-owned vehicles used in the performance of this Contract.

Combined Single Limit (CSL)	\$10,000,000
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- The policy must be endorsed to include the City of Phoenix as an additional insured with respect to liability arising out of the activities performed by, or on behalf of the Contractor, relating to this Contract.
 - City of Phoenix is an additional insured to the full limits of liability purchased by the Contractor.
 - The Contractor’s insurance coverage must be primary insurance and non-contributory with respect to any insurance or self-insurance carried by the City.
- E. The solicitation is modified by addition of Exhibit 48, “Operator List,” which is separately posted on the City’s solicitation website and incorporated into this Solicitation by reference here.
- F. The solicitation is modified by addition of Exhibit 49, “Non-Operator Employee List,” which is separately posted on the City’s solicitation website and incorporated into this Solicitation by reference here.
- G. The Written Inquiries Due Date and Offer Due Date in the **Section 1.4** (“Schedule of Events”) are revised as follows:
 - a. Written Inquiries due date –
From: July 18, 2024 at 5:00PM MST (Phoenix local time)



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To: July 18, 2024 at 5:00PM MST (Phoenix local time) for initial written inquiries;
August 16, 2024 at 5:00PM MST (Phoenix local time) for any final written
inquiries.

b. Offer due date –

From: August 20, 2024 at 2:00PM MST (Phoenix local time)

To: September 5, 2024 at 2:00PM MST (Phoenix local time)

II. Written Inquiries. In response to Offerors’ written inquiries in accordance with the Solicitation’s **Section 1.8** (“Inquiries”), the City of Phoenix (“**City**”) provides answers to those inquiries below.

No.	Question	City’s Response
1	Site Visit: How many electric charging stations will be put in?	For battery electric buses, the City intends to install six charging stations that can charge up to twelve buses at a time, recognizing that plans may change over time.
2	Site Visit: Will EV’s be revenue or support?	The City intends for its battery electric buses, hybrid electric buses, and fuel cell electric buses to be dedicated for revenue service only.
3	Please provide the average Operator seniority.	See Section I, Paragraph E above regarding solicitation modifications for list of Operators and their seniority dates.
4	What is the current post-training turnover rate for Operators?	The post-training turnover rate for Operators is reported by the current service provider to be 25%.
5	Section 3.4/Attachment A: The Fee Schedule requests pricing to be provided for each year of the contract; however, Section 3.4 indicates pricing after the initial two years of the contract is adjusted no more than 3% annually. Please confirm whether this language applies to this contract?	This language applies to the contract to be procured under this solicitation.
6	Section 5.2.6 refers to 63,000 annual revenue miles of Express and/or RAPID bus service. Please provide additional detail for this service: a. Is this new or existing service; if existing, what are the route number(s) in consideration for reassignment. b. Please provide the daily In-Service, Deadhead, Loading, and Pull Trip durations for the service. c. Please provide the count of blocks that operate each day.	See last sentence of Section 5.2.6. The CITY expects proposers to have the knowledge and expertise to develop a proposal based on the general specification noted for this type of service in the solicitation. See Section I, Paragraph B above regarding solicitation modifications for information on “Life Miles.” See also Exhibit 14, Fleet Inventory. Please note that no vehicles from



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	<p>d. Please indicate the vehicle type and count that would be allocated to the project to support this service. If the vehicles are not new, please provide:</p> <ol style="list-style-type: none"> 1. Vehicle # 2. Year 3. Make Model 4. Engine 5. Fuel type 6. Life mileage on unit 	<p>the West Transit Facility are yet dedicated to Express and/or RAPID bus service.</p>
7	<p>Section 5.2.7 refers to new BRT service. Please provide additional detail for this service:</p> <ol style="list-style-type: none"> a. Please provide the expected daily In-Service, Deadhead, Loading, and Pull Trip durations for the service. b. Please provide the expected count of blocks that operate each day. c. Please indicate the vehicle count that would be allocated to the project to support this service. As well as the following details: <ol style="list-style-type: none"> 1. Vehicle # 2. Year 3. Make Model 4. Engine 5. Fuel type 6. Life mileage on unit d. Does the BRT service overlap any existing transit lines, and will the existing lines be eliminated or modified when BRT service is implemented? e. Will the BRT service require dedicated support staff such as managers and supervisors? f. Will the BRT service use off-board fare collection systems or will fares be collected using an onboard farebox? g. Will the BRT service operate according to a schedule with mid-trip timepoints, and will the contractor's schedule adherence performance be subject to the same requirements as local routes? 	<p>See Sections 5.2.7 and 5.1.2.2. The CITY expects proposers to have the knowledge and expertise to develop a proposal based on the general specifications noted for this type of service in the solicitation.</p> <p>BRT operating needs and support will be coordinated with the awarded contractor when implemented, although it will operate similarly to the city's RAPID service.</p>
8	<p>Section 5.2.6 and 5.2.7: How will the City handle the startup costs associated with adding the new services described? Will this be handled separately so that it is not included in the total cost of the service indicated in the fee schedule?</p>	<p>All costs associated with the provision of services throughout the proposed term of the contract should be accounted for in proposers' overall price proposal, i.e., cost per mile (CPM), recognizing that proposers can choose to account for such costs over multiple years.</p>



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9	Section 5.3.1: Would the City please indicate the make and model of the battery-electric and fuel-cell-electric buses arriving in the second quarter of 2025?	Initial orders will be as follows: <ul style="list-style-type: none"> - 40' Gillig Battery Electric Low Floor Plus Bus. - 40' New Flyer Fuel Cell Electric Xcelsior bus (Model XHE40).
10	Section 5.4.14.3: Is it the City's wish that the contractor continues to stage 6 ready-vehicles and Operators to protect service?	There is no requirement in the solicitation for a specific number of ready vehicles. The CITY expects proposers to have the knowledge and expertise to develop a proposal based on the requirements provided throughout the solicitation.
11	Section 5.8.4.1/Exhibit 2: The CBA states a 15-minute pre trip inspection plus a 5-minute walk time (total of 20-minutes) is required; however, it does not indicate a time duration for the post-trip. Please confirm the Contractor is required to schedule a 5-minute post-trip inspection as indicated in this section of the RFP.	There is no requirement in the solicitation for a specific number of minutes for such inspections. The CITY expects proposers to have the knowledge and expertise to develop a proposal based on the solicitation information provided. Any labor agreements entered into between the Contractor and a union are between those parties. The CITY is not a party to those agreements, nor does it interpret those agreements.
12	Section 5.10.5.1: Currently, the shop floors are scrubbed 3-4 times each day to mitigate the debris from the pigeon infestation. Should Contractors plan to continue this practice?	The CITY expects proposers to have the knowledge and expertise to develop a proposal based on the requirements provided throughout the solicitation.
13	Attachment C, Form EO2: Form E02 requires information from the DBE/SBEs that will not be available if the DBE/SBE doesn't respond to our outreach efforts. This information includes Number of Employees, Number of Years in Business and Range of Annual Gross Receipts. Will the City consider requiring these three information items for only those DBE/SBEs who respond to our outreach?	The City requires all proposers to list all DBEs and Small Business <u>contacted</u> by the proposer. The City <u>does not</u> require the Number of Employees, Number of Years in Business and Range of Annual Gross Receipts for DBEs and Small Business who did not respond to outreach efforts.
14	Please provide a current list of employees absent any identifiable information to include wages, position, full-time or part-time status, and seniority. Please also provide a current organizational chart provided for this contract by the current contractor.	See Section I, Paragraphs E and F above regarding solicitation modifications for list of employees/job functions, their wages, and their seniority/hiring dates. In addition to wages, employees receive health benefit plans as included in their respective Collective Bargaining Agreements (Exhibits 2, 5, and 6). The participation rate for Operators is reported by the current service provider to be 80%.



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15	Please confirm the key personnel positions that bidders must name in their respective proposals?	See Solicitation Sections 3.9.1 and 7.4 (Technical Proposal, Tab 2, Required Components 1).
16	Pg. 16, 1.25 - Performance Bond: Does the Performance Bond need to be maintained/kept throughout the contract's life? Also, please confirm if the bond is to be renewed annually.	The performance bond needs to be maintained throughout the contract's life, whether the performance bond is written for the full contract term or annually renewed.
17	Pg. 44, 3.14.17 - Badge & Key Fees: If a new contractor is selected would existing employees that transition to the new contractor be required to get new badges?	Yes, see last sentence of Solicitation Section 3.14.16.
18	Pg. 65, 5.1.7 - Transition / Start-Up: There is no specified place in the client provided price pages for start-up costs. Where should bidders include costs for Transition/Start-Up costs? Please also describe how start-up costs would be paid to the awarded contractor.	See answer to Question 8 above.
19	Pg. 90, 5.8.7 - Major Repairs: The RFP indicates that the Contractor is responsible for major repairs, how does this list change with the addition of Zero Emission vehicles?	The responsibilities for major repairs are the same for all vehicle types. The list for correction of deficiencies is not an exhaustive list.
20	Pg. 103, 5.10.17.1 - Utility Costs: The RFP indicates that the Contractor is responsible for refuse/recycling and sewer, but the table provided in 5.10.17.4 doesn't provide historical costs for these services.	Approximate historical facilities costs for refuse/recycling is reported by the current service provider to be \$23,000/year for the last three years. Please note that the sewer charges were included in the Solicitation's provision of historical costs for water utilities.
21	Pg. 133, 5.23.14 - Staff Training: This section indicates that the Contractor's staff shall participate in the City's TARR, NIMS, CAS, FCS, and fingertip maintenance training. Please provide all bidders with the duration and frequency of these required training courses.	Although the City may direct Contractor to participate in such training, the City expects the contractor to coordinate the provision of this training to its workforce based on its policies and procedures and the availability of staffing and resources.
22	Pg. 133, 5.23.16 - Bus Passes: Can the City please provide all bidders with the amount and cost of bus passes purchased by the current contract in the last 12 months?	The cost of bus passes purchased for employees/dependents is reported by the current service provider to be \$2,000/month.
23	Pg. 170, 6.27 - Buy America: Do Buy America requirements apply to contractor-purchased support vehicles for this contract?	No.
24	Pre-Offer Conf. Presentation: The City indicates that it will acquire battery-electric and hydrogen buses during the 1st quarter of 2025. Please provide bidders with the anticipated quantity, year, make and model.	Refer to Exhibit 14, Fleet Inventory, and Exhibit 46, Zero-Emission Bus Transition Plan, which describes bus replacements.



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	<p>Will the City be retiring any current vehicles with the addition of battery-electric vehicles?</p> <p>If this information is not readily available, should bidders price to the existing fleet through the contract term?</p>	
25	<p>Pre-Offer Conf. Presentation: The City indicates that forty (40) buses are replaced annually (contingent on funding). Please provide bidders with information on the make, model and fuel type of the anticipated 40 vehicles to be replaced annually.</p> <p>If this information is not readily available, should bidders price to the existing fleet through the contract term?</p>	Refer to Exhibit 46, Zero-Emission Bus Transition Plan.
26	<p>Price Page Excel Document: The tab labeled “6 Month-to-Month Extensions” appears to be using annual quantities instead of monthly quantities in the Estimated Annual Revenue Miles for each of the three (3) services: Local/Circulator, Express/Rapid and BRT. These can be found in rows 10, 14 and 23.</p> <p>Please provide guidance on how this should be priced or if an updated price sheet will be provided.</p>	See Section I, Paragraph C above regarding solicitation modifications for Attachment A – Fee Schedule.
27	<p>Exhibit 31: Do the Non-Revenue Hours listed in this Exhibit include just deadhead time or does it also include pre and post-trip times?</p>	The non-revenue hours listed on Exhibit 31 include pull trips and deadhead trips. It does not include pre- and post-trip times.
28	<p>Price Page Excel Document: The tab labeled “Fee Schedule 1” indicates that the BRT Service starts in Year 5 of the contract. Can the City please provide bidders with anticipated schedules for this service so that we can accurately account for all revenue and non-revenue, hours/miles or provide guidance on how bidders should price these items?</p>	See answer to Question 7 above.
29	<p>Price Page Excel Document: The tab labeled “Fee Schedule 1” indicates that the Express/Rapid Service should be priced.</p> <p>Can the City please provide bidders with anticipated schedules for this service so that we can accurately account for all revenue and non-revenue, hours/miles or provide guidance on how bidders should price these items?</p>	See answer to Question 6 above.
30	<p>Pg. 69, 5.3.1 - City-Furnished Vehicles: Please provide all bidders with the anticipated fleet replacement plan for the duration of the new</p>	Refer to Exhibit 46, Zero-Emission Bus Transition Plan.



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	<p>agreement so that bidders can accurately price all anticipated fleet maintenance expenses.</p> <p>If this information is not readily available, should bidders price to the existing fleet through the contract term?</p>	
31	<p>Exhibit 17- West Transit Facility Asset and Equipment List: Please confirm the City is responsible for replacing any equipment on this list during the full term of this contract.</p>	<p>See Solicitation Section 5.10.15.2, "CONTRACTOR shall replace with like item any CITY-provided and CONTRACTOR-maintained equipment that becomes damaged or inoperable due to CONTRACTOR's or its subcontractors' misuse (accidents, improper operation, theft, etc.)." Absent such misuse, the City will be responsible for replacement of such equipment.</p>
32	<p>Has the city developed a zero-emissions transition plan? If so, can this plan be provided to all bidders?</p>	<p>Refer to Exhibit 46, Zero-Emission Bus Transition Plan.</p>
33	<p>Has the local utility been engaged? What type of load can the facility handle?</p>	<p>The City is actively coordinating with the local utility provider relative to its fleet and infrastructure transition. The City is seeking sufficient load to support all battery electric buses and other fleet/infrastructure to be used at the West Transit facility.</p>
34	<p>Please provide the quantity, OEM, and model of the hybrid-electric buses that will arrive in the 1st quarter of 2024, and the battery-electric and fuel cell-electric buses that will begin arriving in the 2nd quarter of 2025 according to Section 5.3.1.</p>	<p>Refer to Exhibit 46, Zero-Emission Bus Transition Plan. See also answer to Question 9 above.</p>
35	<p>Do you have a timeline for the charging infrastructure installation?</p> <p>Will there be enroute charging?</p> <p>If so, can we please identify where in the service area these will be installed and what type of chargers will be installed?</p>	<p>Refer to Exhibit 46, Zero-Emission Bus Transition Plan. Enroute charging is not currently envisioned as part of operating such buses.</p>
36	<p>Is the City having hydrogen delivered or producing onsite?</p> <p>Does the City have a resiliency solution identified for grid outages?</p>	<p>The City will be having the hydrogen delivered and is in the process of procuring temporary hydrogen storage, with the intent to later construct permanent hydrogen infrastructure. The hydrogen installations will have redundancy measures in the event of grid outage.</p>
37	<p>What type of battery warranties are being purchased with the vehicles?</p>	<p>For battery electric buses, the City has purchased an extended battery warranty that covers parts and labor for twelve years or the system throughput limit (1,925,000 kWh),</p>



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	Who is responsible for battery replacements after the warranty ends?	<p>whichever comes first. For hybrid electric and fuel-cell electric buses, the City has purchased an extended battery warranty that covers parts and labor for twelve years or a mileage of no less than 500,000 miles, whichever comes first.</p> <p>The awarded contractor will not be responsible for battery replacements. The City will work with the bus OEMs for battery replacements.</p>
38	Is OEM training, for operators and technicians, included in the vehicle purchases?	Yes.
39	<p>Has a scheduling or bus blocking analysis been performed?</p> <p>Has an analysis been completed to determine how terrain, weather, temperature, traffic, and other operational factors will affect the range of the vehicles?</p> <p>What does the fleet look like going forward, considering it may not be a 1:1 replacement ratio?</p>	For scheduling, bus blocking, and other analysis, refer to Exhibit 46, Zero-Emission Bus Transition Plan.
40	<p>Is the City purchasing Battery Analytics for the Zero Emissions buses to monitor battery degradation and as a solution for thermal mitigation?</p> <p>If so, please provide this information for all bidders.</p>	Yes. The Battery Analytics Program comes with the bus. The software is in the process of being determined and this information will be provided to the awarded contractor.
41	<p>Is the City purchasing any Fleet or Charger Management software for the zero-emission buses?</p> <p>If so, please provide this information for all bidders.</p>	Yes. The zero-emissions charging management system is in the process of being determined and this information will be provided to the awarded contractor.
42	<p>Page 75, Section V -Scope of Work, 5.4.3.3: This section indicates that the "CONTRACTOR shall maintain the on-board equipment to Original Equipment Manufacturer (OEM) specification and shall be financially responsible for all maintenance/support costs associated with the non-warrantied CAD/AVL parts. The CITY will supply CONTRACTOR with spare CAD/AVL components as currently maintained and warranted by the CITY's CAD/AVL Vendor."</p> <p>Can the CITY please provide the make, model, and age of all on-board systems/equipment for which the Contractor is responsible? (i.e., AVLs, Clever Devices hardware/software, LED Signs, destination</p>	See Solicitation Sections 5.8.13 and 5.8.14. The on-board equipment/components are covered by warranties through their respective vendors, for which the contractor will retain warranty credits for reimbursements for work performed on a City owned vehicle or components/system under warranty. The City will provide a comprehensive list of these items to the awarded contractor.



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	signs, DVRS, APCs, PA System, Fare Collection Equipment)?	
43	Exhibit 25, Phoenix Technology Services Technical Requirements: Can the CITY please provide the annual costs for the past 2 years that are associated with the maintenance and repair of any onboard systems/equipment for which the Contractor is responsible? (i.e., AVLS, Clever Devices hardware/software, LED Signs, destination signs, DVRS, APCs, PA System, Fare Collection Equipment)?	Refer to answer to Question 42 above.
44	Page 16, Exhibit 25, Phoenix Technology Services Technical Requirements, CAD/AVL System: Will the City's sixteen-year agreement with Clever Devices come to an end during the term of this contract? If so, does the CITY intend to renew its agreement with Clever Devices, or will the CITY be seeking a replacement CAD/AVL system? If the city is seeking a change, can the city please share the possible vendor?	The Clever Devices contract, with its optional extensions, has a term of up to sixteen years. If all options are exercised, the Clever Devices contract would extend into Spring 2033, which is beyond the term for this Solicitation's resulting contract.
45	Page 16, Exhibit 25, Phoenix Technology Services Technical Requirements, CAD/AVL System: This section indicates that "The TRANSIT PARTNER shall assign an Information Technology Specialist to provide first-level support to dispatch consoles(s) equipment." Does the CITY require this person to be solely dedicated to this service?	See first sentence of Solicitation Section 5.23.6.
46	Page 20, Exhibit 25, Phoenix Technology Services Technical Requirements, CAD/AVL System: This section indicates that the TRANSIT PARTNER shall maintain a spare ratio of CAD/AVL warranted and non-warranted components. Please, confirm that the spare components will be provided by the CITY. If not, please list the specific components being referenced and advise what the spare ratio percentage should be.	Spare components related to CAD/AVL are purchased and provided by the CITY.
47	Page 23, Exhibit 25, Phoenix Technology Services Technical Requirements, CAD/AVL System, Mobile Device Requirements: This section indicates that the TRANSIT PARTNER is responsible for	This section refers only to mobile devices (not MDTs) to be used with the CAD/AVL system, specifically Android tablets based on the current versions supported by Clever Devices.



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	<p>purchasing the mobile device and warranty, as well as cellular service fees.</p> <p>Please, confirm that this refers to mobile devices to be used with the CAD/AVL system.</p> <p>If so, does the CITY require the mobile devices to be the proprietary Clever mobile device terminals (MDTs) or can these devices be standard Android tablets?</p>	<p>These Android tablets must be a specific make and model as provided by Clever Devices. The City will provide these mobile device specifications to the awarded contractor.</p>
48	<p>Page 14, Exhibit 25, Phoenix Technology Services Technical Requirements, 12. Training: Please, confirm that the CITY will provide initial training of the CITY provided software and the CONTRACTOR is only responsible for ongoing training</p>	<p>The City will provide initial training of the City provided software to the awarded contractor. The awarded contractor is responsible for refresher and ongoing training.</p>
49	<p>4.3 Scope and Limits of Insurance: Please clarify if the authority is requesting Fire Damage of \$10,000,000 coverage for premises rented.</p>	<p>Yes, the premises must be included in the Fire Damage coverage (\$10,000,000) under the awarded Contractor’s commercial liability insurance.</p>
50	<p>4.3 Scope and Limits of Insurance: This section states, “UM/UIM Per Person Limit \$500,000” We respectfully request that the City remove this language.</p> <p>State law allows workers' compensation as the sole remedy for employee injuries. Third-party/passengers injured as a result of an accident will file a third-party claim that would be covered under its liability policy. UM/UIM coverage can encourage duplicative claims and increase expenses.</p>	<p>See Section I, Paragraph D above regarding solicitation modifications for UM/UIM coverage.</p>
51	<p>4.3 Scope and Limits of Insurance: This section states, “4.3.1.3 Contractor’s Pollution Liability For losses caused by pollution conditions that arise from the operations of the Contractor as described in the Scope of Services Section of this Contract. Per Occurrence \$1,000,000 General Aggregate \$2,000,000</p> <p>1. The policy should be written on an “occurrence” basis with no sunset clause or if written on a “claims-made” basis, it must be maintained for a period of not less than 8 years with the retroactive date to be prior to or held constant with the date of this Contract.</p> <p>2. Such insurance must name the City of Phoenix and its subsidiaries and affiliates as Additional</p>	<p>No change to the Solicitation is warranted.</p>



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	<p>Insureds with respect to liability arising out of the activities performed by, or on behalf of Contractor.</p> <p>3. The policy must provide coverage for pollution conditions that arise from the operations of Contractor described under the scope of services of the Contract. The policy should include the following coverages: Bodily injury, sickness, disease, mental anguish or shock sustained by any person, including death and medical monitoring costs.</p> <ul style="list-style-type: none"> • Property damage including physical injury to or destruction of tangible property including the resulting loss of use thereof, cleanup costs, and the loss if use of tangible property that has not been physically injured or destroyed including diminution in value. • Environmental damage including physical damage to soil, surface water or groundwater, or plant or animal life, caused by Pollution Conditions and giving rise to Clean-Up Costs. • Defense including costs, charges and expenses incurred in the investigation, adjustment or defense of claims for such compensation damages • Asbestos or lead – no exclusion • Mold coverage • Transportation cargo • Non-Owned Disposal Site coverage <p>4. Should any of the work involve treatment, storage or disposal of hazardous wastes from the job site, Contractor must furnish an insurance certificate from the designated disposal facility establishing that the facility operator maintains current Pollution Legal Liability Insurance in the amount of not less than \$1,000,000 per occurrence/\$2,000,000 annual aggregate and will cover sudden and gradual pollution losses arising from the facility, associated with work performed under this agreement.”</p> <p>We respectfully request that the City remove this language. Bidder will be using the Authority’s equipment, fuel and facilities. Bidder will be using the Authority’s equipment, fuel and facilities, and does not believe they should indemnify for this coverage.</p>	
52	4.3.5 Subcontractors: This section states, “Contractor’s certificates shall include all	No change to the Solicitation is warranted.



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Title: Fixed Route-Services – West Transit Facility

City of Phoenix
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Phoenix, AZ 85003
PTDProcurement@phoenix.gov

subcontractors as additional insureds under its policies OR Contractor shall be responsible for ensuring and verifying that all subcontractors have valid and collectable insurance. At any time throughout the life of the contract, the City of Phoenix reserves the right to require proof from the Contractor that its subcontractors have insurance coverage. All subcontractors providing services included under this Contract's Scope of Services are subject to the insurance coverages identified above and must include the City of Phoenix as an additional insured. In certain circumstances, the Contractor may, on behalf of its subcontractors, waive a specific type of coverage or limit of liability where appropriate to the type of work being performed under the subcontract. Contractor assumes liability for all subcontractors with respect to this Contract."

We respectfully request that the City revise this section to reflect the following language, "At any time throughout the life of the contract, the City of Phoenix reserves the right to require proof from the Contractor that its subcontractors have insurance coverage. All subcontractors providing services included under this Contract's Scope of Services are subject to procuring and maintaining the insurance coverages deemed reasonable and necessary by Contractor and must include the City of Phoenix as an additional insured."

Contractor shall require all subcontractors to procure and maintain insurance as required by law and/or that are standard and customary for subcontractors' business.

Bidder's insurance will respond on behalf of Bidder and the City as an additional insured for claims caused by actions of Bidder's subcontractors and should not be extended to provide coverage to subcontractors for their own operations.

53 4.4. Responsibility For Revenue Vehicle Physical Damage: "If an accident results in physical damage to a Revenue Vehicle and Contract Worker is found to be not at fault, the CITY will reimburse CONTRACTOR for costs incurred to repair physical damage to such Revenue Vehicle in excess of the nonrefundable deductible of \$50,000 per

No change to the Solicitation is warranted.



SOLICITATION ADDENDUM #1

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	<p>occurrence. CONTRACTOR is responsible for the first \$50,000 of damage for all collision and comprehensive losses. CONTRACTOR must submit two itemized repair estimates, or other such documentation as agreed upon, to the CITY and provide the vehicle number, date of the accident, a copy of the police accident report and a narrative statement setting forth how the accident occurred. Requests for CONTRACTOR reimbursement must be presented to the CITY for payment on a monthly basis.</p> <p>If damage to a Revenue Vehicle is caused by a third party (“Other Party”), CONTRACTOR must pursue, in a timely fashion, the Other Party for reimbursement of the total cost of the repairs or the total loss value of the Revenue Vehicle, if the Revenue Vehicle is a total loss. The CITY’s agreement is required prior to CONTRACTOR entering into a settlement agreement for amounts less than the total repair cost or total loss value of the Revenue Vehicle, and for writing off uncollectible matters. If the entire damage amount is recovered from the Other Party, the CITY must be reimbursed for the amount it has paid CONTRACTOR in excess of CONTRACTOR’S \$50,000 deductible. If only a portion of the total damage is recovered, the amount collected will first be repaid to the CITY for the amount it has paid to CONTRACTOR for repairs made or for the total loss value of the Revenue Vehicle. Any remaining monies collected will be distributed to the CONTRACTOR. The CITY’s share of recoveries must be paid to the CITY within 30 days of receipt. CONTRACTOR is responsible for providing the CITY with copies of all documents relating to the subrogation/collection effort made by CONTRACTOR within 30 days of commencing subrogation proceedings against the Other Party.”</p> <p>Can the city consider removing or lowering the deductible for this provision?</p>	
54	DBE: Please confirm if the City will allow Bidders to submit their Good Faith Effort package on a USB drive due to its large file size.	Yes, although the USB drive <u>must</u> be received by the City within three business days of the Notice of Contract Award Recommendation, pursuant to Solicitation Section 6.43.
55	7.3. OFFER SUBMITTAL FORMAT: Please confirm that Bidder’s title pages, confidentiality statement,	Per Solicitation Section 7.3, only the cover letter, price proposal (fee schedule), and



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	<p>table of contents, tabs, divider pages, required attachments and supporting documents, Start-Up Plan detailed chronology/calendar, and Good Faith Effort Packet (including its outreach log) are not included in the City’s 100 page limit.</p>	<p>required submittal forms (such as required certifications, solicitation attachment forms including DBE submissions, and submittal requirements identified in Solicitation Sections 7.7 through 7.14) are excluded from the City’s 100-page limit. Dividers, tabs and the Table of Contents are not material components of the proposal and will likewise not be counted against the City’s 100-page limit.</p> <p>The Start-Up Plan and detailed chronology/calendar is a required component under 7.1 and is subject to page limitation noted under Solicitation Section 7.4.</p> <p>Designations of confidentiality should comply with Solicitation Section 1.21.</p>
56	<p>DBE: Please confirm if Bidders are required to return EXHIBIT 45 Disadvantaged Business Enterprise/Small Business Participation Plan with their proposal.</p>	<p>Solicitation Attachment D must be received by the City within three business days of the Notice of Contract Award Recommendation pursuant to Solicitation Section 6.43(F)(3)(a). Exhibit 45 must be received by the City annually from the contract start, pursuant to Solicitation Section 6.43(F)(3)(b).</p>
57	<p>7.5. PRICE PROPOSAL (FEE SCHEDULE): This section states, “Offeror must complete and submit the Fee Schedule (Attachment A) in hard copy and electronic copy (portable drive or CD) in a separate sealed envelope.”</p> <p>Please confirm if this requirement is separate from the requirements in Section 7.1. Copies, which requires 1 electronic copy of the Offer with the Fee Schedule and 1 electronic copy without the Fee Schedule.</p> <p>Please confirm if the City wants three electronic copies.</p>	<p>Solicitation Section 7.5 reiterates the requirements of the first paragraph in Solicitation Section 7.1: One hard copy and one electronic copy of the Price Proposal (Fee Schedule) for the Procurement Officer’s review. Although Solicitation Section 7.1 is silent about separating the Price Proposal from the other submittals, please submit these copies of the Price Proposal in a separate, sealed envelope as indicated in Solicitation Section 7.5.</p> <p>Please also note that the second paragraph in Solicitation Section 7.1 also requires submittal of additional hard/electronic copies of the Offer (minus the Price Proposal and Required Submittal Forms) for the evaluation panel’s review.</p>
58	<p>7.5. PRICE PROPOSAL (FEE SCHEDULE): Please clarify if Attachment A (Fee Schedule) is a part of the technical proposal.</p> <p>Should Bidders provide Attachment A in a separately sealed envelope for the original copy?</p>	<p>Attachment A (Fee Schedule) is not part of the Technical Proposal, but rather constitutes the Price Proposal as indicated in Solicitation Section 7.5.</p>



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		Please submit the required hard/electronic copies of the Price Proposal in a separate, sealed envelope as indicated in Solicitation Section 7.5. See answer to Question 57 above.
59	7.8. EMERGENCY 24-HOUR SERVICE CONTACT: Please confirm if Bidders should provide 24-hour service contact information with our proposal.	Yes, this is a required submittal form as indicated in Solicitation Section 7.1.
60	7.15. ACCEPTANCE OF OFFER: Please confirm if Bidders are required to return this document with their proposal.	The City asks that offerors submit this blank form with their proposal.
61	ATTACHMENT D Disadvantaged Business Enterprise/Small Business Participation Plan, Initial Plan Submission: Please confirm if Bidders are required to submit Attachment D with their proposal.	See answer to Question 56 above.
62	<p>Price Adjustment: We respectfully request that the City include a provision that provides for price adjustments if Contractor's costs increase or revenues decrease as a result of (i) changes to the scope of work / service hours requested by the City, (ii) changes in laws, rules, regulations, etc. applicable to the services to be provided by Contractor, and/or (iii) wage increases necessary for Contractor to be able to recruit and retain qualified employees as a result of an increase in the minimum wage in the City or surrounding jurisdictions; and (iv) costs incurred in response to a federal, state, or local state of emergency (including the COVID-19 pandemic or similar national emergency), including providing personal protective equipment, supplies, staffing, and additional services (including additional health and safety services or requirements). If the parties are unable to agree on a rate adjustment, then either party may terminate the contract upon 120 days written notice to the other party.</p> <p>Contractor needs price protection for changes requested by the City or matters that were not contemplated at the time of Contractor's proposal.</p>	<p>No change to the Solicitation is warranted.</p> <p>For price adjustments, refer to Solicitation Section 3.4, Pricing.</p>
63	Vehicle Acceptance Standards: We respectfully request that the City include Contractor's vehicle acceptance standards as the applicable standard against which all vehicles will be inspected. Please also include Contractor's vehicle acceptance agreement as an exhibit to the Agreement.	No change to the Solicitation is warranted.



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	<p>Upon delivery of the vehicles to Contractor, the vehicles must be in the same condition as the condition that Contractor is required to maintain.</p> <p>Please include that the City will be responsible for the cost of major repairs needed during the first 180 days after Contractor begins service under the Agreement.</p>	
64	<p>Facility Condition / Environmental: We respectfully request that the City include a provision to make it clear that Contractor is only responsible to maintain the City’s facilities in their current condition, and Contractor is not responsible for major repairs. In addition, please add a provision to make it clear that Contractor is not responsible for any environmental issues or releases of hazardous materials existing on or prior to the Contractor’s occupancy of the City’s facilities, or caused by any party other than Contractor.</p> <p>Contractor should not be responsible for existing issues or issues caused by other parties.</p>	<p>No change to the Solicitation is warranted.</p> <p>Although Solicitation Section 5.10.11 provides that the awarded contractor is responsible for the safe and proper care/operation of the facility and maintenance of clean and safe work areas, the City remains responsible for making repairs to city-provided facility, systems, components, and equipment via its separate facility maintenance contractor (FMC), with exception for emergency repairs performed by the awarded contractor after written approval by the City.</p> <p>The CITY expects proposers to have the knowledge and expertise to develop a proposal based on the general specifications that complies with the environmental requirements in the Solicitation. Please note that Section 5.10.17.3 provides that the awarded contractor is responsible for the environmentally safe removal of “any waste generated by CONTRACTOR in performing the Scope of Work.”</p>
65	<p>RFP §2.4.7 – Maximum Prices: This section states, “Offeror certifies, by signing this proposal that the prices offered are no higher than the lowest price the Offeror charges other buyers for similar quantities under similar conditions.”</p> <p>We respectfully request that the City remove this language.</p> <p>Contractor provides services to clients across North America, and pricing, services, requirements, etc. vary (often significantly) by region and by contract (even within the same region). It is not possible for Contractor to guarantee most favored customer pricing.</p>	<p>No change to the Solicitation is warranted.</p> <p>Please note, this term only affects pricing based on other procurements for similar quantities under similar conditions.</p>



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66	<p>RFP §2.6.3 – Force Majeure: We respectfully request that the City include labor strikes or disputes as force majeure events.</p> <p>Contractor should be excused from performance under the contract for circumstances beyond Contractor’s control.</p>	<p>No change to the Solicitation is warranted.</p> <p>Labor strikes and disputes are not force majeure events.</p>
67	<p>RFP §3.1 – Term of Agreement: This section states, “Authority has sole option to extend contract for an additional two years as well as the option to extend on a month-to-month basis for up to six months. “</p> <p>We respectfully request that the City revise this section to require mutual agreement for any extension of the Agreement, with pricing to be negotiated by the parties.</p> <p>Extension of the Agreement should require mutual agreement, and should allow for price adjustments to reflect changes in Contractor’s cost to operate the service.</p>	<p>No change to the Solicitation is warranted.</p> <p>For price adjustments, refer to Solicitation Section 3.4, Pricing.</p>
68	<p>RFP §5.30 – Labor Relations Requirements: This section states, “Contractor agrees to comply with the requirements of 49 U.S.C.A 5333(b) and assume the obligations of the existing 13(c) Agreement(s) between the CITY’s previous fixed route bus service providers, the CITY, and the signatory union(s)”</p> <p>We respectfully request that the City revise this section to clearly acknowledge and agree that Contractor is not a party to and not bound by the terms of any of the Authority’s 13(c) Agreement(s) or any existing CBA.</p> <p>Contractor shall have the ability to determine which employees it will hire and will have the right to set the terms and conditions of employment for its employees.</p> <p>Contractor shall not be liable for 13(c) claims resulting from Contractor’s hiring of employees and setting the terms and conditions of employment. Contractor must have the ability to negotiate the terms and conditions of employment and shall not be bound by the terms of any of the Authority’s 13(c) Agreements or of any CBA between the employees and the prior contractor.</p>	<p>No change to the Solicitation is warranted.</p> <p>As provided in Sections 5.29 and 5.30, the Contractor is required to fully comply with the legal requirements of 49 U.S.C. 5333(b) and the National Labor Relations Act, to provide a preference in hiring to the existing employees of the prior service provider, and to assume the obligations of the City’s existing 13(c) Agreement(s). Accordingly, the Contractor is administratively and financially responsible for 13(c) claims during the term of the Contract. Further, the Contractor’s obligation with respect to existing CBAs is set out clearly in Sections 5.29.2 and 5.30.3.</p>



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69	<p>RFP §6.12 – Breaches and Dispute Resolution: This section states, “Disputes shall be determined by the Authority, and such decision shall be binding on Contractor.”</p> <p>We respectfully request that the City remove this language.</p> <p>Disputes should not be conclusively determined by either party to the dispute.</p>	<p>No change to the Solicitation is warranted.</p> <p>This is a long-standing federal provision that the FTA has required for federally funded contracts. This provision requires exhaustion of administrative remedies with a final decision by the contracting authority before a contractor may pursue other legal recourse.</p>
70	<p>5.4.6 & 5.4.7 Runcutting and Rostering p77-79: Will the City allow Contractor to create runcuts and rosters in a separate system that can produce HASTUS compatible upload files, or must all runcutting and rostering be performed in the City’s HASTUS environment for the creation of all quarterly bids?</p>	<p>The awarded contractor can create run cuts and roster in a separate system that can produce HASTUS-compatible upload files. However, it will be the awarded contractor’s responsibility to ensure full compatibility with the region’s HASTUS-based structure with our blocking solutions as well as our export to Clever Devices and CAD/AVL consumption and General Transit Feed Specification (GTFS) for public consumption.</p>
71	<p>Please provide a list of the equipment and tool list provided.</p>	<p>Refer to Exhibit 17 for City provided equipment. See also Solicitation Section 2.6.5 Contract Performance for other equipment and tools to be provided by Contractor.</p>
72	<p>Please confirm who is responsible for servicing the city provided fuel stations and bus wash.</p>	<p>The City services the City provided fuel stations and bus wash via a separate contractor.</p>
73	<p>Please confirm who will be conducting the bus turnover inspections?</p>	<p>Refer to Solicitation Section 5.7 Lot/Vehicle Inspections.</p>

III. Remainder. The balance of the RFP specifications and instructions remain the same. Offeror must acknowledge receipt and acceptance of **all** addenda by signing the Addenda Certification form (**Section 7.13**) and submitting the form with their proposal.

RFP PTD24-005
FIXED-ROUTE SERVICES
WEST TRANSIT FACILITY

EXHIBITS 46-49

EXHIBIT 46
ZERO-EMISSION BUS TRANSITION
PLAN



ZERO-EMISSION BUS TRANSITION PLAN



Kimley»Horn



City of Phoenix

City of Phoenix Public Transit Department **ZERO-EMISSION BUS TRANSITION PLAN**

Prepared for City of Phoenix Public Transit Department



December 13, 2022 | Version 5

Prepared By:

Kimley»»Horn



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Acronyms and Abbreviations

AC	Alternating Current
AC Transit	Alameda-Contra Costa Transit
APS	Arizona Public Service Company
APTA	American Public Transportation Association
ASE	National Institute for Automotive Service Excellence
BEB	Battery Electric Bus
BIL	Bipartisan Infrastructure Law
BLM	Bureau of Land Management
BRT	Bus Rapid Transit
CIP	Capital Improvement Project
CNG	Compressed Natural Gas
CTAA	Community Transportation Association of America
DC	Direct Current
DERA	Diesel Emissions Reduction Act
DMM	Digital Multi-Meters
EV	Electric Vehicle
FCEB	Fuel Cell Electric Buses
FTA	Federal Transit Administration
FY	Fiscal year
REET	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation
H2	Hydrogen
HVAC	Heating, Ventilation, and Air Conditioning
ITLC	International Transportation Learning Center
JMA	Jobs to Move America
KWH/MI	Kilowatt Hour Per Mile
LED	Light Emitting Diode
MOU	Memorandum of Understanding
MPG	Miles-Per-Gallon



MW	Mega Watt
OEM	Original Equipment Manufacturer
PPE	Personal Protective Equipment
PTD	City of Phoenix Public Transit Department
RAISE	Rebuilding America Infrastructure with Sustainability and Equity
REV	Regional Electric Vehicle
RFP	Request for Proposal
SMR	Steam Methane Reforming
SRP	Salt River Project
TCRP	Transit Cooperative Research Program
TOU	Time of Use
USDOT	United States Department of Transportation
ZEB	Zero-Emission Bus
ZEBRA	Zero-Emission Bus Resource Alliance
ZEV	Zero-Emission Vehicles



Introduction

Overview of City of Phoenix Public Transit Department

City of Phoenix Public Transit Department (PTD) provides public transportation for the Phoenix metropolitan area in Arizona. PTD operates a fleet of 500 transit buses comprised of 40- and 60-foot buses. The current fleet mix includes 165 B20 biodiesel-powered buses, which account for 33 percent of the fleet, and 335 CNG-powered buses, which account for the remaining 77 percent of the fleet. The majority of the bus fleet operates out of PTD's North, South, and West Facilities.

Zero-Emission Bus Transition Plan

The Bipartisan Infrastructure Law (BIL) has introduced a new requirement that any federal grant application for projects related to zero-emission vehicles (ZEV) must include a zero-emission transition plan. Therefore, the Federal Transit Administration (FTA) requires a Zero-Emission Bus Transition Plan from each transit agency that applies for the FTA Low or No Emission Grant Program and the FTA Bus and Bus Facilities Grant Program for zero-emission bus (ZEB) projects.

The Zero-Emission Bus Transition Plan must include the following six elements:

- 1. Policy & Legislative Impacts:** Consideration of policy and legislation impacting relevant technologies
- 2. Fleet Plan:** Demonstration of a long-term fleet management plan with a strategy for how the applicant intends to use the current request for resources and future acquisitions
- 3. Facility & Infrastructure Plan:** Evaluation of existing and future facilities and their relationship to the technology transition
- 4. Fuel Plan:** Description of the partnership of the applicant with the utility or alternative fuel provider
- 5. Funding Plan:** Address the availability of current and future resources to meet costs for the transition and implementation
- 6. Workforce Transition Plan:** Examination of the impact of the transition on the applicant's current workforce by identifying skill gaps, training needs, and retraining needs of the existing workers. This focuses on supporting the applicant's short-term and long-term needs to operate and maintain zero-emission vehicles while avoiding displacement of the existing workforce.

Plan Organization

The remainder of the plan is organized as follows:

- Section 1 - Introduction
- Section 2 - Policy & Legislative Impacts
- Section 3 - Peer Review Process
- Section 4 - Fleet Plan
- Section 5 - Facility & Infrastructure Plan
- Section 6 - Fuel Plan
- Section 7 - Funding Plan
- Section 8 - Workforce Transition Plan
- Appendix - Threshold Development and Assumptions



Policy & Legislative Impacts

PTD is considering policy and legislation that may impact relevant technologies. In particular, PTD has identified specific supportive policies at the federal, state, and local level that will help ensure the success of the fleet's transition.

City of Phoenix Initiatives

- In 2020, Phoenix joined the C40 Cities Climate Leadership Group, which is a network of world cities committed to addressing climate change.
- In October 2021, the Phoenix City Council approved a Climate Action Plan with the goal of reaching net-zero carbon emissions by 2050, including transitioning city operations from electric to carbon neutral by 2030. In the Plan, Phoenix also demonstrates a commitment to invest in previously underserved communities, proactively seeking community input on all major climate policy decisions and embedding equity in all climate actions.
- In November 2021, Phoenix City Council authorized a Green Transit Request for Proposals to procure vehicles for the implementation of a pilot program to operate and evaluate a sub-fleet of heavy-duty transit buses that use zero and/or near-zero-emission technology, and associated charging/fueling technologies.
- Phoenix has demonstrated a strong commitment to addressing climate change within city operations through investments totaling over \$600 million in recent years, including installation of cool pavement, LED streetlights, a biogas facility, retrofits to benefit energy efficiency in city buildings, and \$530 million in transit for expanded bus service through extended operating hours and increased frequency.
- In August 2015, Phoenix voters approved the Transportation 2050 initiative to invest in street and transit improvements such as new sidewalk construction, improved connections to existing transit stops, enhanced access to major transportation and transit corridors, longer hours of operation for local buses, and new bus rapid transit corridors. Transportation 2050 is a dedicated sales tax to fund transportation projects in the City of Phoenix. The tax went into effect in January 2016.
- PTD and Valley Metro are two departments with the City of Phoenix that provide transit service. In 2020, Valley Metro completed testing on the performance of battery electric buses in the region's unique extreme temperatures. The testing resulted in Valley Metro deciding to pursue grant funding for battery electric buses on select routes.

Arizona State Initiatives

- In 2017, Arizona joined Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming in signing the Regional Electric Vehicle (REV) West memorandum of understanding (MOU) to create an Intermountain West Electric Vehicle (EV) Corridor that will make it possible to seamlessly drive an EV across the Signatory States' major transportation corridors. One of the action items in the REV West Plan is to facilitate the successful commercialization of electric vehicles and maximize use of electric vehicles for private and public transportation.
- According to Arizona State Statute, local governments in Maricopa, Pinal, and Yavapai counties with a population of more than 1.2 million people must develop and implement vehicle fleet plans to encourage and increase the use of alternative fuels in municipal fleets. At least 75 percent of the total municipal fleet must operate on alternative fuels. Local governments in counties with populations of more than 500,000 people with bus fleets must purchase or convert buses to operate on alternative fuels. The City of Phoenix falls under these regulations due to its location (Maricopa County) and population (1.6 million).



Utility/Energy Initiatives

- In 2019, the Arizona Corporation Commission issued an EV policy statement that provides guidelines on EVs, charging infrastructure, and transportation electrification to utility companies that the Commission regulates. The policy addresses the state of EVs in Arizona, EV benefits, and barriers to adoption.
- Arizona Public Service Company (APS), one of the City of Phoenix’s local utility companies, supports fleet electrification through its “Take Charge AZ” program by helping with the cost of infrastructure including charging stations, electrical cable, and other equipment necessary to provide power to the charging station.
- In October 2021, the U.S Department of Energy announced \$20 million in federal funding to produce clean hydrogen in Arizona from the nuclear power plant at Palo Verde.

Peer Review Process

To understand best practices for transitioning to a zero-emission bus fleet, PTD took part in a peer review process in early 2022 that included in-person site visits to four peer agencies in California that have been operating ZEB technologies for several years, including Sunline Transit, Foothill Transit, Victor Valley Transit, and AC Transit. Tours were provided by agency staff most familiar with the ZEB transition program and resulted in documentation of lessons learned and real-world best practices. Key findings from these site-visits are outlined below and were incorporated into this plan. The findings and considerations informed PTD’s strategy for fleet procurement, infrastructure phasing, and workforce development.



Sunline Transit

Sunline Transit in Thousand Palms, California has experience operating fuel cell electric buses (FCEBs) since 2012 and has taken on initiatives that have allowed the Agency to become a testbed for hydrogen fueling infrastructure, fuel cell technology development, and commercial operations of fuel cell buses. A site visit was conducted in March 2022 to tour Sunline Transit’s facility to learn about the Agency’s fuel cell electric buses, battery electric buses, hydrogen infrastructure, and training and workforce development. Sunline Transit found that FCEBs have much better range than BEBs in a hot climate, such as Palm Springs, which is a relevant to Phoenix as it is a location that is impacted by extreme heat. Another key takeaway is that the production of hydrogen on-site is expensive, energy-intensive, and requires extensive space.



Foothill Transit

Foothill Transit in West Covina, California has experience operating BEBs since 2010, but retired BEBs early due to operational and supply chain issues. They plan to look for a different fuel alternative moving forward in the future. A site visit was conducted in March 2022 to tour the Agency’s facilities to learn about their BEBs, challenges they had to overcome, and their training and workforce development. Foothill Transit will be purchasing



FCEBs going forward and is currently in the process of building hydrogen storage and fueling equipment for future FCEBs.

Victor Valley Transit

Victor Valley Transit in Hesperia, California is currently operating 12 BEBs, and will be purchasing FCEBs moving forward. A site visit was conducted in March 2022 to tour the Agency's facilities, learn about their fleet, and training and workforce development in more detail. The Agency believes the FCEBs will have better range than the BEBs, considering the strain extreme heat and desert climates can place on the climate-control systems of BEBs. Victor Valley Transit is in the process of applying for funding for hydrogen infrastructure.



AC Transit

AC Transit in Oakland, California purchased their first FCEB in 2003, and 68 percent of the legacy FCEB fleet is still operational in 2022. In general, Oakland's climate is much cooler than Phoenix and the city is not impacted by extreme heat. A site visit was conducted in April 2022 to tour AC Transit's facility to learn about their fleet of BEBs and FCEBs, training and workforce development, and facilities in greater detail. AC Transit is currently conducting a 5x5 ZEB Study, which is testing 5 diesel buses, 5 hybrid electric buses, 5 BEBs, 5 FCEBs, and 5 legacy FCEBs. The Agency has found that the newer FCEBs and BEBs have more power and can adapt to their service demands more easily. AC Transit has also concluded that initial implementation of hydrogen infrastructure should be closely monitored and analyzed to ensure that the fleet does not exceed the capacity of the fueling infrastructure.

Fleet Plan

The Fleet Plan defines how PTD will transition the existing bus fleet to zero-emission buses (ZEBs). This section outlines the existing conditions, vehicle task analysis, and plan for procurement from present-day (2022) over the next 20 years.

For the purposes of this section, the following key terms are defined:

- **Block:** The duty cycle of a bus from pull-out (from the depot) to pull-in. This can include deadhead and revenue service. Blocks may be "interlined", meaning a bus serves multiple routes throughout the scheduled block.
- **Vehicle Task:** The complete duty cycle of a single bus throughout a single day. Typically, each vehicle task is associated with just one block, but some vehicle tasks in the current schedule service multiple blocks throughout the day, with a break at the depot in between.
- **Assigned Vehicle Type:** To best serve the demands of a certain block/vehicle task, dispatchers assign a certain type of vehicle based on length and passenger capacity.



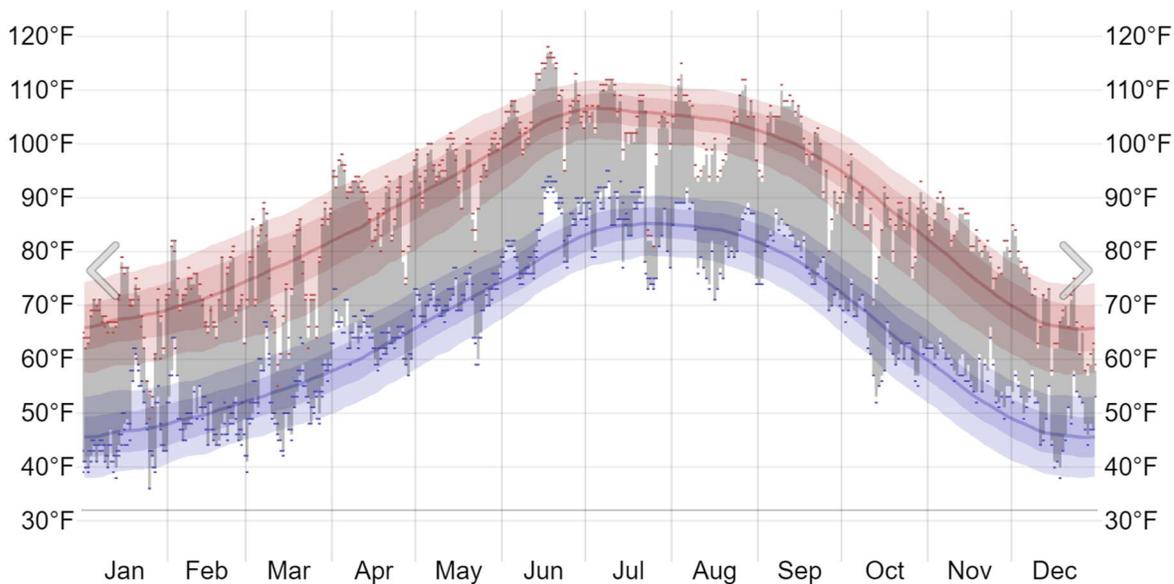
Existing Conditions

Existing conditions were analyzed to establish a baseline for the transition strategy.

Local Climate

The climate in which PTD operates transit service is one of the most extreme in the country. During the summer months, average daily temperatures in Phoenix, Arizona are over 90° F and maximum temperatures are sometimes over 115° F. **Figure 1** shows the daily range of reported temperatures (gray bars) and 24-hour highs (red ticks) and lows (blue ticks), placed over the daily average high (faint red line) and low (faint blue line) temperature for Phoenix in 2021. In the last 30 years, Phoenix has averaged 111 days per year over 100° F and 21 days per year of temperatures over 110° F.¹

Figure 1: Reported Temperatures for Phoenix, Arizona in 2021



Source: WeatherSpark.com

Battery electric buses (BEBs) use the vehicle’s battery to operate all functions of the bus. The constant air conditioning demand present in hot climates like Phoenix cause the battery to deplete more quickly than it would in moderate climates. This was seen in 1994 during a pilot program in Phoenix and again in 2016 during a BEB test in Tempe, Arizona. Previous tests showed a BEB’s range to be under 100 miles, which would not support the needs of most routes unless on-route fast charging was used. Many bus manufacturers are now offering BEBs with larger battery sizes and increased range which may make BEBs feasible for more of PTD’s service.

Baseline Data Collection

To understand the costs associated with PTD’s ZEB transition, the following key data elements were provided by PTD staff and are described below:

- Current fleet composition
- Current transit routes, operations, and block schedules

¹ Weather.gov



- Local ZEB testing performance

Current Fleet

As of January 1, 2022, the current fleet is comprised of 500 buses. 33 percent of these vehicles run on B20 biodiesel and the remaining 67 percent run on compressed natural gas (CNG). A breakdown of the existing fleet is summarized in **Table 1**.

Table 1: Existing Bus Fleet

Fuel Type			
Fleet	B20 Biodiesel	CNG	Total
Local 40'	92	278	370
Local 60'	73	0	73
Rapid 40'	0	29	29
Rapid 60'	0	28	28
Total	165	335	500
Percent of Fleet	33%	67%	100%

Source: PTD (January 2022)

The replacement schedule was designed so that buses are retired after 14 years of operation, which is two years more than the federal requirement. To avoid a single year with significantly more purchases than usual, the expected retirement age is occasionally staggered to better distribute procurement across multiple years. All fixed route buses were assumed to remain in service for at least 12 years and no bus was projected to last more than 16 years.

Current Operations

PTD currently operates 500 fixed route buses from three different garages: the North, South and West Transit Facilities. The North and South Facilities are contracted to Transdev and the West Facility is contracted to First Transit. In October of 2022, Transdev announced plans to acquire First Transit, but because the two companies had separate contracts with PTD the opportunities for consolidating operations remain unclear.

Weekday Operations

There are 374 total vehicle tasks operated each weekday. On average, each vehicle travels 204 miles and spends around 15 hours in service. The number of vehicle tasks by facility is shown in **Table 2**.

Table 2: Weekday Vehicle Tasks by Facility

Facility	Number of Vehicle Tasks
West	130
North	100
South	144



Vehicle Task Analysis

For the purposes of this analysis, it is assumed that PTD is planning to continue operating its existing routes and would ideally replace retiring buses that have met the end of their useful life on a one-to-one basis such that a decommissioned diesel or CNG bus is replaced with a ZEB capable of servicing the designated vehicle task. PTD does have some fleet expansion plans in place, which are addressed as part of the **Transition Strategy**.

Vehicle Task ZEB Transition Feasibility

The first step in the ZEB transition feasibility analysis is to evaluate the daily accrued distance and assigned vehicle type (bus length) of each current vehicle task to determine the number of vehicle tasks feasible for replacement with a BEB or FCEB. Vehicle range and vehicle type are key limitations of current ZEB vehicles on the market.

Extreme heat may impact the feasibility of transitioning PTD's fleet to ZEBs. Numerous studies have explored how both extreme cold and extreme heat affect the performance and range of ZEBs, which has the potential to impact route coverage. To better understand these climate limitations, PTD referred to lessons learned by peer agencies. Feasible range for each vehicle type was estimated using operations data from agencies currently operating ZEBs and from the Valley Metro Electric Bus Study, which provided valuable information about vehicle performance in the Phoenix region during periods of extreme heat.

For the purposes of this analysis, feasibility for conversion to BEB or FCEB is defined in the following categories based on the total task distance and vehicle type:

- **Feasible (Green):** Can be feasibly converted to BEB/FCEB operation in Strenuous Conditions
- **Challenging (Yellow):** Feasible in Nominal Conditions
- **Not Feasible (Red):** Not feasible under current conditions

For a detailed breakdown of the assumptions and thresholds utilized in this analysis, see the **Appendix**.

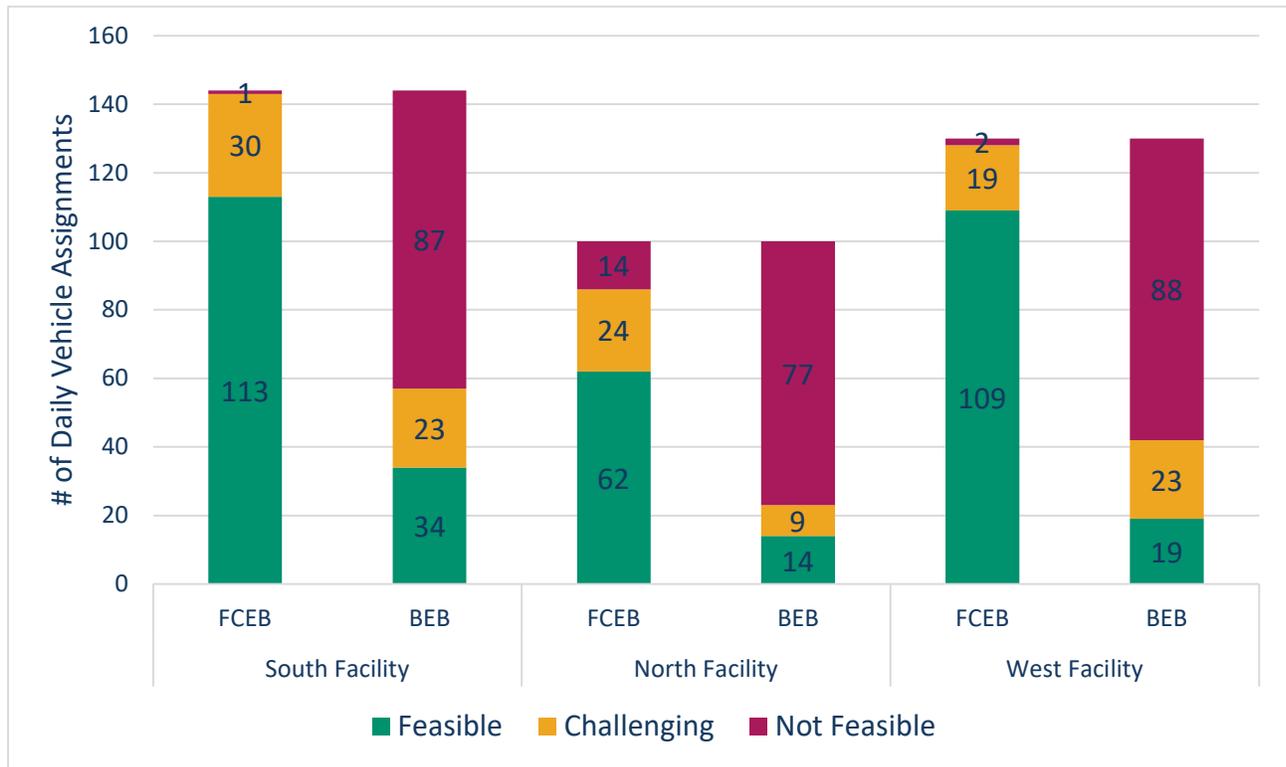
It should be noted that PTD aims to maintain flexibility in operations that allow buses to operate on several different vehicle tasks in the event of unplanned service disruptions. Based on this principle, on-route BEB charging at fixed locations was not considered.

Based on the thresholds defined above, PTD's current vehicle tasks were analyzed based on their feasibility to be transitioned from diesel or CNG buses, to zero-emission buses, BEB or FCEB. The feasibility assessment was conducted by facility to assist with the phasing of infrastructure improvements at each location. The **Facility Plan** and **Transition Strategy** sections of this report contain more details on constraints related to the implementation of ZEB infrastructure. The results of the feasibility analysis are shown below in Figure 2: Task Feasibility for ZEB Transition by Facility **Figure 2**. Key takeaways from this analysis include:

- 67 of the 374 total tasks (18 percent) are feasible (green) to be operated by BEBs
- 285 of the 374 total tasks (76 percent) are feasible (green) to be operated by FCEBs



Figure 2: Task Feasibility for ZEB Transition by Facility



Strategies to Account for Infeasible Blocks

The results from the feasibility analysis, shown in **Figure 2**, shows 90 vehicle tasks that will be challenging to transition to FCEB/BEB. PTD will likely wait to transition these vehicle tasks until a later stage. The following are strategies that PTD will use to improve the feasibility of these challenging tasks:

- Tracking technological developments (i.e., increased battery sizes) leading to more range
- Optimizing block pairing to develop more vehicle tasks within a feasible range
- Adjust schedule to allow for more opportunities to charge or fuel at the facility mid-day
- Re-assigning vehicle tasks by facility

The **Procurement Plan** resulting from the Vehicle Task Analysis is heavily dependent on PTD’s plans for the development of ZEB facilities and necessary fueling infrastructure. The procurement plan for the fleet is therefore presented alongside the infrastructure phasing plan in the **Transition Strategy**.



Facility & Infrastructure Plan

The **Facility & Infrastructure Plan** incorporates an analysis of the three existing PTD facilities, infrastructure, and technology, as well as recommendations for future improvements and details on how the agency’s facilities can eventually accommodate the new zero-emission technology. The section also describes how PTD will adapt to changes and improvements in technology over time.

Existing Conditions

The majority of the PTD bus fleet operates out of the three facilities described in **Table 3**.

Table 3: Existing Operation and Maintenance Facilities

Facility	Address	Size (Acres)	Bus Parking Spaces	Buses Operating from Facility	Percent Capacity	Contractor	Utility
North Facility	2010 W Desert Cove Ave	9.98	112	130	116%	Transdev	APS
West Facility	405 N 79 th Ave	25.58	250	230	92%	First Transit	SRP
South Facility	2225 W Lower Buckeye Rd	15.50	213	220	103%	Transdev	APS

In addition, each of these facilities includes the following:

- Administration Building
- Maintenance Building
- Employee Parking
- Bus Parking
- Bus Wash Equipment
- Biodiesel Fuel Infrastructure
- Unleaded Gasoline Fuel Infrastructure
- CNG Fuel Infrastructure

Feasible Vehicle Tasks by Facility

Table 4 summarizes the current number of buses assigned to each garage along with the design capacity of the facility. Notably, two of the three facilities are currently maintaining, fueling, and storing more buses than the number they were originally designed for. **Table 4** also provides the feasible vehicle tasks (originally shown above in **Figure 2**) for each ZEB technology at each facility.

Table 4: Feasible Tasks by Fuel Type and Garage

Garage	Current Bus Utilization	Design Capacity	Feasible Tasks	
			BEB	FCEB
North Facility	130	112	14	109
West Facility	230	250	19	62
South Facility	220	213	34	113



Some key takeaways from **Table 4** are as follows:

- The South Facility has the highest number of feasible tasks for both ZEB technology types, but is over the existing design capacity
- The West Facility has a significant number of feasible tasks for both ZEB technology types and has some remaining capacity
- The North Facility has the fewest number of feasible tasks for both ZEB technology types and is over the existing design capacity

Existing and Planned Facilities

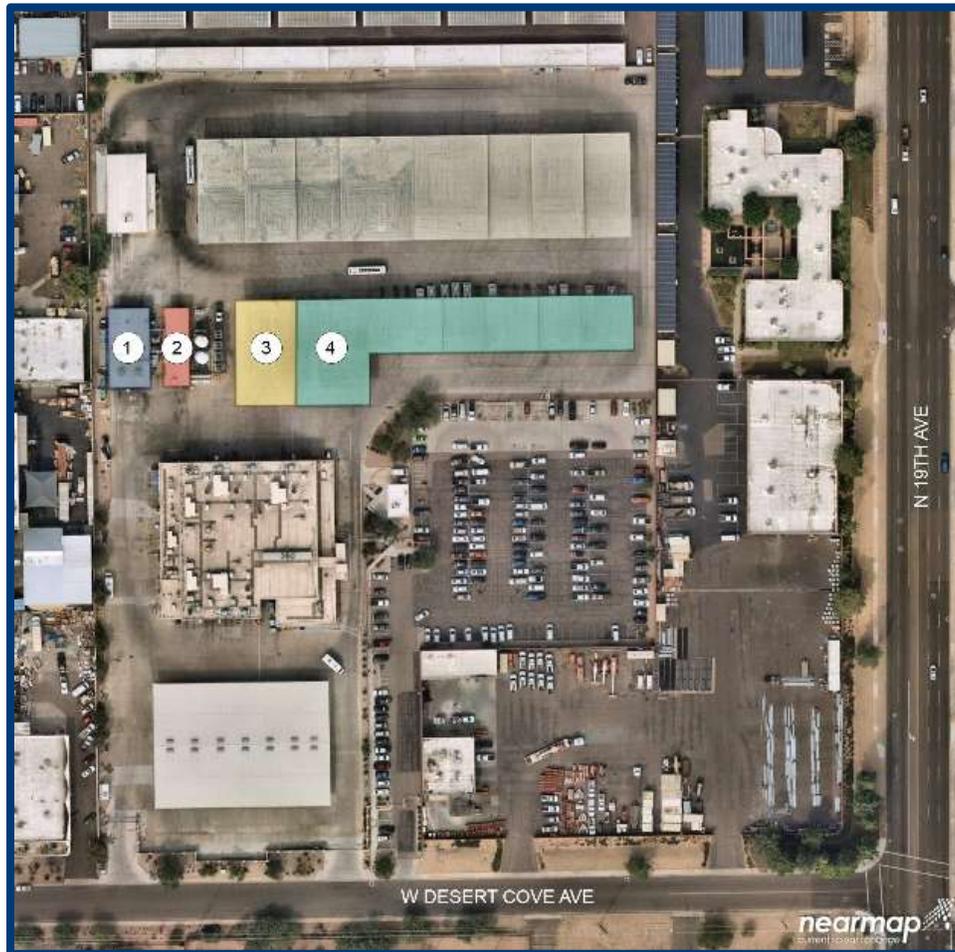
In addition to the existing North, South, and West Facilities, PTD is narrowing down a list of potential sites for a fourth operation and maintenance facility. This site will be the location of a future ZEB-ready facility with ZEB charging and/or fueling infrastructure. This new facility is planned for completion by 2027.



North Facility

Existing buses that operate out of the North Facility are fueled with both biodiesel and CNG. **Figure 3** shows the existing on-site fueling equipment, as well as locations for potential BEB charging and hydrogen fueling equipment. Existing bus parking spaces would need to be repurposed to accommodate zero-emission fueling equipment. It should be noted that the North Facility currently serves more buses than it has parking capacity. For any ZEB infrastructure to be implemented at this facility, it would need to occur when the new facility opens and some of the vehicles from the North Facility will be reallocated.

Figure 3: North Facility Existing and Potential Future Fueling Equipment



1. Existing Diesel Equipment
2. Existing CNG Equipment
3. Approximate Location of Future BEB Chargers
4. Approximate Location of Future Hydrogen Fueling Equipment



West Facility

Existing buses that operate from the West Facility are fueled with both biodiesel and CNG. **Figure 4** shows the existing on-site fueling equipment, as well as locations for potential BEB charging and hydrogen fueling equipment. Existing bus parking spaces would need to be repurposed to accommodate zero-emission fueling equipment. The West Facility currently has available space for zero-emission infrastructure and will be the initial implementation site. As noted above, the West Facility could accommodate additional vehicles, but significant bus route re-assignment would have to occur between the two existing bus operations contractors.

Figure 4: West Facility Existing and Potential Future Fueling Equipment



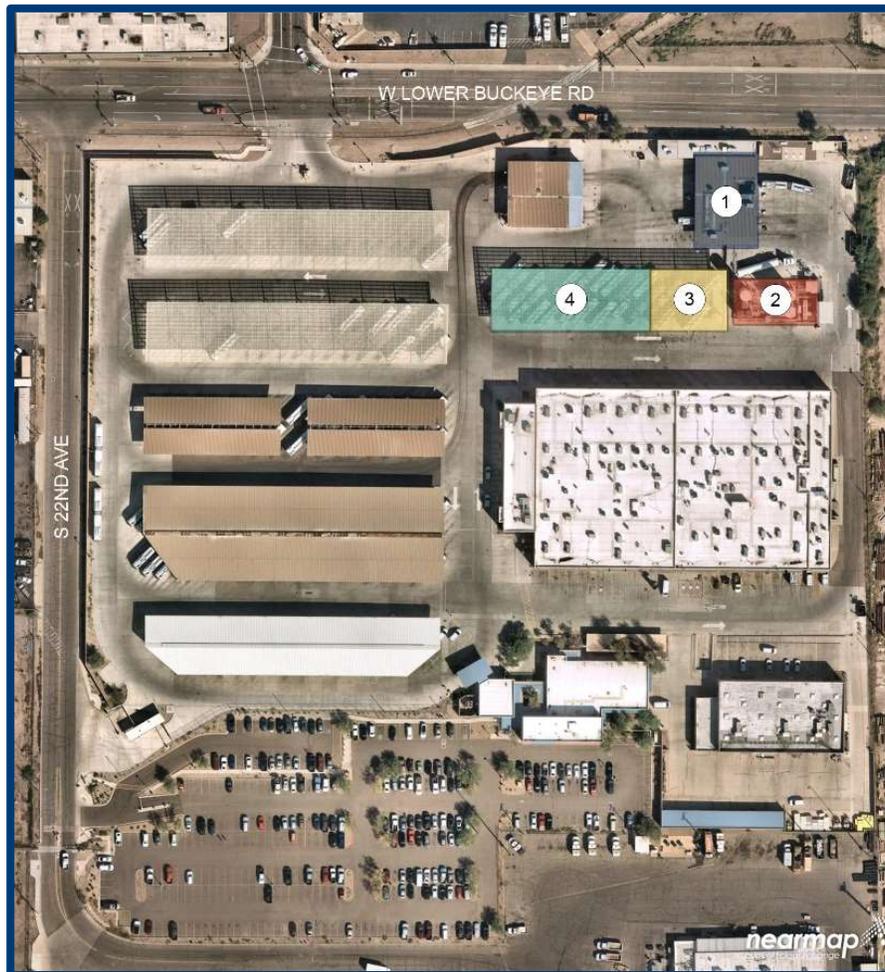
1. Existing Diesel Equipment
2. Existing CNG Equipment
3. Approximate Location of Future BEB Chargers
4. Approximate Location of Future Hydrogen Fueling Equipment



South Facility

Existing buses that operate out of the South Facility are fueled with both biodiesel and CNG. **Figure 5** shows the existing on-site fueling equipment, as well as locations for potential BEB charging and hydrogen fueling equipment. Existing bus parking spaces will be repurposed to accommodate zero-emission fueling equipment. The South Facility is currently serving more buses than it has parking capacity for, which will be addressed by a planned expansion of service in an effort to reduce spare ratio. For any ZEB infrastructure to be implemented at this facility, it would need to occur when the new facility opens and some of the vehicles from the South Facility can be reallocated.

Figure 5: South Facility Existing and Potential Future Fueling Equipment



1. Existing Diesel Equipment
2. Existing CNG Equipment
3. Approximate Location of Future BEB Chargers
4. Approximate Location of Future Hydrogen Fueling Equipment



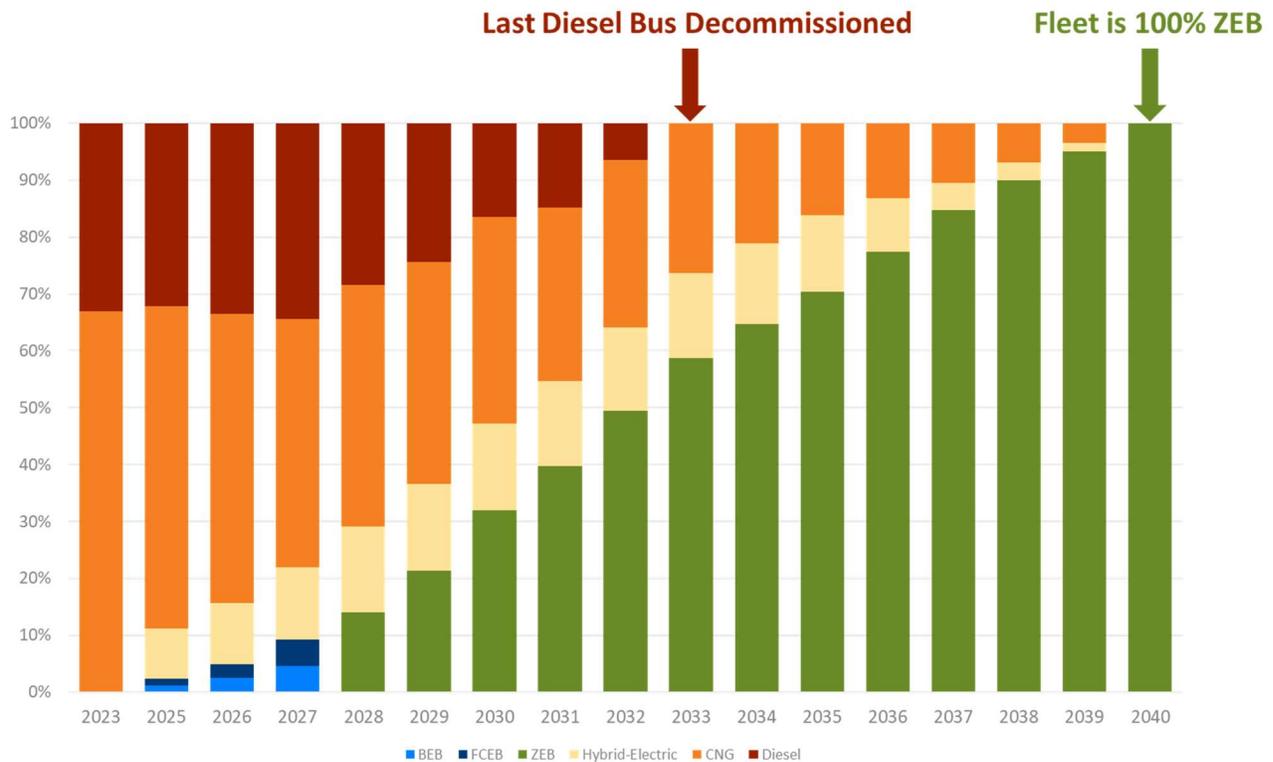
Transition Strategy

PTD is dedicated to fully converting their fleet to 100 percent zero-emission buses (ZEBs) by 2040. To initiate the transition, PTD received approval from the Phoenix City Council in November 2021 to issue a solicitation to procure vehicles for the implementation of an initial phase program to operate and evaluate a sub-fleet of heavy-duty transit buses that use zero and/or near-zero-emission technology, and associated charging/fueling infrastructure. To meet the target of 100 percent ZEB by 2040, PTD developed a bus replacement plan and infrastructure phasing strategy, outlined below, that will guide PTD in their long-term planning and capital improvement project goals.

Fleet Infrastructure Phasing

As PTD begins to purchase ZEBs and decommission diesel and CNG buses that have reached or exceeded their useful life, the overall composition will include a higher proportion of zero-emission vehicles over time. The projected fleet composition from 2023 to 2040 is shown in **Figure 6**. This bus replacement plan assumes that buses will be delivered within two years after procurement based on the most recent figures. PTD’s **Procurement Plan** is described in more detail in the following section.

Figure 6: Annual Fleet Composition and Transition





PTD's ZEB transition purchases will occur in two phases, a short-term phase starting in fiscal year (FY) 2023 and a longer-term phase extending from FY 2028 to FY 2040. It is important to note the lead time from purchase to delivery of the buses is estimated at this point to be 24 months. Both short and long-term planning associated with the ZEB infrastructure design, construction, operations, and maintenance will all be integral in guiding PTD to stay on track with their goal to make the complete transition to a zero-emission fleet by 2040.

Bus Procurement Plan

The purpose of the Bus Procurement Plan is to determine the type and quantity of low-emission buses and zero-emission buses (ZEBs) that will be procured each year, as well as the initial schedule and cost to transition the fleet to ZEBs. Procurement year is defined as the year buses are ordered from manufacturer. In general, receipt of the bus is expected within two years of procurement, but the specific dates of delivery may vary based on demand and materials availability.

The guiding principles of the Procurement Plan are as follows:

- Plan for the implementation of low-emission and ZEB technologies: Hybrid Electric Buses, BEBs, and FCEBs
- Maintain flexibility as technology continues to advance
- Use lessons learned from BEB and FCEB performance to guide future bus purchases

Projected Vehicle Purchases

Based on the guiding principles, PTD has split the fleet transition into two phases: Phase 1, which is a detailed purchasing plan for the initial five years, and Phase 2, which is a more flexible plan outlining purchasing through 2040. This phased approach allows for long-term purchasing choice, pending technology development and local experience.

Key Milestones:

- *2028: PTD will no longer purchase buses powered by fossil fuels*
 - *2033: All biodiesel buses will be phased out of the PTD fleet*
 - *2040: PTD's bus fleet composition will be 100% zero-emission*
-

Phase 1 includes procurement of zero-emission buses, BEB and FCEB, as well as low-emission buses, hybrid electric and CNG, as shown in **Table 5**. By the end of Phase 1, PTD will have procured 96 ZEBs, which will comprise about 20 percent of the total fleet, and ZEB infrastructure will be in development at multiple facilities.

Based on a peer review of AC Transit, a hydrogen fueling trailer would only be suitable for an initial implementation of a small number of FCEB vehicles. As PTD fuels the initial procurements of FCEBs with the trailer-style implementation, the agency will concurrently be developing more permanent forms of hydrogen fueling infrastructure (large liquid hydrogen storage tank, fueling stations, etc.). This will help to ensure the number of FCEBs in service does not at any point exceed the capacity of the available fueling infrastructure. PTD will continue to conduct reviews of peer agency ZEB implementations throughout Phase 1 and update this Transition Strategy as necessary.



Table 5. ZEB Transition Plan Phase 1

Procurement Year	Delivery Year	Total # of Purchases	% ZEBs Purchased	BEB	FCEB	Hybrid-Electric	CNG
2023	2025	50	23%	6	6	20	18
2024	2026	54	23%	6	6	25	17
2025	2027	28	72%	10	10	8	0
2026	2028	28	72%	10	10	8	0
2027	2029	40	80%	12	20	8	0

Phase 2 of PTD’s transition strategy, shown in

Table 6, will not include procurements of low-emission vehicles. All procurements starting in FY 2028 will be ZEBs and ZEB-related infrastructure. The specific zero-emission vehicle types will be determined by PTD’s experience with the Phase 1 deployments as well as anticipated technological improvements in ZEB range and efficiency. Phase 2 procurements will be adjusted to account for the planned development of a new facility as that project becomes more solidified and land is secured.

Table 6. ZEB Transition Phase 2 – Long-Term Purchasing Plan

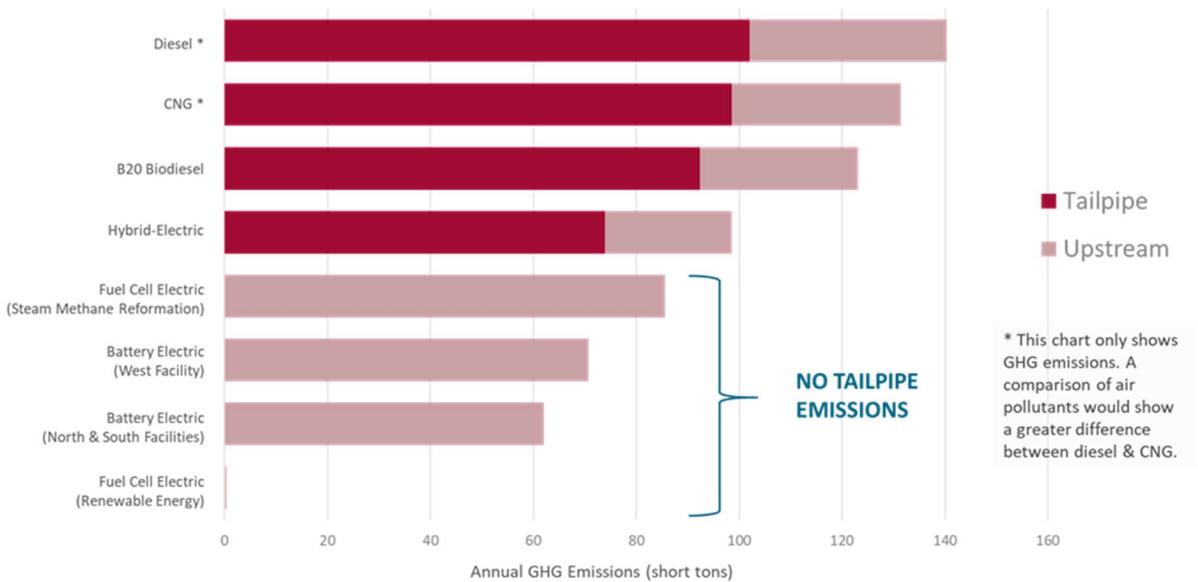
Procurement Year	Delivery Year	Total # of Purchases	% ZEBs Purchased	ZEB (BEB, FCEB)	Hybrid-Electric	CNG	Development Notes
2028	2030	50	100%	50	0	0	· Phase 2 is contingent upon the construction of a new North Facility, creating capacity for additional ZEBs
2029	2031	39	100%	39	0	0	-Begin planning for the development of ZEB fueling infrastructure at the South Facility
2030	2032	47	100%	47	0	0	
2031	2033	40	100%	40	0	0	
2032	2034	43	100%	43	0	0	· South Facility ZEB infrastructure is completed, adding fueling capacity for an additional 122 ZEBs
2033	2035	46	100%	46	0	0	
2034	2036	40	100%	40	0	0	
2035	2037	40	100%	40	0	0	
2036	2038	40	100%	40	0	0	
2037	2039	40	100%	40	0	0	
2038	2040	38	100%	38	0	0	· Begin decommissioning first ZEB Buses
2039	2041	40	100%	40	0	0	
2040	2042	40	100%	40	0	0	



Fuel Plan

The Fuel Plan provides an overview of PTD’s planned partnerships with relevant utilities and hydrogen fuel providers to support the transition to a zero-emission fleet. The development of this fuel plan relies upon an analysis of well-to-wheel emissions based on Argonne National Laboratory’s AFLEET tool. The results of this analysis are shown in **Figure 7**.

Figure 7: Well to Wheel Emissions



Source: Argonne National Laboratory AFLEET Tool

PTD recognizes the significance of upstream emissions even for buses that produce zero tailpipe emissions. In response, PTD plans to proactively develop fueling and charging plans and provider partnerships to minimize upstream emissions.

Battery Electric Charging

PTD is served by the Arizona Public Service Company (APS) at the North and South Facilities, and by Salt River Project (SRP) at the West Facility.

APS offers rate schedules for general service with three basic components: a basic service charge; a demand charge based on the highest demand averaged over a 15-minute period for the month; and a charge based on the energy used over the course of a month (APS Rate Schedule E-32 M). The North Facility is currently billed under APS’s Medium General Service rate schedule. The South Facility has two separate accounts with APS, but the bulk of the electrical use is represented under APS’s Small General Service Rate Schedule, with the remainder covered under the Dusk to Dawn Lighting service plan. The West Facility is served by SRP under two accounts: General Service (E-36), which is structured to encourage stable energy usage through avoiding spikes in demand; and Business Time of Use, which sees off-peak pricing about one-third the cost of on-peak pricing for energy use charges.

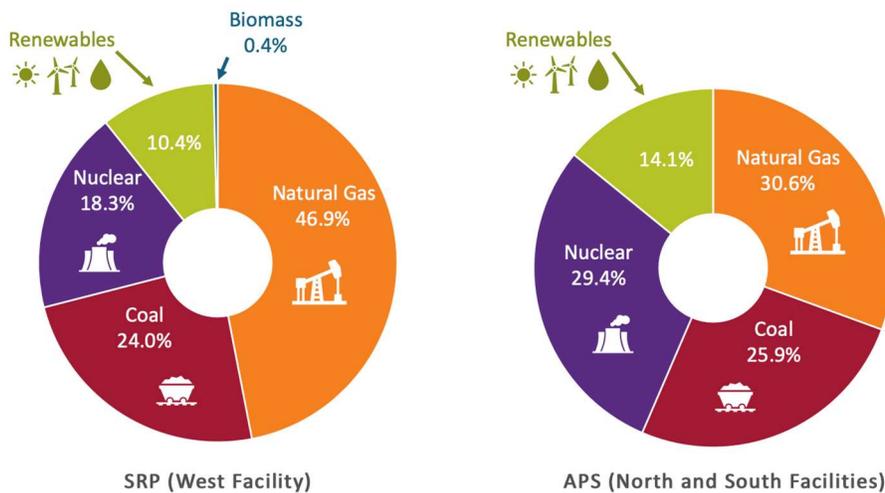
Temporal spread of charging can significantly impact demand charges incurred. As such, PTD will collaborate with APS and SRP to choose rate schedules that align with planned/observed charging



schedules. With the right utility rate and careful charging management, PTD could see an increase in total energy usage but a decrease in demand charges. PTD may stay on a General Service rate schedule for the first stages of BEB deployment, with future potential to shift to a Time of Use rate schedule depending on charging conditions observed during initial deployments. At that time, facilities will be reviewed for potential to transition to a Time of Use (TOU) rate schedule to minimize demand changes and to support the resiliency of APS and SRP electric grids through strategic charging schedules. A separate electric grid analysis will be conducted for each of the PTD facilities.

As shown in **Figure 8**, SRP and APS currently use a diverse mix of methods to generate electricity including coal, natural gas, nuclear energy, and renewable energy (solar, wind, hydro). Both utilities have goals to increase the percentage of renewable energy represented in their generation mixes. As the power grid transitions to renewable energy, the battery electric buses in PTD’s fleet will have minimal upstream emissions associated with their operations.

Figure 8: Utility Electricity Generation Mix



Hydrogen Fueling

PTD has several options for sourcing hydrogen in the southwest region. PTD is gathering information and cost estimates from each potential provider and will have a competitive procurement process to select a hydrogen producer. The potential hydrogen producers are described below.

As of March 2022, the most well-established hydrogen fuel source in the region is the Air Liquide hydrogen fuel plant in North Las Vegas, NV, which is roughly 320 miles from Phoenix. The plant currently produces around 29 tons of hydrogen each day and mostly serves light-duty and heavy-duty vehicles. If PTD decided to purchase hydrogen from this site, the hydrogen would be trucked from this plant to the bus facilities serving FCEB routes and stored on-site. The Air Liquide hydrogen fuel plant is a valuable resource for PTD’s hydrogen supply needs, especially during early stages of deployment, but also as a backup source once other local options currently in development are operational.

In addition to the plant in Nevada, PTD has identified two major local hydrogen production facilities in development that are promising future providers, as well as one recently announced early-stage development. In October 2021, the U.S. Department of Energy announced funding for PNW Hydrogen, LLC to explore using nuclear energy to produce hydrogen at the Palo Verde Generating Station. The hydrogen produced is planned to help fuel an APS owned gas-fired power plant, with the potential to



store excess hydrogen produced. This storage is intended to aid in ensuring resilience during periods of high demand.

The other local source in Air Products recently announced plans to build and operate a hydrogen plant in Casa Grande, AZ, approximately 50 miles south of Phoenix. This plant will have the capacity to produce 10 metric tons of green hydrogen each day and is expected to begin operations in 2023.

In a February 2022 press release, Heliogen announced their plans to partner with Bloom Energy to develop a green hydrogen facility on the Bureau of Land Management (BLM) land in Brenda, AZ, approximately 120 miles west of Phoenix. PTD will continue to monitor the development of this project for hydrogen sourcing potential.

Another supportive technology with high potential to ensure the success of PTD's FCEB deployment is the availability of fuel storage modules and hydrogen refueling systems such as those provided by BayoTech, NewDay Hydrogen, and Linde. These on-site storage and dispenser modules are scalable and provide options for hydrogen fuel infrastructure in relatively small footprints. The potential for this technology will be assessed to determine whether it could support FCEB-assigned vehicle tasks that require additional range flexibility.

Efforts are underway to build relationships with companies involved in the deployment and maintenance of hydrogen refueling systems to gain a better understanding of potential of scalable modular production, storage, and fueling systems at PTD's bus facilities.



Funding Plan

The replacement of the existing fleet of diesel and CNG buses with ZEBs will have a significant cost impact on PTD and the Transportation 2050 dedicated sales tax. As such, PTD will address the availability of current and future resources (federal funding, grants, local and regional sales tax revenue projections) to meet the costs of the transition and implementation.

ZEB Cost Comparison

Table 7 shows a comparison of costs for BEBs, FCEBs, hybrid electric buses, and CNG buses. These costs are based on information collected through peer interviews and PTD’s current CNG fleet. The capital cost of a BEB or FCEB is about double the cost of a CNG bus. The cost estimates are based on 2022 costs and are not adjusted for inflation.

In addition, mid-life overhaul costs are significantly higher for BEBs compared to other vehicle types due to the high cost of replacing batteries. These costs were derived from a variety of sources including prices from the Washington State Procurement Contract and recent purchases by peer agencies.

The cost of infrastructure by vehicle type included in **Table 7** assumes overnight depot charging as a charging method for BEBs and hydrogen delivery and storage for FCEBs. However, the cost associated with infrastructure improvements can vary significantly based on a wide variety of factors. For battery electric infrastructure, these factors include electrical capacity of the grid and on-site, charging speed, and charging time of day, and scale of deployment. For hydrogen infrastructure, the cost is dependent on the size of fuel storage, number of dispensers, delivery distance, and contracted provider.

Table 7: Estimated Infrastructure Cost

	Battery Electric	Fuel Cell Electric	Hybrid Electric	CNG
Bus Capital Cost	\$920,000	\$1,200,000	\$700,000	\$550,000
Mid-life Overhaul Costs	\$350,000	\$100,000	\$80,000	\$40,000
Infrastructure Costs	\$130,000	\$120,000	\$0	\$0
Total per Bus	\$1,400,000	\$1,420,000	\$780,000	\$590,000
Range (miles)	150	250	350	425
Cost per Range Mile	\$9,333	\$5,680	\$2,229	\$1,388
Time to Fuel	2-8 hours	~20 min	~20 min	~20 min

Long-term Maintenance Costs

PTD anticipates that long-term maintenance costs of a ZEB fleet will be lower than maintenance costs of a fleet of CNG or diesel buses. Phase 1 of the ZEB transition will serve as learning period to develop in-house best practices for maintenance and determine what maintenance costs look like for PTD.



Vehicle Procurement Costs

Table 8 displays vehicle procurement costs (in millions) by vehicle type. Phase 1 includes procurement of zero-emission buses, BEB and FCEB, as well as low-emission buses, hybrid electric and CNG. Phase 2 only includes zero-emission bus procurements. There are a range of ZEB costs in Phase 2 due to the cost differential between BEBs and FCEBs. Once a ZEB vehicle type is identified, these costs will be refined. The cost estimates are based on 2022 costs and are not adjusted for inflation.

Table 8: Vehicle Procurement Costs by Phase

Vehicle Procurement Costs – Phase 1				
Fiscal Year	Battery Electric	Fuel Cell Electric	Hybrid-Electric	CNG
2023	\$5,520,000	\$7,200,000	\$14,000,000	\$9,900,000 \$9,900,000.00
2024	\$5,520,000	\$7,200,000	\$17,500,000	\$9,350,000.00 \$9,350,000.00
2025	\$9,200,000	\$12,000,000	\$5,600,000	\$0
2026	\$9,200,000	\$12,000,000	\$5,600,000	\$0
2027	\$11,040,000	\$24,000,000	\$5,600,000	\$0
Vehicle Procurement Costs – Phase 2				
	Zero-Emission Buses (Low Estimate to High Estimate)		Hybrid-Electric	CNG
2028	\$36,800,000	\$48,000,000	\$0	\$0
2029	\$46,000,000	\$60,000,000	\$0	\$0
2030	\$35,880,000	\$46,800,000	\$0	\$0
2031	\$32,200,000	\$42,000,000	\$0	\$0
2032	\$36,800,000	\$48,000,000	\$0	\$0
2033	\$39,560,000	\$51,600,000	\$0	\$0
2034	\$42,320,000	\$55,200,000	\$0	\$0
2035	\$36,800,000	\$48,000,000	\$0	\$0
2036	\$36,800,000	\$48,000,000	\$0	\$0
2037	\$36,800,000	\$48,000,000	\$0	\$0
2038	\$36,800,000	\$48,000,000	\$0	\$0
2039	\$34,960,000	\$45,600,000	\$0	\$0
2040	\$27,600,000	\$36,000,000	\$0	\$0



Potential Funding Sources

PTD primarily receives funding through the FTA and the City of Phoenix dedicated transportation sales tax, along with the Maricopa County Regional Sales Tax, which are described below.

- Transportation 2050: Revenues generated by a 0.7 percent sales tax approved by votes in August 2015, as well as fare box revenue.
- Regional Transit Funds: Funds used to account for transit services that are paid by and provided for other cities or funded by the Regional Public Transportation Authority.
- Farebox Revenue
- Grants: Grant funds from federal, state, or local programs.

PTD will continue to leverage existing local funding sources and seek additional funds from federal, state, or local grants as shown in **Table 9**. The Bipartisan Infrastructure Law (BIL), as enacted in the Infrastructure Investment and Jobs Act, authorizes up to \$108 billion for public transportation – the largest federal investment in public transportation in the nation’s history. Part of the BIL funding will be used to increase the funds available through the FTA Low or No Emission Vehicle Grant Program and the FTA Bus and Bus Facilities Grant Program.

In August of 2022, PTD was awarded \$16.3 million through the Low or No Emission Vehicle Grant Program. These dollars will aid in funding Phase 1 of the ZEB transition, and will augment the local match to fund the purchase of zero-emission buses and fueling equipment procurement, along with supporting workforce training.



Table 9: Potential Grant Opportunities

Grant			
	Agency	Title	Description
Federal	United State Department of Transportation (USDOT)	Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	(Competitive) Investment in transportation infrastructure including transit.
	Federal Transit Administration (FTA)	Grants for Buses and Bus Facilities Formula Program (49 USC 5339 a)	(Formula) Bus procurement and related facilities
		Bus & Bus Facilities (49 USC 5339 b)	(Competitive) Bus procurement and related facilities
		Low or No Emission Vehicle (49 USC 5339 c)	Procurement of ZEB and fueling/charging infrastructure
		Metropolitan & Statewide Planning and Non-Metropolitan Transportation Planning (49 USC 5303)	(Formula) Planning activities that support economic vitality, increase safety, increase accessibility and mobility, protect and enhance environment
		Urbanized Area Formula (49 USC 5307)	(Formula) Transportation-related planning for transits capital and operation
		State of Good Repair (49 USC 5337)	(Formula) Capital assistance for maintenance, replacement, and rehabilitation for bus systems
		Flexible Funding Program – Surface Transportation Block Grant (23 USC 133)	(Formula) Preserve and improve the conditions and performance of surface transportation including transit.
		Flexible Funding Program – Congestion Mitigation and Air Quality Program (23 USC 149)	(Formula) Funding may be used for areas in nonattainment or maintenance of ozone, carbon monoxide and/or particulate matter. Funds may be used for transit capital expenditures as long as they have an air quality benefit
		Human Resource & Training (5314 b)	(Formula) Human resource and workforce development programs as they apply to public transit activities.
Regional	Maricopa County Air Quality Department	Diesel Emissions Reduction Act (DERA)	(Competitive) Replace, repower, or retrofit older higher emitting diesel engines with newer diesels or alternative fuel vehicles.
Local and Project Specific		Transportation 2050	Sales tax that goes towards transportation and transit investments
		SRP Business EV Charger Rebate	Rebate for installing EV charger equipment
		Joint Development	Partner with private companies for project specific effort



Workforce Transition Plan

A key aspect of this ZEB transition plan is to preserve the current workforce and to provide a pathway to empower staff with the necessary skills to support the successful deployment and maintenance of ZEBs. This is done with the goal of not only of ensuring consistent passenger service while delivering environmental benefits, but also in recognition of the value and importance of the existing workforce and the City of Phoenix Public Transit Department's (PTD) significant role as an employer within the city. Updating the existing training systems to include battery electric and fuel cell electric buses while planning for the gradual retirement of CNG and biodiesel buses will be done as part of this transition. PTD will partner with Kimley-Horn, original equipment manufacturers (OEMs) and other industry specialists to train trainers, operators, mechanics, and other staff to work with the new zero-emission vehicles with the goal of avoiding the displacement of the existing workforce. This workforce plan provides a framework to identify skill gaps, training needs, and retraining needs of the existing workers to operate and maintain zero-emission vehicles and related infrastructure while undergoing a significant operational shift.

Training Approach

Training will occur in various formats to support diverse learner needs, such as in-person instructor-led sessions, hands-on exercises, computer-based training, knowledge checks, reference material, and operational manuals.

Workforce training efforts consider the human aspect of this shift in operations and acknowledge the challenges that come with introducing new skills, processes, and procedures. For this reason, the workforce transition will include resources to support affected employees directly and indirectly through the cultural and technological shift.

Transit Cooperative Research Program's (TCRP) Research Report 219: Guidebook for Deploying Zero-Emission Transit Buses (2021) identifies three key best practices relating to personnel training and development:

- Ensuring adequate safety training related to high voltage hazards and hydrogen fuel (as applicable).
- Requiring OEMs to conduct first responder training and specifying training materials, needs, and responsibilities in the procurement contract.
- Careful coordination of training prior to or in conjunction with bus delivery.

In addition to these considerations, PTD will work with the existing bus operating contractors to coordinate training efforts and ensure compliance.

From a high-level perspective, workforce training needs to cover three distinct phases:

- Phase 1: Foundational Electrical/Electronics Principles
- Phase 2: Zero-Emission Bus Systems and PPE
- Phase 3: OEM-specific training



Phase 1: Electrical/Electronics (E/E) Principles

Learning elements covered in the foundational phase of training will include (but will not be limited to) the following key elements identified by the International Transportation Learning Center (ITLC):

- **Foundational Skills**
 - Ability to read basic wiring diagrams
 - Safe handling of low-voltage batteries
 - Troubleshooting and repairing basic circuit faults
 - Inspecting and testing relays
 - Demonstrating proficient use of digital multi-meters
 - Repair wiring and terminals
- **Multiplexing**
 - Reading and interpreting ladder logic diagrams
 - Using LED indicator lights to troubleshoot the system
 - Identifying symbols used for input and output electrical systems
- **Electronics Skills**
 - Ability to inspect and test capacitors, diodes, and other electronic modules
 - Differentiate between analog and digital signals
 - Ability to describe the purpose of data communication protocols CAN/SAE J1939 and SAE J1708
 - Differentiate between direct current (DC) and alternating current (AC)
 - Demonstrate use of an oscilloscope and a graphing multimeter
 - Inspect and troubleshoot gateway modules

Phase 2: Zero-Emission Bus Systems and PPE

Following the acquisition of the foundational skills listed above, workforce development training will focus on familiarizing workers with the structure, major components, and functionality of both Battery Electric and Fuel Cell Electric Buses, as well as the associated elements of Personal Protective Equipment (PPE), Safety, and High-Voltage Systems. This will focus on the application of fundamental electronics skills for high-voltage bus systems to ensure safe and effective maintenance. There is potential for this stage of development to use a combination of three major industry resources:

- OEM-produced training
- American Public Transportation Association (APTA) Training Syllabus to Instruct Bus technicians on Hybrid Drive Systems Operations and Maintenance
- Electrified Transportation Pro+ Training and Certification Program

Phase 3: OEM-Specific Training

Once maintenance technicians have a solid foundation in E/E components, ZEB systems, and safety protocol for working on high-voltage systems, focus can shift to familiarizing with and working on the specific make and model of buses ordered by PTD.

For basic electrical/electronic certification, PTD is interested in identifying key staff to take the National Institute for Automotive Service Excellence (ASE) Electrical/Electronic Systems (A6) test. PTD recognizes that technicians should only be required to take this ASE test if first provided with the comprehensive training, and if both labor and management agree to the process. PTD also recognizes that at this point there are currently no national credentialing requirements for ZEB maintenance technicians but will regularly review developments in a potential ZEB certification through ASE.



Skill Assessment of Existing Workers

At a broad level, it is expected that all technicians will be impacted to some degree by the transition to ZEBs.

The baseline assessment of skills of maintenance technicians will be their proficiency at diagnosing and repairing electrical and electronic faults on traditional buses (12- and 24-volt electrical systems). Without these foundational skills, workers cannot move forward on transitioning to ZEB-specific skills, including working on systems with upwards of 800 volts and using specialized tools and instruments to diagnose electrical faults. PTD plans to complete this assessment of baseline skills by coordinating with contracted bus operators to tap into the expertise of maintenance supervisors, who will be able to estimate the percentage of technicians who are already proficient at using specialized tools, such as digital multi-meters (DMM), to diagnose electrical faults.

The existing staff of technicians will be evaluated to determine who already hold ASE Transit Bus certifications for Electrical/Electronic Systems (H6), or similar certifications from the automobile and heavy-truck sectors. In addition to measures of those with standardized certifications, PTD plans to recognize and account for training provided internally, as well as from technical schools, previous employment, and third-party training providers. The findings of this assessment will inform more detailed assessments of skills gaps and next steps, explored further in the next section.

PTD will work with the bus operating contractors and the facilities and labor management to develop the criteria for foundational E/E skills and establish the baseline for deciding which workers need the additional training and in which skill area depending on workforce structure.

Impacted workers will be classified by their expected level of training required based on job requirements:

- Basic E/E Training
- Multiplex Training
- Advanced E/E Training
- Basic ZEB Training
- Advanced ZEB Training

PTD will consider working to develop E/E skills across the entire workforce of technicians with the understanding that these skills are widely transferrable and can assist in the repair of traditional buses.

Current or Anticipated Skill Gaps

A key skill identified in case studies and literature surrounding ZEB deployment is the development of new safety protocols and practices related to high voltage battery energy storage systems and hydrogen storage and fueling.

Best practice cases have identified the importance of engaging the workforce in the process of assessing the gap between baseline skills and those needed to work on ZEBs. PTD will support Transdev and First Transit, as the bus operating contractors, to develop surveys and questionnaires for specific subject areas that allow technicians and workers to rate their own abilities on a scale from high level of familiarity to complete unfamiliarity, with varying levels of ability and comfort between the two. In the process of developing these self-assessments, PTD will refer to and rely on the job tasks identified in the American Public Transportation Association's (APTA) Training Syllabus to Instruct/Prepare for the ASE Transit Bus E/E Test as established industry standards to inform skills



included on the survey. Surveying shop-floor supervisors, trainers, and leads, along with documenting technicians with ASE E/E certifications and other training, will provide a better understanding of existing E/E and ZEB skill levels among the current workforce. The high-level goal of well-developed surveys is to identify skill gaps with the goal of effectively harnessing workforce training funds, resources, and worker hours on-the-job to close the gaps.

It's important to communicate to the technicians that the sole purpose of this survey is to develop an understanding of current levels of competency in certain skills that will be used to inform deployment of targeted trainings. A low score on the survey only represents the opportunity to provide additional training. There is potential for those workers with strong existing skills in E/E to be tapped as the primary targets for training on ZEBs or to be identified as mentors to support other workers in apprenticeship programs.

There are not yet fully established industry standards regarding ZEB training standards, but there are a few existing touchpoints, including experience working on hybrid buses. Workers who do not have hybrid-bus experience will need foundational and comprehensive high-voltage safety training. It will be necessary to work closely with the selected bus OEM to build high-voltage safety training into the procurement contract and to explore potential for the OEM to assist in development of a ZEB-specific skills survey.

At this stage in the process, it is expected that most of the workforce will need training in high-voltage systems and safety, as well as the new forms of diagnostic tools associated with ZEB maintenance. Implementation of ZEB buses will require a shift to new diagnostic tools and methods. Familiarity with the new diagnostic procedures and troubleshooting techniques should be emphasized through early stages of workforce training and bus delivery. Peer agencies have emphasized the importance of strong diagnostic skills to minimize downtime and unscheduled maintenance for vehicles and fueling infrastructure.

PTD has identified the following skill gaps and related trainings for operators and technicians based on the experiences of a peer agency, AC Transit:

Training for Operations Personnel:

- Reading of ZEB compartment gauges and indicators
- High voltage battery safety and awareness
- Specific start up and shut down procedures
- Driving techniques to maximize battery capacity
- Education on seasonal variations in range or battery endurance
- Expected refueling and recharging times
- Recurrent emergency procedure training

Training for Maintenance and Facilities Personnel:

- Specific training procedures as indicated by OEM specifications
- High voltage battery safety and awareness, as recommended by the ITLC
 - Reading wiring diagrams
 - Safe handling of batteries
 - Troubleshooting and repairing basic circuits
 - Inspecting and testing relays
- Hydrogen fuel storage and safety
- Expected refueling and recharging times



- Use of new diagnostic tools
- Recommended preventative maintenance schedules
- Recurrent emergency procedure training

Training the Trainer

PTD will strategically develop in-house trainers to sustain ZEB deployment in the long-term to develop existing employees and on-board new employees, which is covered in more detail in the next section. Part of this approach includes learning from OEM-contracted engineers during the warranty period so that the maintenance technicians are well-prepared to handle the transition.

Training Plan: Strategies and Partners

The first step in closing the skill gaps will be to establish a team of labor and management subject-matter experts who are committed to working together in support of that goal. The inclusion of labor subject matter experts is key to a successful training strategy. Their inclusion will support technicians to assess their skills openly and accurately in the skills gap survey and provide a venue for the technicians to provide feedback regarding training content and delivery methods.

The team will offer input on the training requirements and responsibilities of the OEM using the language and best practices outlined in the report from International Transportation Learning Center (ITLC) and Jobs to Move America (JMA) titled “Providing Training for Zero-Emission Buses: Recommended Expanded RFP Language”.

Technical skills are best transferred by engaging trainees through hands-on exercises, computer simulations, training mock-ups, and on-the-job exercises. Use of learning aids and hands-on exercises will be implemented for classroom learning to supplement education on theory and principles based on the success of these methods.

PTD has identified the Transit Training Network’s Battery Electric Bus Familiarization Course as a comprehensive overview of ZEB systems and as a potential course for technicians following completion of the foundational E/E training requirements or proving skills in those areas. This training covers three major topics: an overview of BEB systems; high voltage safety considerations; and battery charging approaches.

There is potential to partner with local community colleges and technical education providers to develop responsive training to address the need for rapid learning gains in electrical-electronic systems. PTD will research these types of partnerships and will work closely with the instructors to ensure the syllabus materials are well suited to cover the comprehensive list of learning needs outlined in APTA’s Standard for Training on Electrical and Electronic Systems. The selected partner will provide evidence of its success in workforce education and experience in training incumbent workers.

Using the results of the survey outlined in the previous section, the team will target training for specific technicians in specific skill areas and coordinate classes to train technicians in the skill gap areas.

PTD recognizes the significant value of the existing workforce’s experience and intends on working collaboratively throughout the process to support workers during the transition.

Selection of Training Programs and Partners

Any process of identifying training partners and programs will be completed with the support and input of the existing workforce as stakeholders. PTD will consult with labor management, operators, and



technicians regarding training needs to inform the procurement specifications and contracted training components. The results of the skills gap surveys and analysis will be used to inform the specific training programs chosen.

PTD acknowledges that each OEM will have its own specific high-voltage safety and training protocols and will be experts in the training needed for their specific equipment. Once a manufacturer is chosen, PTD will coordinate with the OEM to administer training to supplement in-house safety training, policies, and procedures related to high-voltage safety. PTD also plans to coordinate with their utility providers and first responders to familiarize with best practices and training on high-voltage safety practices.

Training Resources

A case study of Seattle's King County Transit serves as a best-practice example of using both virtual and classroom learning to support agency workforce development. As part of the transition to ZEBs technicians are required to first take online classes and then complete specific training and on-the-job learning.

Another key consideration in workforce training is the prioritization of diversity, equity, and inclusion in the workforce, especially among the ranks of skilled technicians. Effective outreach will be crucial to fill open positions left in the process of employee turnover and retirement. This challenge to fill open positions presents opportunities to recruit directly from the community that the transit agency serves, especially among underrepresented and disadvantaged groups.

In addition to the steps outlined above, PTD will continue efforts to coordinate with its current transit operations contractors to develop robust apprenticeship programs based on the Urban Institute's Department of Labor-approved Bus Maintenance Registered Apprenticeship Framework. PTD will refer to the apprenticeship framework's spreadsheet of learning objectives for reference.

Engagement of Workforce in Development of Transition Plan

Ongoing engagement with the frontline workforce in all decision-making processes accounts for a critical piece of the transition plan and the implementation of ZEB technology. Involvement of all members of the workforce should be integrated throughout the workforce transition process, from the initial planning phases through each consecutive step.

Ensuring engagement and involvement with frontline workers is a top priority for PTD, and this will be communicated from the technician level to the management level. PTD has identified strategic approaches to integrate and engage the current workforce in the development of the transition plan, including regular communications within PTD regarding progress updates and the development of engagement mechanisms and tools between PTD leadership and the frontline workforce. Another key component to prioritize engagement of the current workforce is to encourage and empower the frontline workforce to speak up in the decision-making processes, rather than just solely keeping these processes in the hands of management.

PTD intends to carefully craft bus procurement documents that require the OEM/vendor to provide training aligned with closing the existing skill gaps and developing the workforce to work on ZEBs safely and confidently. Staff with local agency subject-matter expertise will be included in meetings with the OEM/vendor to ask questions and review all the training specifications in the Request for Proposals (RFPs). This is designed to ensure a voice for those in the workforce that will directly be



affected by the introduction of the ZEB technologies to steer the decisions that affect how they will adapt to and develop skills for the successful deployment and maintenance of ZEBs.

Workforce Training Funding

Many items should be considered when initially estimating the cost of the training, included but not limited to:

- Classroom training hours
- Instructor hours (Preparation and Instruction)
- Instructor hourly wages and benefits
- Instructor costs per class
- Instructor cost per trainee
- On-the-job learning training hours
- Mentor hours and hourly cost
- Mentor cost per trainee
- Facilities cost
- Training materials/mock-ups/software/simulation cost

A key component in estimating how much the training will cost is referencing the results of the skills gap analysis, which will assist PTD in estimating the number of technicians that need to complete the various levels of training.

PTD will also consider contacting other agencies with more expertise and experience on ZEBs, such as APTA's Zero-Emission Bus Committee, Community Transportation Association of America (CTAA), or Zero-Emission Bus Resource Alliance (ZEBRA). Key questions include but are not limited to:

- How much did the training cost?
- What worked well about the training?
- Did the bus manufacturer provide the quality of training expected and needed?
- Did PTD engage any third-party trainer or consultant on the training?
- Are there training modules developed that can be shared?
- From the lessons learned to date in the implementation, what would trainers advise for PTD?

Following the establishment of estimated costs, PTD plans to utilize funding built into the BIL to pay for significant aspects the training. The BIL also amended 49 U.S.C. 5339 to require that applicants for competitive Bus and Bus Facilities Program or Low and No Emissions Program funding for projects related to zero-emission vehicles **must use 5 percent of the Federal award for workforce development** to retrain the existing workforce and train the new workforce to be fully competent in E/E systems.

PTD is poised to leverage both existing and new resources to develop the existing workforce while building the foundation for a sustainable source of incoming workers to ensure the success of PTD's ZEB deployment.



APPENDIX: Threshold Development and Assumptions

BEB Thresholds

During the summer of 2020, Valley Metro held a three-day demo with three different BEB manufacturers: BYD USA, Proterra, and New Flyer. The purpose of the BEB demonstrations was to determine if BEBs could operate in place of natural gas- or diesel-powered buses that currently operate on Valley Metro routes. The study was focused on the FLASH circulator and Route 56. To determine if BEBs could be an option for select Valley Metro routes, the project team first needed to understand the expected range of a BEB in hotter months.

The range of BEBs varies greatly depending on climate, topography on routes, use of heating, ventilation, and air conditioning (HVAC) units, and number of passengers. Air conditioning use during the summer was the most applicable of these factors in the City of Phoenix. BYD USA’s vehicle had mechanical issues and was not able to complete the trial. Proterra and New Flyer (both using 35’ vehicles) completed their demos during the summer, which allowed Valley Metro to monitor performance and HVAC power usage during temperatures more than 100°F (see **Table 10**).

Table 10: Performance Results of Summer 2020

Performance Results of Summer 2020 Bus Testing					
Bus Type	Avg Temperature During Service Day	Avg Efficiency in KWH/MI	MPG Equivalent Description	Maximum Range	Maximum Time of Operation
Proterra 35’	105.5	2.6	15	152	19:43
New Flyer 35’	98.7	2.0	19	181	20:30

In addition, Valley Metro modeled performance in 112°F, which is considered the upper extreme of expected temperatures in Phoenix (see **Table 11**).

Table 11: Modeled Performance Results

Modeled Performance Results in 112°F			
Bus Type	Avg Efficiency in KWH/MI	MPG Equivalent Description	Maximum Range
Proterra 35’	2.6	15	152
New Flyer 35’	2.4	16	160

Based on these observed ranges in combination with the market availability of bus lengths, the threshold table below was used to analyze the feasibility of daily vehicle tasks for each facility. The thresholds described in **Table 12** account for lifetime battery degradation and days of use at high temperature. This analysis provides for one scenario with mid-day charging available and one with no possible time for mid-day charging.

Table 12: Vehicle Task Conversion to BEB



Vehicle Task Conversion to BEB			
	Distance (miles)	Difficulty	Description
Distance (with Mid-Day Charging)	0-100	Feasible	Relatively short distance & travel time
	100-150	Feasible	Will be feasible even with battery degradation if mid-day charging is available
	150-200	Not Feasible	This task will be challenging during days with extreme heat and not feasible with future battery degradation
	200+	Not Feasible	This task will not be possible without on-route charging
Distance (without Mid-Day Charging)	0-100	Feasible	Relatively short distance & travel time
	100-150	Challenging	With battery degradation this task will be challenging during days with extreme heat
	150-200	Not Feasible	This task will be challenging during days with extreme heat and not feasible with future battery degradation
	200+	Not Feasible	This task will not be possible without on-route charging

Review of peer agencies and market overview finds that short-term deployment of cutaways and 60' buses is affected by the relatively lower availability of these vehicles on the market today. Over the coming years there is an anticipated growth of vehicle types available, at which point the feasibility of tasks currently assigned to cutaways and 60' buses can be reevaluated. **Table 13** summarizes the feasibility of each vehicle type.

Table 13: Vehicle Task Conversion to BEB, Vehicle Type

Vehicle Task Conversion to BEB			
	Distance (miles)	Difficulty	Description
Vehicle Type	Cutaways	Not Feasible	Not many ZEV cutaway vehicles are available on the market
	40'	Feasible	Most common vehicle type on the market
	60'	Challenging	Fewer articulated buses have been deployed than 40-ft buses

FCEB Thresholds

Like the process for evaluating Vehicle Task Conversion to BEB, analysis of fuel cell electric bus feasibility by task was based on ranges observed by peer agencies as well as leading industry research. Key among peer agencies reviewed were AC Transit, Foothill Transit, Victor Valley Transit, and Sunline Transit.

Fuel cell electric buses are refueled similar to traditional diesel buses, requiring on average 10 minutes to fuel. This represents potential for FCEBs to further extend their ranges above what is possible with



a single tank of fuel with strategically placed fueling infrastructure in relatively short mid-day breaks that can be more easily worked into existing schedules and vehicle tasks. To arrive at the thresholds below, PTD relied on FCEB fuels efficiency standards developed in the Argonne National Laboratory GREET (Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation) model, which indicated an efficiency of 7.89 miles/kg. Based on a standard on-board hydrogen (H2) storage of 43kg and a conservative multiplier of .75 to account for a loss in efficiency in Phoenix’s extreme summer temperatures, PTD developed the thresholds, shown below in **Table 14** as the basis for analyzing vehicle task feasibility for FCEBs.

Table 14: Vehicle Task Conversion to FCEB

Vehicle Task Conversion to FCEB			
	Distance (miles)	Difficulty	Description
Distance (with mid-day refueling)	0-250	Feasible	Relatively short distance & travel time
	250 - 300	Feasible	Will be feasible even with extreme heat if mid-day refueling is available
	300	Feasible	Will be feasible even with extreme heat if mid-day refueling is available
Distance (without mid-day refueling)	0-250	Feasible	Relatively short distance & travel time
	250 - 300	Challenging	This task will be challenging during days with extreme heat
	300	Not Feasible	This task will not be possible without on-route refueling

FCEBs have significant potential for continued inter-lining and flexibility given improved range consistency in both the short- and long-term deployment, as compared to BEBs.

EXHIBIT 47
LIFE MILES

**Exhibit 47
Life Miles**

West Transit Facility

Vehicle Unit	Life Miles (as of February 2024)		Vehicle Unit	Life Miles (as of February 2024)
1518	270,323		5034	528,147
3005	233,695		5035	514,077
3010	69,888		5037	480,336
3011	91,180		5038	497,712
3019	10,890		5039	502,160
3020	10,222		5040	521,893
5001	484,141		5042	521,090
5003	553,854		5043	504,239
5004	490,840		5044	490,200
5005	487,123		5045	509,216
5006	536,915		5046	411,600
5007	549,077		5048	506,313
5008	509,499		5049	484,752
5009	519,031		5050	524,630
5011	535,631		5051	550,854
5013	519,408		5052	476,162
5014	489,476		5053	441,559
5015	498,127		5054	511,379
5016	465,236		5055	384,605
5017	516,556		5056	522,634
5018	528,702		5057	528,933
5019	533,635		5058	472,215
5020	467,084		5059	507,283
5022	487,594		5060	522,902
5023	527,487		5174	335,600
5024	525,420		5175	364,778
5025	530,027		5176	307,704
5026	521,212		5177	325,754
5027	534,079		5178	344,053
5028	522,557		5179	319,800
5030	526,908		5180	348,500
5031	558,013		5181	337,469
5032	481,986		5182	326,500
5033	535,969		5183	364,349

Vehicle Unit	Life Miles (as of February 2024)
5184	296,351
5185	329,446
5186	352,074
5187	331,814
5188	362,626
5189	302,000
5190	306,808
5191	311,869
5192	319,374
5193	314,618
5194	327,964
5195	336,928
5196	357,666
5197	316,700
5198	347,108
5199	360,664
5200	377,658
5241	185,397
5242	302,553
5243	252,594
5270	277,945
5271	295,073
5272	295,485
5273	261,385
5274	282,000
5327	6,521
5328	6,877
5329	4,207
5330	675
5331	4,172
5332	788
5333	734
5334	779
5335	813
5336	754
5600	291,122
5601	302,096
5602	315,188
5603	312,587
5604	303,297

Vehicle Unit	Life Miles (as of February 2024)
5605	286,789
5606	322,722
5607	311,201
5608	302,683
5609	300,068
5610	326,764
5611	314,377
5612	283,894
5613	261,512
5614	266,782
5615	276,628
5616	243,504
5617	244,537
5618	283,312
5619	268,093
5620	286,089
5621	251,882
5622	264,601
5623	252,700
5624	263,887
5625	217,844
5626	201,730
5627	212,142
5628	252,798
5629	246,492
5630	243,463
5631	211,812
5645	200,676
5646	184,062
5647	165,587
8102	299,757
8103	279,160
8104	273,143
8105	260,577
8106	222,155
8107	139,331
8108	276,934
8109	232,074
8110	267,820
8111	228,099

Vehicle Unit	Life Miles (as of February 2024)
8112	279,964
8113	272,103
8114	274,480
8115	288,131
8116	276,670
8122	206,166
8123	200,273
8124	196,482
8125	207,117
8126	165,077
8127	216,638
8128	187,393
8129	165,239
8130	169,176
8131	175,262
8132	176,528
8133	172,763
8134	178,740
8135	175,249
8136	155,730
8137	162,234
8138	155,168
8139	138,147
8140	152,219
8141	172,973

**EXHIBIT 48
OPERATOR LIST**

Transdev Phoenix West Facility Operator List

Position	Wage as of 7/1/2025	Seniority Date
Operator 1	\$33.57	1/12/1998
Operator 2	\$33.57	6/22/1998
Operator 3	\$33.57	7/13/1998
Operator 4	\$33.57	12/7/1998
Operator 5	\$33.57	1/4/1999
Operator 6	\$33.57	1/31/2000
Operator 7	\$33.57	2/7/2000
Operator 8	\$33.57	4/10/2000
Operator 9	\$33.57	4/10/2000
Operator 10	\$33.57	6/21/2000
Operator 11	\$33.57	6/29/2000
Operator 12	\$33.57	7/17/2000
Operator 13	\$33.57	9/14/2000
Operator 14	\$33.57	12/12/2000
Operator 15	\$33.57	3/19/2001
Operator 16	\$33.57	4/19/2001
Operator 17	\$33.57	4/19/2001
Operator 18	\$33.57	7/23/2001
Operator 19	\$33.57	8/13/2001
Operator 20	\$33.57	10/29/2001
Operator 21	\$33.57	10/29/2001
Operator 22	\$33.57	10/29/2001
Operator 23	\$33.57	2/7/2002
Operator 24	\$33.57	2/7/2002
Operator 25	\$33.57	2/7/2002
Operator 26	\$33.57	2/7/2002
Operator 27	\$33.57	3/17/2002
Operator 28	\$33.57	6/3/2002
Operator 29	\$33.57	7/5/2002
Operator 30	\$33.57	7/27/2002
Operator 31	\$33.57	8/19/2002
Operator 32	\$33.57	9/9/2002
Operator 33	\$33.57	12/2/2002
Operator 34	\$33.57	12/2/2002
Operator 35	\$33.57	3/24/2003
Operator 36	\$33.57	4/10/2003
Operator 37	\$33.57	6/9/2003
Operator 38	\$33.57	6/9/2003
Operator 39	\$33.57	9/22/2003
Operator 40	\$33.57	9/22/2003
Operator 41	\$33.57	11/11/2003
Operator 42	\$33.57	4/14/2004
Operator 43	\$33.57	6/15/2004
Operator 44	\$33.57	10/25/2004
Operator 45	\$33.57	4/4/2005
Operator 46	\$33.57	5/23/2005
Operator 47	\$33.57	6/14/2005
Operator 48	\$33.57	9/7/2005
Operator 49	\$33.57	11/7/2005
Operator 50	\$33.57	11/21/2005
Operator 51	\$33.57	1/11/2006
Operator 52	\$33.57	4/5/2006
Operator 53	\$33.57	5/16/2006
Operator 54	\$33.57	7/24/2006

Operator 55	\$33.57	1/2/2007
Operator 56	\$33.57	1/10/2007
Operator 57	\$33.57	2/18/2007
Operator 58	\$33.57	5/4/2007
Operator 59	\$33.57	8/10/2007
Operator 60	\$33.57	10/12/2007
Operator 61	\$33.57	12/27/2007
Operator 62	\$33.57	12/27/2007
Operator 63	\$33.57	1/14/2008
Operator 64	\$33.57	2/11/2008
Operator 65	\$33.57	2/11/2008
Operator 66	\$33.57	3/10/2008
Operator 67	\$33.57	3/31/2008
Operator 68	\$33.57	3/31/2008
Operator 69	\$33.57	4/14/2008
Operator 70	\$33.57	4/14/2008
Operator 71	\$33.57	4/28/2008
Operator 72	\$33.57	4/28/2008
Operator 73	\$33.57	4/28/2008
Operator 74	\$33.57	5/9/2008
Operator 75	\$33.57	5/12/2008
Operator 76	\$33.57	5/27/2008
Operator 77	\$33.57	5/27/2008
Operator 78	\$33.57	9/8/2008
Operator 79	\$33.57	9/29/2008
Operator 80	\$33.57	11/10/2008
Operator 81	\$33.57	11/10/2008
Operator 82	\$33.57	12/16/2008
Operator 83	\$33.57	12/16/2008
Operator 84	\$33.57	2/16/2009
Operator 85	\$33.57	2/16/2009
Operator 86	\$33.57	2/16/2009
Operator 87	\$33.57	3/2/2009
Operator 88	\$33.57	3/2/2009
Operator 89	\$33.57	3/2/2009
Operator 90	\$33.57	3/2/2009
Operator 91	\$33.57	5/26/2009
Operator 92	\$33.57	5/26/2009
Operator 93	\$33.57	5/26/2009
Operator 94	\$33.57	6/23/2009
Operator 95	\$33.57	8/18/2009
Operator 96	\$33.57	8/18/2009
Operator 97	\$33.57	1/4/2010
Operator 98	\$33.57	1/4/2010
Operator 99	\$33.57	1/4/2010
Operator 100	\$33.57	1/26/2010
Operator 101	\$33.57	2/15/2010
Operator 102	\$33.57	5/24/2010
Operator 103	\$33.57	5/24/2010
Operator 104	\$33.57	9/21/2010
Operator 105	\$33.57	9/21/2010
Operator 106	\$33.57	11/8/2010
Operator 107	\$33.57	12/13/2010
Operator 108	\$33.57	1/10/2011
Operator 109	\$33.57	1/10/2011

Operator 110	\$33.57	1/10/2011
Operator 111	\$33.57	2/14/2011
Operator 112	\$33.57	2/14/2011
Operator 113	\$33.57	2/14/2011
Operator 114	\$33.57	2/14/2011
Operator 115	\$33.57	3/14/2011
Operator 116	\$33.57	5/16/2011
Operator 117	\$33.57	5/16/2011
Operator 118	\$33.57	6/13/2011
Operator 119	\$33.57	9/19/2011
Operator 120	\$33.57	10/17/2011
Operator 121	\$33.57	10/17/2011
Operator 122	\$33.57	12/4/2012
Operator 123	\$33.57	1/15/2013
Operator 124	\$33.57	1/15/2013
Operator 125	\$33.57	1/15/2013
Operator 126	\$33.57	2/26/2013
Operator 127	\$33.57	2/26/2013
Operator 128	\$33.57	5/20/2013
Operator 129	\$33.57	9/24/2013
Operator 130	\$33.57	9/24/2013
Operator 131	\$33.57	11/12/2013
Operator 132	\$33.57	12/17/2013
Operator 133	\$33.57	12/17/2013
Operator 134	\$33.57	2/11/2014
Operator 135	\$33.57	2/26/2014
Operator 136	\$33.57	2/26/2014
Operator 137	\$33.57	2/26/2014
Operator 138	\$33.57	4/7/2014
Operator 139	\$33.57	4/7/2014
Operator 140	\$33.57	5/13/2014
Operator 141	\$33.57	5/13/2014
Operator 142	\$33.57	5/13/2014
Operator 143	\$33.57	5/13/2014
Operator 144	\$33.57	5/13/2014
Operator 145	\$33.57	7/29/2014
Operator 146	\$33.57	7/29/2014
Operator 147	\$33.57	9/9/2014
Operator 148	\$33.57	9/9/2014
Operator 149	\$33.57	9/9/2014
Operator 150	\$33.57	12/16/2014
Operator 151	\$33.57	12/16/2014
Operator 152	\$33.57	1/20/2015
Operator 153	\$33.57	2/3/2015
Operator 154	\$33.57	3/10/2015
Operator 155	\$33.57	3/10/2015
Operator 156	\$33.57	3/18/2015
Operator 157	\$33.57	4/14/2015
Operator 158	\$33.57	5/12/2015
Operator 159	\$33.57	6/16/2015
Operator 160	\$33.57	7/28/2015
Operator 161	\$33.57	8/18/2015
Operator 162	\$33.57	9/15/2015
Operator 163	\$33.57	9/15/2015
Operator 164	\$33.57	10/13/2015

Operator 165	\$33.57	10/13/2015
Operator 166	\$33.57	10/20/2015
Operator 167	\$33.57	10/20/2015
Operator 168	\$33.57	11/10/2015
Operator 169	\$33.57	1/11/2016
Operator 170	\$33.57	1/25/2016
Operator 171	\$33.57	2/15/2016
Operator 172	\$33.57	3/14/2016
Operator 173	\$33.57	3/14/2016
Operator 174	\$33.57	3/28/2016
Operator 175	\$33.57	5/16/2016
Operator 176	\$33.57	6/6/2016
Operator 177	\$33.57	6/6/2016
Operator 178	\$33.57	6/6/2016
Operator 179	\$33.57	6/6/2016
Operator 180	\$33.57	6/6/2016
Operator 181	\$33.57	6/20/2016
Operator 182	\$33.57	6/20/2016
Operator 183	\$33.57	6/20/2016
Operator 184	\$33.57	7/11/2016
Operator 185	\$33.57	7/11/2016
Operator 186	\$33.57	7/11/2016
Operator 187	\$33.57	7/11/2016
Operator 188	\$33.57	7/11/2016
Operator 189	\$33.57	8/8/2016
Operator 190	\$33.57	8/8/2016
Operator 191	\$33.57	8/29/2016
Operator 192	\$33.57	10/3/2016
Operator 193	\$33.57	10/3/2016
Operator 194	\$33.57	10/3/2016
Operator 195	\$33.57	10/3/2016
Operator 196	\$33.57	10/3/2016
Operator 197	\$33.57	10/3/2016
Operator 198	\$33.57	11/14/2016
Operator 199	\$33.57	11/14/2016
Operator 200	\$33.57	12/5/2016
Operator 201	\$33.57	5/2/2017
Operator 202	\$33.57	6/30/2017
Operator 203	\$33.57	7/11/2017
Operator 204	\$33.57	7/11/2017
Operator 205	\$33.57	7/11/2017
Operator 206	\$33.57	7/17/2017
Operator 207	\$33.57	7/26/2017
Operator 208	\$33.57	7/26/2017
Operator 209	\$33.57	8/9/2017
Operator 210	\$33.57	8/9/2017
Operator 211	\$33.57	8/15/2017
Operator 212	\$33.57	8/15/2017
Operator 213	\$33.57	8/31/2017
Operator 214	\$33.57	8/31/2017
Operator 215	\$33.57	9/7/2017
Operator 216	\$33.57	9/20/2017
Operator 217	\$33.57	9/20/2017
Operator 218	\$33.57	9/25/2017
Operator 219	\$33.57	9/28/2017

Operator 220	\$33.57	10/17/2017
Operator 221	\$33.57	10/17/2017
Operator 222	\$33.57	10/20/2017
Operator 223	\$33.57	10/23/2017
Operator 224	\$33.57	11/15/2017
Operator 225	\$33.57	11/15/2017
Operator 226	\$33.57	11/15/2017
Operator 227	\$33.57	11/28/2017
Operator 228	\$33.57	11/28/2017
Operator 229	\$33.57	11/28/2017
Operator 230	\$33.57	12/14/2017
Operator 231	\$33.57	12/14/2017
Operator 232	\$33.57	2/6/2018
Operator 233	\$33.57	2/26/2018
Operator 234	\$33.57	3/5/2018
Operator 235	\$33.57	3/12/2018
Operator 236	\$33.57	3/12/2018
Operator 237	\$33.57	3/16/2018
Operator 238	\$33.57	4/4/2018
Operator 239	\$33.57	4/4/2018
Operator 240	\$33.57	5/3/2018
Operator 241	\$33.57	5/21/2018
Operator 242	\$33.57	5/21/2018
Operator 243	\$33.57	6/6/2018
Operator 244	\$33.57	6/6/2018
Operator 245	\$33.57	6/6/2018
Operator 246	\$33.57	6/18/2018
Operator 247	\$33.57	6/18/2018
Operator 248	\$33.57	6/18/2018
Operator 249	\$33.57	6/18/2018
Operator 250	\$33.57	6/18/2018
Operator 251	\$33.57	6/18/2018
Operator 252	\$33.57	6/18/2018
Operator 253	\$33.57	6/18/2018
Operator 254	\$33.57	6/18/2018
Operator 255	\$33.57	6/18/2018
Operator 256	\$33.57	6/18/2018
Operator 257	\$33.57	6/18/2018
Operator 258	\$33.57	6/18/2018
Operator 259	\$33.57	7/9/2018
Operator 260	\$33.57	8/27/2018
Operator 261	\$33.57	9/4/2018
Operator 262	\$33.57	9/25/2018
Operator 263	\$33.57	11/21/2018
Operator 264	\$33.57	11/21/2018
Operator 265	\$33.57	11/29/2018
Operator 266	\$33.57	1/2/2019
Operator 267	\$33.57	1/31/2019
Operator 268	\$33.57	1/31/2019
Operator 269	\$33.57	3/13/2019
Operator 270	\$33.57	4/8/2019
Operator 271	\$33.57	4/15/2019
Operator 272	\$33.57	6/7/2019
Operator 273	\$33.57	6/7/2019
Operator 274	\$33.57	6/7/2019

Operator 275	\$33.57	7/10/2019
Operator 276	\$26.05	8/20/2019
Operator 277	\$26.05	9/19/2019
Operator 278	\$26.05	9/19/2019
Operator 279	\$26.05	1/2/2020
Operator 280	\$26.05	2/10/2020
Operator 281	\$26.05	2/10/2020
Operator 282	\$26.05	2/24/2020
Operator 283	\$26.05	3/13/2020
Operator 284	\$26.05	5/4/2020
Operator 285	\$24.17	11/2/2020
Operator 286	\$24.17	12/3/2020
Operator 287	\$24.17	12/17/2020
Operator 288	\$24.17	12/28/2020
Operator 289	\$24.17	1/8/2021
Operator 290	\$24.17	2/1/2021
Operator 291	\$24.17	2/17/2021
Operator 292	\$24.17	2/23/2021
Operator 293	\$24.17	3/2/2021
Operator 294	\$24.17	3/2/2021
Operator 295	\$24.17	3/23/2021
Operator 296	\$24.17	5/12/2021
Operator 297	\$24.17	5/19/2021
Operator 298	\$22.45	9/15/2021
Operator 299	\$22.45	9/29/2021
Operator 300	\$22.45	10/8/2021
Operator 301	\$22.45	11/30/2021
Operator 302	\$22.45	12/28/2021
Operator 303	\$22.45	12/28/2021
Operator 304	\$22.45	12/28/2021
Operator 305	\$22.45	1/5/2022
Operator 306	\$22.45	2/16/2022
Operator 307	\$22.45	3/15/2022
Operator 308	\$22.45	3/15/2022
Operator 309	\$22.45	3/24/2022
Operator 310	\$22.45	3/31/2022
Operator 311	\$22.45	4/21/2022
Operator 312	\$22.45	4/21/2022
Operator 313	\$22.45	5/26/2022
Operator 314	\$22.45	6/8/2022
Operator 315	\$21.34	8/11/2022
Operator 316	\$21.34	9/7/2022
Operator 317	\$21.34	9/7/2022
Operator 318	\$21.34	10/5/2022
Operator 319	\$21.34	10/5/2022
Operator 320	\$21.34	10/12/2022
Operator 321	\$21.34	10/24/2022
Operator 322	\$21.34	10/27/2022
Operator 323	\$21.34	10/28/2022
Operator 324	\$21.34	11/10/2022
Operator 325	\$21.34	12/1/2022
Operator 326	\$21.34	12/30/2022
Operator 327	\$21.34	2/2/2023
Operator 328	\$21.34	2/2/2023
Operator 329	\$21.34	2/16/2023

Operator 330	\$21.34	2/23/2023
Operator 331	\$21.34	3/30/2023
Operator 332	\$21.34	3/30/2023
Operator 333	\$21.34	4/6/2023
Operator 334	\$21.34	4/13/2023
Operator 335	\$21.34	4/13/2023
Operator 336	\$21.34	5/4/2023
Operator 337	\$21.34	5/11/2023
Operator 338	\$21.34	5/11/2023
Operator 339	\$21.34	5/18/2023
Operator 340	\$21.34	5/18/2023
Operator 341	\$21.34	5/18/2023
Operator 342	\$21.34	5/18/2023
Operator 343	\$21.34	5/18/2023
Operator 344	\$21.34	5/25/2023
Operator 345	\$21.34	6/6/2023
Operator 346	\$21.34	6/6/2023
Operator 347	\$21.34	6/21/2023
Operator 348	\$21.34	6/21/2023
Operator 349	\$21.34	6/27/2023
Operator 350	\$21.34	6/27/2023
Operator 351	\$21.34	6/27/2023
Operator 352	\$21.34	6/27/2023
Operator 353	\$21.34	7/5/2023
Operator 354	\$21.34	7/5/2023
Operator 355	\$21.34	7/13/2023
Operator 356	\$21.34	7/21/2023
Operator 357	\$21.34	7/21/2023
Operator 358	\$21.34	7/21/2023
Operator 359	\$21.06	8/1/2023
Operator 360	\$21.06	8/3/2023
Operator 361	\$21.06	8/3/2023
Operator 362	\$21.06	8/16/2023
Operator 363	\$21.06	8/16/2023
Operator 364	\$21.06	8/16/2023
Operator 365	\$21.06	9/5/2023
Operator 366	\$21.06	9/13/2023
Operator 367	\$21.06	9/13/2023
Operator 368	\$21.06	9/21/2023
Operator 369	\$21.06	10/12/2023
Operator 370	\$21.06	10/12/2023
Operator 371	\$21.06	10/12/2023
Operator 372	\$21.06	10/12/2023
Operator 373	\$21.06	11/29/2023
Operator 374	\$21.06	11/29/2023
Operator 375	\$21.06	12/8/2023
Operator 376	\$21.06	12/21/2023
Operator 377	\$21.06	1/5/2024
Operator 378	\$21.06	1/5/2024
Operator 379	\$21.06	1/5/2024
Operator 380	\$21.06	1/5/2024
Operator 381	\$21.06	1/10/2024
Operator 382	\$21.06	1/10/2024
Operator 383	\$21.06	1/10/2024
Operator 384	\$21.06	1/24/2024

Operator 385	\$21.06	2/28/2024
Operator 386	\$21.06	3/21/2024
Operator 387	\$21.06	3/21/2024
Operator 388	\$21.06	3/21/2024
Operator 389	\$21.06	3/21/2024
Operator 390	\$21.06	3/21/2024
Operator 391	\$21.06	3/28/2024
Operator 392	\$21.06	4/4/2024
Operator 393	\$21.06	4/4/2024
Operator 394	\$21.06	4/11/2024
Operator 395	\$21.06	4/17/2024
Operator 396	\$21.06	5/8/2024
Operator 397	\$21.06	5/8/2024
Operator 398	\$21.06	5/8/2024
Operator 399	\$21.06	5/29/2024
Operator 400	\$21.06	5/29/2024
Operator 401	\$21.06	5/29/2024
Operator 402	\$21.06	5/29/2024
Operator 403	\$21.06	5/29/2024
Operator 404	\$21.06	5/29/2024
Operator 405	\$21.06	Open
Operator 406	\$21.06	Open
Operator 407	\$21.06	Open
Operator 408	\$21.06	Open
Operator 409	\$21.06	Open
Operator 410	\$21.06	Open
Operator 411	\$21.06	Open
Operator 412	\$21.06	Open
Operator 413	\$21.06	Open
Operator 414	\$21.06	Open
Operator 415	\$21.06	Open
Operator 416	\$21.06	Open
*This list accounts for current service levels not future expanded service.		

EXHIBIT 49
NON-OPERATOR LIST

Transdev Phoenix West Facility - Non Operator Employee List

Job Function	Wage as of 7/1/2025	Hire Date
General Manager	Exempt - Confidential	07/01/07
Finance Manager	Exempt - Confidential	03/30/20
HR Manager	Exempt - Confidential	07/30/24
IT Manager	Exempt - Confidential	06/18/18
Director of Maintenance	Exempt - Confidential	03/11/06
Operations Manager	Exempt - Confidential	10/17/16
Parts Manager	Exempt - Confidential	06/17/24
Quality Assurance Manager	CExempt - onfidential	02/28/22
Safety and Training Manager	Exempt - Confidential	05/01/23
Asst General Manager	Exempt - Confidential	12/03/07
Maintenance Manager	Exempt - Confidential	06/23/13
Environmental Manager	Exempt - Confidential	03/01/23
Customer Service Manager	Exempt - Confidential	New
Senior Operations Supervisor	Exempt - Confidential	09/08/15
Clerk Office	\$20.60	12/04/23
Clerk Office	\$25.75	08/01/22
Clerk Office	\$19.06	07/17/24
Clerk Parts	\$19.10	06/28/21
Clerk Parts	\$18.54	03/04/24
Clerk Payroll	\$21.22	11/14/11
Clerk Payroll	\$24.54	08/19/19
Clerk Shop	\$23.34	06/26/23
Clerk Shop	\$26.37	06/13/11
Dispatcher 1	\$34.91	07/11/11
Dispatcher 2	\$23.00	New
Dispatcher 3	\$23.00	New
Dispatcher 4	\$23.00	New
Filing Clerk - Safety	\$18.50	New
Service Employee 1	\$20.56	07/08/24
Service Employee 2	\$21.13	11/28/22
Service Employee 3	\$20.56	07/01/24
Service Employee 4	\$23.66	01/25/05
Service Employee 5	\$22.28	12/03/07
Service Employee 6	\$23.66	12/03/07
Service Employee 7	\$21.13	11/28/22
Service Employee 8	\$21.13	04/03/23
Service Employee 9	\$21.13	05/01/23
Service Employee 10	\$20.56	09/08/23
Service Employee 11	\$21.13	10/25/22
Service Employee 12	\$21.97	04/05/21
Service Employee 13	\$21.13	08/02/22
Service Employee 14	\$21.13	02/20/23
Service Employee 15	\$21.69	02/01/22
Service Employee 16	\$20.56	12/11/23
Service Employee 17	\$21.13	02/27/23
Service Employee 18	\$23.66	07/05/17
Service Employee 19	\$20.56	08/21/23
Service Employee 20	\$21.13	10/10/22
Service Employee 21	\$23.66	11/12/19
Service Employee 22	\$20.56	04/29/24
Service Employee 23	\$20.56	New

Service Employee 24	\$20.56	New
Service Employee 25	\$20.56	New
Road Supervisor 1	\$24.00	02/26/24
Road Supervisor 2	\$34.91	09/18/17
Road Supervisor 3	\$34.91	09/25/17
Road Supervisor 4	\$34.91	01/23/17
Road Supervisor 5	\$34.91	07/11/16
Road Supervisor 6	\$25.00	06/12/23
Road Supervisor 7	\$34.91	02/01/16
Road Supervisor 8	\$25.00	05/26/23
Road Supervisor 9	\$34.91	06/06/17
Road Supervisor 10	\$25.00	08/14/23
Road Supervisor 11	\$34.91	03/31/08
Road Supervisor 12	\$34.91	02/02/09
Road Supervisor 13	\$34.91	02/10/97
Road Supervisor 14	\$34.91	10/14/18
Road Supervisor 15	\$34.91	06/12/17
Road Supervisor 16	\$34.91	12/04/12
Road Supervisor 17	\$23.00	New
Road Supervisor 18	\$23.00	New
Road Supervisor 19	\$23.00	New
Road Supervisor 20	\$23.00	New
Shop Supervisor 1	\$39.75	06/09/14
Shop Supervisor 2	\$39.75	03/18/24
Shop Supervisor 3	\$39.75	New
Technician Facilities 1	\$20.74	12/03/07
Technician Facilities 2	\$26.37	05/17/16
Technician I - 1	\$26.03	07/06/23
Technician I - 2	\$26.03	05/13/24
Technician I - 3	\$26.03	04/29/24
Technician I - 4	\$26.03	05/06/24
Technician I - 5	\$26.03	05/06/24
Technician I - 6	\$26.03	04/15/24
Technician I - 7	\$26.03	01/29/24
Technician II - 1	\$30.97	09/25/23
Technician II - 2	\$30.97	11/07/22
Technician II - 3	\$30.97	05/24/23
Technician II - 4	\$30.97	04/11/23
Technician II - 5	\$30.97	09/08/23
Technician II - 6	\$30.97	12/11/23
Technician II - 7	\$30.97	05/04/23
Technician II - 8	\$30.97	05/06/24
Technician II - 9	\$30.97	12/03/07
Technician II - 10	\$30.97	12/20/23
Technician II - 11	\$31.47	01/11/16
Technician II - 12	\$30.97	04/08/24
Technician II - 13	\$30.97	03/11/24
Technician II - 14	\$30.97	06/02/10
Technician II - 15	\$36.54	04/22/24
Technician II - 16	\$37.04	06/07/21
Technician II - 17	\$36.54	04/01/24
Technician II - 18	\$36.54	04/29/24

Technician III - 1	\$39.84	02/03/15
Technician III - 2	\$39.29	03/21/11
Technician III - 3	\$36.54	05/16/05
Technician III - 4	\$36.54	01/24/24
Technician III - 5	\$36.54	02/12/24
Technician III - 6	\$39.21	10/02/17
Technician III - 7	\$38.29	11/29/16
Technician III - 8	\$41.61	04/08/19
Technician III - 9	\$36.54	New
Trainer I - 1	\$33.16	12/13/10
Trainer I - 2	\$33.16	06/23/13
Trainer I - 3	\$33.16	02/12/07
Warranty/Report Analyst	\$25.00	New

*This list accounts for current service levels not future expanded service.