



GRTC Transit System

Training Simulator Specification



301 East Belt Boulevard
Richmond VA 23224

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Purpose and Scope

The purpose of this document is to outline the functional and technical requirements and specifications for a Transit Bus Training System (the “Simulator System”) to be installed at GRTC Administrative Building in the Training Room, located at 301 E. Belt Blvd Richmond VA 23224.

The Contractor shall be responsible for the manufacture, supply, delivery, installation, testing, commissioning, training, documentation, warranty, and on-going maintenance of the Simulator System in accordance with the requirements described herein.

The Contractor shall be responsible for delivering a complete and working system as per the Agency requirements. Any additional components and/or functions not specifically called out in the requirements described within the RFP, which are required to deliver complete and working system, shall be clearly detailed in the Proponent’s submission.

The Simulator System shall include the following features:

1. High-End Simulator System with customized driver cab replicating a driving compartment of a [insert fleet vehicle], including genuine OEM side console and dash component(s).
2. The Operator’s cab must be a full-size, enclosed transit bus operator’s cab including the driver’s seat, steering wheel, mirrors, instrument panel, dash, foot switches, and floor-mounted controls.
3. The Simulator System should provide a simulated vehicle to drive that is the conventional 40-foot length , 35-foot, 45-foot Coach and a 60 – Foot Articulate.
4. The Contractor shall provide an uninterruptable power source (UPS) with battery backup per Simulator System.
5. The Simulator System shall provide at a minimum two (2) real-world electric bus vehicle models for driving on the Simulator System within the virtual training world.
6. The Contractor shall outline any applicable electric bus training programs currently available for use on the Simulator System.
7. The Simulator System shall provide assessment tools that monitor and generate on-demand. reports on the trainee’s performance during a training session.
8. The ability to customize virtual worlds reproducing and replicating select existing and future GRTC Transit routes, conventional roadways, and associated features, including roadside architectural and structural features.
9. Intelligent and realistic simulation of road traffic, pedestrian traffic, passengers boarding, car traffic, other transit traffic, etc. with high degree of realization.

10. Ability to develop customized training scenarios and situations through a user-friendly editor.

11. Auxiliary Driving Station to allow manual interaction by the instructor into the virtual environment the students are currently driving in. This Station would include a separate wheel and/or joystick and pedal set located at the Instructor Operator Station.
12. Instructor Operator Station which manages the Simulator System, including loading scenarios, monitoring real-time driving, and a student management section.
13. Stand-Alone Viewing Monitor to provide additional trainees in the class with a view of the scenario being driven in real-time.
14. Applicable office chair and desk furniture at the Instructor Operator Station.
15. 180-day period of performance for base systems.
16. The Contractor shall propose a separate schedule for the delivery of the geo-specific database.
17. Three (3) years of extended warranty.
18. Warranty coverage should include preventative maintenance on an ongoing basis for the entire duration of the selected warranty period.

Project Arrangement

1. The project will be composed of two phases:
 - a. Phase 1 will include the manufacture, supply, delivery, installation, testing, commissioning, training, documentation of the base Simulator System.
 - b. Phase 2 will focus on adding/enhancing customized features to the geo-specific virtual world and training environment. All requirements stated in this document are part of Phase 1 unless otherwise explicitly noted as Phase 2. Final system acceptance at the end of Phase 1 will commence the Warranty and Support period.

Simulator System Components

1. General Room Arrangement
 - a. The Simulator System shall be designed to efficiently fit/replicate the driver's cabin of a GRTC bus.
2. The Contractor shall provide a proposed layout drawing of the Simulator System within the room for approval prior to the manufacture of the Simulator System.
3. The Contractor shall propose an electrical layout for the training room to identify the quantity of outlets and the power thresholds for each.

Driver Cab

1. The Driver Cab shall be designed and constructed to replicate GRTC Transit's 40-foot bus. The Contractor shall be responsible for contacting and coordinating with manufacturers to gather the proper information to reconstruct the full-size enclosed cab(s).
2. The Driver Cab shall be constructed with authentic materials and be of sturdy construction. The exterior of the Driver Cab enclosure shall be painted, or vinyl wrapped to match the GRTC Transit colors and design.
3. The entrance and exit of the Driver Cab shall be through the rear of the enclosure.
4. The Driver Cab shall include, at a minimum, a roof, flooring, enclosure openings, front passenger door, and windows.
5. The Driver Cab shall include 3 glass rear view mirrors – driver side, curb side, and interior center – of equal size, shape (flat glass) location, and control to that of the replicated GRTC Transit bus model.
6. The Driver Cab glass mirrors shall provide accurate parallax and reflection of the Simulator System generated images like that of an actual vehicle in operation at GRTC Transit. The driver side and curb side mirrors shall have a minimum dimension of 6" wide and 9" in height.
7. Convex mirrors (L/R) shall provide digital representations of the virtual training world they would normally view.
8. The Driver Cab shall include a two-way radio for communicating with the Instructor Operator Station.

9. The Driver Cab shall introduce physical obstructions as blind spots by nature of its design to aid trainees in a real-world experience when operating the Simulator System.

Driver Cab Enclosure

1. The Driver Cab Enclosure shall be designed to replicate the driver compartment of GRTC Transit's bus.
2. The Driver Cab Enclosure will be realistically replicated to account for overall spatial layout of the cab, doors, windscreen, seat, steering wheel with horn, mirrors, dash, brake and accelerator pedals, parking brake, door interlock switch, indicators, and side console panel.
3. The Driver Cab Enclosure shall provide directional signal switches located on the floor and will function as in a typical bus. A headlight dimmer switch will be mounted on the floor of the Simulator Systems adjacent to the directional switches and will function as in a typical bus.
4. The Drive Cab Enclosure shall include genuine OEM products and their placement shall be in the same locations as they exist in the actual vehicle.
5. The Driver Cab Enclosure shall be designed to comfortably accommodate persons with heights ranging from 5'0" to 6'6" by being able to adjust the seat and steering wheel column accordingly.
6. The Driver Cab Enclosure shall include a floor-mounted radio button that activates the Push-to-Talk feature to communicate with the Instructor Operator Station.
7. The Driver Cab Enclosure shall be designed to include a space for the instructor to stand by the trainee (over the right shoulder) without obstructing any of the training environment screen views. This space shall allow for persons ranging from 5'0" to 6'6" in height to comfortably stand.
8. The driver's seat shall be a genuine OEM seat found in GRTC Transit's Bus, be fully operational, adjustable, and include a seatbelt.
9. The Drivers Cab Enclosure shall have a full roof, physical A/B pillars offset from visual system to provide realistic operator training that requires movement in the seat to resolve viewing blockages caused by these physical structures.

Driver Cab Console

1. The Driver Cab dashboard and side console panel shall integrate genuine OEM products, replicating the GRTC Transit Bus.
2. All vehicle controls, indicators, and related components shall accurately replicate or simulate correct behavior dependent on the training exercise and driver interaction.
3. The following bus components shall be provided with integrated functions in the Simulator System:
 - a. Full-size bus steering wheel with Tilt, telescopic and horn functionality.
 - b. Realistic horn sound logged in the reporting module and reproduced through the Simulator System audio system.
 - c. Accelerator and brake pedals
 - d. Realistic tension and feedback based on the vehicle being driven.
 - e. Adjustable driver's seat including seat belt and seat belt sensor.
 - f. Comfortably accommodate persons from 5'0" to 6'6" in height
 - g. A seat belt sensor shall provide notifications to the Instructor Operator Station if not being used during a training session by the trainee.
 - h. Speedometer in miles per hour
 - i. RPM (if applicable)
 - j. Door control
4. For operation with standard buses:
 - a. The virtual front door shall open accordingly.
 - b. All virtual doors opening shall be shown in the Simulator Software training environment.
 - c. Door interlock system to prevent vehicle from moving when a door is open.
 - d. Pressure, temperature, and status gauges
 - e. Parking brake

- f. Washer and wiper control
- 5. Response shall be simulated in the Simulator Software training environment regardless of weather conditions:
 - a. Lights
 - b. Simulator Software Environment shall illuminate based on the lighting function chosen.
 - c. Turn signals!
 - d. Transmission controls
 - e. Wheelchair ramp control
 - f. Kneeling control
 - g. Driver covert alarm
 - h. Telltale panel with indicator lights for all warnings and messages consistent with vehicle type
 - i. Fire suppression system status panel
 - j. Emergency alarm
 - k. Driver microphone

Situational Response Simulator (Optional Pricing)

1. The Simulator System shall include an integrated situational response simulator for use by trainees.
2. The Response Simulator shall provide a real-world training catalog of scenarios to load onto the simulator.
3. The Response Simulator shall be configured for operation from the Instructor Operator Station.
4. The Simulator System's "Response" driving scenarios shall be inter-connected with the Response Simulator to enable the driver to experience both Simulators during a specified

training exercise.

5. The trainee shall experience the Response Simulator from the operator's seat of the Driver Cab.
6. The trainees shall be recorded using the in-cab camera's along with capturing the trainees. commands and verbal cues for playback.
7. Playback of the audio and visual recording shall be available for viewing at the Instructor Operator Station, Standalone Viewing Station, or from a Screen Display System on the Simulator System.

Motion System & Steering

1. The Driver Cab shall be equipped with a motion platform to provide realistic motion feedback through three degrees of freedom; pitch, roll, and heave.
2. The Simulator System shall provide real-time motion feedback based on the occurrences in the Simulator Software training environment.
3. Motion feedback shall result from driving conditions such as hard braking, acceleration, contact with external objects, steering, wheel return and tire deflation.
4. The motion platform shall provide three degrees of freedom only to the Driver Cab of the Simulator System. Motion shall not occur in the visual system to best replicate a realistic driving experience.
5. The steering column shall provide force feedback to simulate driving conditions; this may include contact with external objects, steering, wheel return, and tire deflation.

Audio and Screen Display System

1. The Simulator System's Screen Display System shall be comprised of five (5) forward facing display(s) and three (3) rearview displays.
2. The Screen Display System(s) shall be composed of multiple ultra-high-definition flat-panel monitors producing a continuous wraparound visual image of at least 300-degree horizontal field of view and at least 40-degree vertical field of view from the driver's viewpoint. The field of view shall be maintained in all adjustable positions of the driver's seat.
3. The Screen Display System(s) for the left-side view, middle-rear, and right-side view shall include three (3) ultra-high-definition flat panel monitors providing a minimum 40-degree horizontal field of view and a minimum of 30-degree vertical field of view through the mirrors from the driver's seat.

4. Each ultra-high-definition, flat-panel monitor's screen size shall be at least 60 inches diagonally.
5. The combined space and bezel between adjacent images on the monitors shall be less than one (1) centimeter.
6. The Screen Display System(s) shall provide a minimum 4K resolution with a minimum 60 Hz refresh rate.
7. Graphics shown on the Screen Display System(s) shall be rendered in 4K resolution on the Screen Display System(s).
8. The Screen Display System(s) shall be installed in such a way as to provide unobstructed entry and exit into the Driver Cab.

Audio System

1. The Driver Cab shall include an integrated surround sound Audio System composed of at least four (4) speakers located near the Driver Cab.
2. Each speaker shall have at least 5 Watts of power with an associated amplifier to support the total system power output. The system shall output at least 95 dB of sound.
3. The Audio System shall provide simulated sounds of the following:
 - a. Engine, dependent on Revs Per Minute (RPM) if applicable
 - b. Rolling noise, dependent on roadway material
 - c. Pneumatic brake
 - d. Horn
 - e. Door operations
 - f. Turn signals.
 - g. Alarms
 - h. Stop request.
 - i. Collisions
 - j. Skidding, slipping.

- k. Weather conditions
 - l. Passengers speaking to each other in the vehicle.
 - m. Passenger yelling/crying/screaming.
 - n. Other traffic vehicles and pedestrians
4. The Audio System volume controls shall be accessible through the Instructor Operator Station.
 5. The Instructor Operator Station shall also include a microphone allowing for two-way communication between the Instructor Operator Station and the Driver Cab.
 6. The Audio System shall record verbal exchanges as part of the audio/video playback of the reporting module.

Camera System

1. The Driver Cab Enclosure shall include two (2) Closed Circuit Television (CCTV) cameras. Each camera shall be in a fixed position, full-color high-definition (minimum 1080p) network camera.
 - a. The locations of the cameras are to be proposed and approved by GRTC Transit.
2. The cameras shall output the recorded feed to the Instructor Operator Station and Stand-Alone Viewing Station.
3. The cameras shall also allow for recorded video and playback to be synchronized with the playback of the trainee's drive within the virtual environment.

Instructor Operator Station

1. The Simulator System shall include an Instructor Operator Station which will allow for monitoring, control, and configuration of the Simulator Systems in real time, including training

exercises, Auxiliary Driving Station, driving conditions, vehicle types, CCTV camera, reporting, database management, and user profiles.

2. The Instructor Operator Station shall include but not limited to the following components:
 - a. Wireless keyboard and mouse
 - b. Minimum two (2) 27-inch high-definition flat panel monitors
 - c. Computer programming unit (CPU) designed to exceed requirements of the Simulator System
 - d. Minimum 500 GB of free hard drive space after all software installation
 - e. Color inkjet printer capable of printing 31 to 40 PPM.
 - f. One (1) office desk and one (1) chair to accommodate the Instructor Operator Station and related peripherals.
3. The Instructor Operator Station shall allow for the following conditions to be changed dynamically in the standard virtual training world and geo-specific training environment to a random or configurable condition from the Instructor Operator Station.
 - a. Time and Weather Conditions
 - b. Traffic Conditions
 - c. Transit Vehicle Conditions
4. All training environment conditions shall be configurable from the Wireless Instructor Tablet.
5. All computer-generated vehicles and pedestrians shall operate with a high degree of artificial intelligence, simulating real-world actions and reactions to all other static and dynamic elements in the simulation including the trainee simulation vehicle and Auxiliary Driving Station vehicle, or pedestrian.
6. Time and Weather Conditions. The time in the training environment shall be configurable to include the following times of day:
 - a. Day
 - b. Night
 - c. Sunset (sun in driver's sightline)
7. The weather in the training environment shall be configurable to include the following weather types in both daytime and nighttime lighting conditions:

- a. Sunny
 - b. Overcast
 - c. Rain – adjustable from light to heavy
 - d. Snow – adjustable from light to heavy and drifting with minimal visibility.
 - e. Rain/Snow mix – adjustable from light to heavy
 - f. Fog – adjustable from light to heavy
 - g. Freezing rain – adjustable from light to heavy
 - h. Ice Pellets – adjustable from light to heavy
8. The type and level of the weather shall affect driving conditions, road conditions, visibility, and windshield buildup (as with ice and snow) accordingly.
9. The Instructor Operator Station shall provide a graphical user interface (GUI) which will include but not be limited to the following functionality.
- a. Load or Shutdown the Simulator System
 - b. Start, stop, pause, restart, and replay any position within a training exercise.
 - c. Activate or deactivate any driving conditions.
 - d. Administrative and User management
 - e. Generate performance reports based on the automated assessment from the Simulator System and manual input from the instructor.
 - f. Mark locations within a training exercise for follow up review.
 - g. Activate or configure the Auxiliary Driving Station
 - h. Record and playback training exercises
 - i. Access the CCTV camera for live viewing or recall recorded video.
10. The Instructor Operator Station shall be equipped with a portable Wireless Instructor tablet (minimum 8" screen size) and associated software and charging cables to allow for mobile operation and oversight during training sessions.

- a. The Wireless Tablet shall be able to perform at a minimum, the following capabilities:
 - i. Adjust Time of Day (daytime and dark/nighttime driving)
 - ii. Weather Effects (sunshine, cloudy, light, and heavy rain, light and heavy snow, fog dust)
 - iii. Traffic (aggressiveness, density)
 - iv. Wind (direction, magnitude)
 - v. Road Traction (traction coefficient slider)
 - vi. Start and shutdown the Simulators.
 - vii. Start, stop, and pause training exercises.
 - viii. Activate and stop recording the Operator's cab.
 - ix. Prompt review video of the ongoing or most recent training sessions
 - x. View activities in one, two, three, or all four Operator's cabs that are in use at any given time.
 - xi. Sun Glare should be automatically adjusted based on the time of day.

11. The Instructor Operator Station shall provide the ability to record, store, and report various parameters within training exercises. These parameters shall include but not be limited to the following.
 - a. Trainee Name
 - b. Trainee User ID
 - c. Instructor Name
 - d. Time and date
 - e. Start and stop time of exercise.
 - f. Trainee performance (objects hit, bus stop markers missed, etc.)
 - g. Average speed and speed limit adherence
 - h. Fuel consumption (simulated)

- i. Battery Depletion and Energy Used
 - j. Average following distance
 - k. Braking performance
 - l. Lane positioning
 - m. Instructor Comments
 - n. Hard Braking Occurrences
 - o. Hard Acceleration Occurrences
12. The reporting tool shall configure to output the above-mentioned parameters in a report format customized to [Insert Transit Agency] needs.
 13. The Simulator System shall provide for an unlimited number of customized training exercises to configure and save in the system.
 14. The Simulator System shall provide a database capable of storing a minimum of 1000 individual trainee records.

Operator Assessment Tools

1. The Simulator System shall provide a tool for assessment of a trainee's performance following a driving scenario in the Simulator System.
2. The Assessment Tool shall include a pre-loaded scenario package.
3. The Assessment Tool shall provide an energy score measurement for trainee's who drive an electric bus within the virtual training environment.
4. The Assessment Tool provides a dashboard that monitors distinctive features unique to a bus for review with the trainee following a drive.
5. The Assessment Tool shall monitor speed, acceleration, braking, vehicle lane position and turn signal use.
6. The Assessment Tool shall provide zones that categorically provide a negative, positive, need improvement assessment of the conformance to [insert Transit Agency] policies.

Auxiliary Driving Simulator Station

1. The Auxiliary Driving Simulator Station shall provide the ability to control a simulated vehicle or pedestrian in the virtual training environment which will be used to interact with the trainee.
2. The simulated vehicle or pedestrian shall have the ability to be placed anywhere in the virtual training environment or by selecting an existing vehicle or pedestrian in the environment.
3. The Auxiliary Driving Simulator Station shall be activated or deactivated by the Instructor Operator Station.
4. The Auxiliary Driving Simulator Station shall include but not be limited to:
 - a. Minimum of one (1) 27-inch high-definition flat panel monitor
 - b. Desktop-based steering wheel, turn signals, and automatic transmission control.
 - c. Brake and accelerator pedals
 - d. Joystick for pedestrian movement
5. The Auxiliary Driving Simulator Station shall be configured to include and resemble the following vehicles:
 - a. Standard 35' & forty' Gillig, Diesel and Compressed Natural Gas
 - b. Coach and Articulate Electronic and Compressed Natural Gas
 - c. Ambulance and other emergency vehicles
 - d. SUV type vehicle
 - e. Taxicab
 - f. Unmarked Sedan Car
 - g. Motorcycle
 - h. Bicycle
6. The Auxiliary Driving Simulator Station shall be configured to include and resemble the following pedestrians:
 - a. Adult Man
 - b. Adult Woman

- c. Adult Woman with Stroller
- d. Construction Worker
- e. Police Officer
- f. Fire Fighter
- g. Paramedic
- h. Person using Wheelchair/Scooter
- i. Child

Stand-Alone Viewing Station

1. The Simulator System shall include a Stand-Alone Viewing Station to allow observers to follow the actions of the trainee while using the Simulator System.
2. The Viewing Station shall consist of one (1) 70-inch ultra-high-definition flat panel monitor. The Contractor shall propose a mounting location within the Training Room or a rolling monitor stand.
3. The Viewing Station shall allow any of the following views of real time or recorded training exercises, configurable by the Instructor Operator Station:
 - a. Fixed overhead view
 - b. Driver forwards field of view
 - c. CCTV camera view
 - d. Custom view (changeable side or overhead vantage point)
 - e. Response Simulator playback

Simulated Vehicle Types

1. The Simulator System shall accurately replicate the following vehicle types and provide realistic interaction with the simulated training environment:
 - a. Gillig 35' & 40' Diesel and CNG

- b. Coach/Articulated Buses
2. The interiors of the selected vehicle types shall be replicated on any screen display system showing the interior.
 3. The simulated vehicle types shall respond to user inputs through the system and provide an accurate representation of all vehicle sub systems and components, including:
 - a. Steering
 - b. Engine performance, acceleration and deceleration are based on Diesel propulsion.
 - c. Suspension
 - d. Turning radius
 - e. Vehicle weight
 - f. Braking performance
 - g. Tire adhesion
 - h. Transmission performance and control
 - i. Aerodynamic properties
 - j. Electrical systems including lights and turn signals.
 - k. Diesel exhaust fluid system lockout/warning
 - l. Bicycle Racks

Customized GRTC's Training Environment

1. The Contractor will provide (1) custom scenario that replicates the APTA bus roadeo cone course.
2. The Contractor will provide (3) custom scenarios that replicates the following cone courses: straight line backing, offset backing to the right, and 90-degree alley dock. The Contractor shall visit all areas that are identified to assist in developing the environment. Where areas are still under construction or pre-construction, the Contractor shall coordinate with GRTC Transit and/or any other required agencies in obtaining any available construction drawings, engineering drawings, architecture drawings, urban design drawings and illustrations to create those areas. The Contractor shall coordinate with GRTC Transit and /or any other agenc0079 to get an update on the status of construction for all roadways, stations, and stops if it is crucial to the design of the virtual environment.
3. The Contractor shall include all virtual content in one loadable training environment map.

Training Environments

1. The three training environments shall be:
 - a. Downtown/urban type
 - b. Suburban/rural type
 - c. Safety/practice
2. The downtown/urban training environment shall provide an accurate representation of driving conditions in a built-up urban area. The Urban training environment shall include the following simulated components and characteristics:
 - a. Heavy vehicle and pedestrian traffic conditions
 - b. Frequent controlled intersections
 - c. Frequent bus stops
 - d. High concentration of buildings
 - e. Construction zones with lane reductions
 - f. Cyclists
 - g. Multi-lane roads with side curbs and center medians
 - h. Parked cars on both sides
 - i. Intersections include 3 way & 4 way, various lane configurations.
 - j. Expressway overpass style on/off ramps and bridges
 - k. Rail level crossings
 - l. Two lane roundabouts
3. The suburban/rural training environment shall provide an accurate representation of driving conditions in a suburban area.
 - a. Medium to heavy vehicle traffic conditions
 - b. Light to medium pedestrian traffic conditions

- c. Wider intersection spacing
- d. Less frequent bus stops
- e. Lower density buildings
- f. Industrial parks
- g. School Zones
- h. Parks
- i. Residential neighborhoods
- j. Shopping malls
- k. Controlled and uncontrolled intersections
- l. Construction zones with lane reductions
- m. Cyclists
- n. Multi-lane highways with light to heavy traffic conditions and entrance and exit ramps.
- o. Varying speed limits on highways
- p. Multi-lane roads with side curbs and center medians
- q. Parked cars on both sides
- r. Intersections include 3 way & 4 way, various lane configurations.
- s. Expressway overpass style on/off ramps and bridges
- t. Rail level crossings
- u. Winding roads
- v. Two-lane roads with side ditches

- w. Rural obstacles such as guideposts, mailboxes
 - x. Gravel road shoulders
4. The safety/practice training environment shall be composed of, at a minimum, an open-paved area allowing for a configurable pylon, cones, and poles layout to practice vehicle maneuverability skills, this includes:
- a. Serpentine formation
 - b. Offset
 - c. Diminishing clearance

Traffic Conditions

1. The Simulator System training environment shall allow the ability to dynamically adjust traffic conditions using the Instructor Operator Station.
2. The Simulator System training environment shall allow the ability to dynamically adjust traffic behavior from “normal” to “aggressive” and vice versa. This should affect how vehicles and pedestrians obey traffic signals, pedestrian signals, speed limits, acceleration/deceleration, jaywalking tendencies, and lane changes accordingly.
3. Pedestrians shall behave in an autonomous fashion and react to the trainee and / or instructor vehicles in a realistic manner which includes:
 - a. Walking along sidewalks and crossing streets.
 - b. Populate transit stops.
 - c. Flag transit vehicles stop from inside the vehicle and outside the vehicle.
 - d. Boarding and alighting vehicles
 - e. Run to catch a bus.
4. The Instructor Operator Station shall have the ability to trigger a passenger request to board the vehicle.
5. Non-transit vehicles shall not be able to drive on any dedicated bus laneways except for user-controlled Auxiliary vehicles.
6. The Simulator System shall provide the ability to control the movements of a single Auxiliary vehicle or pedestrian within the training environment.

Transit Vehicle Conditions

1. The Simulator System shall provide the ability to dynamically initiate vehicle malfunctions and react accordingly. Malfunctions shall include but not be limited to the following:
 - a. Tire Failure
 - b. Tire Blowout
 - c. Brake Failure
 - d. Engine Overheat
 - e. Oil Pressure Drop
 - f. Check Engine Light
 - g. Fuel Leak
 - h. Fires
 - i. Loose Lug Nuts
 - j. Loss of Engine Power
 - k. Emergency Interlock
 - l. Coolant Leak
 - m. Low Alternator
 - n. Hot Transmission
 - o. Engine Stall
 - p. Traffic Events (Lane Cross, Stale Green, AV Stop)
 - q. Clear Vehicle Damage
 - r. Passenger Stop Request
2. All malfunctions shall be displayed correspondingly in the Simulator System Driver Cab console and screens, as applicable.

3. The Simulator System shall provide the ability to place trainee vehicles “in-service” or “out of service” which will require trainees to pick up and drop off passengers accordingly at bus stops and terminals.
4. All malfunctions listed shall be available for use from the Wireless Instructor Tablet.

Training Exercises and Scenarios

1. The base Simulator System shall include a minimum of 70 pre-loaded training scenarios. Training scenarios shall be configured with appropriate constraints, objectives, and limits to allow for proper analysis and results. The Contractor shall assume each script lasts up to two minutes.
2. [optional custom scenario building, in addition to the 70 pre-loaded.] The Contractor shall provide [Insert quantity of custom scenarios e.g., qty. of 7-10 max] for use within the virtual training environment. These shall be created in concert with GRTC Transit’s training staff. The scope of services shall include the development of the following scenarios:
 - a. Up to “[1-2]” scenarios for various merging/turning/reversing scenarios.
 - b. Up to “[1-2]” scenarios which focus on utilizing the side-view mirrors.
 - c. Up to “[1-2]” scenarios for various bus stop pick-ups
 - d. Up to “[1-2]” scenarios for defensive driving tactics
 - e. Up to “[1-2]” scenarios for corrective action
 - f. Up to “[1-2]” scenarios for transit bicycle racks
3. Training exercises shall include the option of inserting the following objects into the environment and scripting their behavior based on triggers such as trainee vehicle location or speed:
 - a. Pedestrians
 - b. Cyclists
 - c. Cars
 - d. Animals (deer, dogs, cats)
 - e. Emergency vehicles
4. During a training exercise, the Simulator System shall allow the instructor to start, pause, reset,

or move the vehicle to a specified location on the route.

5. During a training exercise, the Simulator System shall provide the option to allow the instructor to ignore any driver faults.
6. The instructor shall have the ability to override any actions to prematurely end, restart or continue a training exercise.
7. The instructor shall have the ability to reset a training exercise to an intermediate point in the exercise.

Scenario Building Training Tool

1. The Simulator System shall include a user-friendly software program to allow the instructor to develop customized training exercises or modify existing. This tool shall include, but not limited to, the ability to add obstacles, follow a defined route, and set constraints.
2. The Simulator System shall allow for an unlimited number of training exercises to be developed and saved.
3. The Contractor shall provide screenshots detailing the user interface for review by GRTC Transit.

Training

1. The Contractor shall be responsible for training Agency-designated personnel according to the requirements specified herein. Operations and Maintenance Training shall be for GRTC Transit lead instructors and not to exceed 10 personnel.
 - a. The Contractor shall provide scenario editing training to GRTC Transit lead instructors and not to exceed 3 personnel.
2. The Contractor shall outline the cost of stand-alone refresher trainings that cover Operations and Maintenance, Scenario Editing or an outline provided by GRTC Transit. The training shall take place over the course of 3 days.
3. Training shall take place at Agency-designated facilities.
4. Instruction shall cover equipment familiarization and systems operation. The minimum training is that which is necessary to bring those employees designated to the level of proficiency required for performing their respective duties.
5. The Contractor shall provide experienced and qualified instructors to conduct all training sessions. The Contractor is responsible for ensuring that the instructors teaching these courses

are not only familiar with technical information but are able to utilize proper methods of instruction, training aids, audio visuals and other materials to provide for effective training.

6. The Contractor shall provide Instructional materials consisting of applicable equipment operation and maintenance manuals.
 - a. All training materials are to become the property of the Agency at the conclusion of training.
7. The Contractor shall provide additional training sessions at the contract price per session.
8. The following summarizes the minimum training that shall be provided. The contractor shall propose a training program that outlines the topics covered for each item listed below. Training for both items can take place consecutively:
 - a. Operation and Maintenance Training
 - b. Scenario Building/Editing Training

Testing

1. The Contractor shall submit a Test Plan that outlines the criteria for test initiation, procedure for dealing with test failures and retests, and the test schedule.
2. The Contractor shall submit test descriptions, procedures and expected results for the following tests at least four (4) weeks prior to the testing date:
 - a. Factory Acceptance Test (FAT)
 - b. Final System Acceptance

Factory Acceptance Testing (FAT)

1. Factory Acceptance Testing shall be performed to ensure that the supplied and developed components meet all functional and environmental requirements and specifications.
2. Factory Acceptance Tests shall be performed prior to onsite installation.
3. Factory Acceptance Testing (FAT) shall be completed on the software to confirm that the required functionality can be delivered by the software before it leaves the factory environment. For commercial off-the-shelf products, the FAT may be replaced by stamped quality testing documents.
4. The FAT on the software shall confirm, in a controlled environment, that the required functions are delivered. Each requirement listed in the specification shall be evaluated where possible; if it cannot be evaluated for compliance it shall be proven by corresponding written documentation or certificates.

Final System Acceptance

1. After installation, the Contractor shall perform a final system acceptance test with Agency.

General Documentation Requirements

1. The manuals shall be complete, accurate, and contain only information that pertains to the system installed.
2. All pages of the documentation shall carry a title, version number and issue date. The Contractor shall be responsible for fully coordinating and cross-referencing all interfaces and areas associated with interconnecting equipment and systems.
3. Documentation shall require re-issues if any change or modification is made to the equipment proposed to be supplied. The Contractor may re-issue individual sheets or portions of the documentation that are affected by the change or modification. Each re-issue or revision shall carry the same title as the original, with a change in version number and issue date.

Training Manuals

1. Training manuals shall be provided for each training participant.
2. The manuals shall provide information on all the topics covered during each of the training sessions and include exercises and screen captures.
3. The Training Manual shall include space for the users to take notes during the training sessions.
4. The Training Manuals shall be provided at the initiation of each training session.

Operation and Maintenance Documentation

1. The Operation and Maintenance documentation will be comprised of the Operation and Maintenance (O&M) manuals.
2. The O&M documentation shall be submitted to GRTC Transit or its representative prior to FAT testing. The Contractor shall deliver fifteen (15) complete sets of O&M manuals.
3. The O&M manuals shall be a detailed presentation and shall include illustrations where applicable. For each unit, it shall include, but shall not be limited to:
 - a. General description
 - b. Functional descriptions
 - c. Operating instructions
 - d. Maintenance and repair procedures
 - e. Test procedures

Warranty and Support

1. The Contractor shall be the warrantor of all system components, notwithstanding any manufacturer's warranties whether written or implied.
2. The Contractor shall provide a 1-year factory warranty covering all system components from the date of Final System Acceptance. The warranty shall cover any defects, failures, or malfunctions in materials and workmanship for all system components.
3. The Contractor shall offer an extended warranty to cover a period of 3 Years from the date of

Factory Warranty expiration.

4. The Contractor shall provide all labor, parts, transportation, expenses, testing equipment, software, and incidentals necessary to provide warranty and support for all elements of the system.
5. The warranty shall include the following support services, to be provided by the Contractor:
 - a. 8am to 5pm EST, Monday through Friday toll free telephone technical support line.
 - b. Maximum of three (3) business day on-site response time for issues that cannot be resolved or repaired over the phone.
 - c. On-site troubleshooting, removal, replacement, repair, re-configuration and testing as required to maintain the system in good operating condition.
6. The vendor will provide preventive maintenance visits on an ongoing basis for the entire duration of warranty and service agreements as required to maintain the system in good operating condition.
7. There shall be no repair cost applied to the Agency for warranted equipment, over the warranty period, unless there is reasonable evidence of damage due to misuse, negligence, improper operation or handling, or willful attack. This shall include all equipment, software, and services performed by the Contractor or any of their sub- contractors.
8. Proponents shall include a list of support services or items not covered under warranty.

Evaluation Criteria

1. EVALUATION CRITERIA AND BASIS FOR AWARD: BEST VALUE
2. Proposals will be evaluated based upon application of the following Evaluation Criteria:
 - a. Responsiveness to GRTC Transit Functional Requirements; (1)
 - b. Quality of Equipment; (2)
 - c. Geo-specific database project plan (3)
 - d. Total Price (4)
 - e. Warranty, Service support and Maintenance Objective; (5)
 - f. Vendor Qualification, Past Performance, Staff and Company Experience; (6)

Past Performance & Qualifications

1. **REQUIRED QUALIFICATIONS:** The following qualifications are the minimum required qualifications that a Proposer must have for a Proposal to be considered:
 - a. The Proposer has five (5) years of experience in providing bus driving simulators.
 - b. The Proposer has five (5) years of experience in the delivery, set-up and maintenance of bus driving simulators, and maintenance of the associated software.
 - c. The Proposer has successfully implemented the proposed bus driving simulators for at least five (5) clients, all of which are public transit agencies.

Final System Acceptance

2. After installation, the Contractor shall perform a final system acceptance test with Agency.

General Documentation Requirements

4. The manuals shall be complete, accurate, and contain only information that pertains to the system installed.
5. All pages of the documentation shall carry a title, version number and issue date. The Contractor shall be responsible for fully coordinating and cross-referencing all interfaces and areas associated with interconnecting equipment and systems.
6. Documentation shall require re-issues if any change or modification is made to the equipment proposed to be supplied. The Contractor may re-issue individual sheets or portions of the documentation that are affected by the change or modification. Each re-issue or revision shall carry the same title as the original, with a change in version number and issue date.

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Operation and Maintenance Documentation

4. The Operation and Maintenance documentation will be comprised of the Operation and Maintenance (O&M) manuals.
5. The O&M documentation shall be submitted to GRTC Transit or its representative prior to FAT testing. The Contractor shall deliver fifteen (15) complete sets of O&M manuals.
6. The O&M manuals shall be a detailed presentation and shall include illustrations where applicable. For each unit, it shall include, but shall not be limited to:
 - a. General description
 - b. Functional descriptions
 - c. Operating instructions
 - d. Maintenance and repair procedures
 - e. Test procedures

Warranty and Support

9. The Contractor shall be the warrantor of all system components, notwithstanding any manufacturer's warranties whether written or implied.
10. The Contractor shall provide a 1-year factory warranty covering all system components from the date of Final System Acceptance. The warranty shall cover any defects, failures, or malfunctions in materials and workmanship for all system components.
11. The Contractor shall offer an extended warranty to cover a period of 3 Years from the date of Factory Warranty expiration.
12. The Contractor shall provide all labor, parts, transportation, expenses, testing equipment, software, and incidentals necessary

to provide warranty and support for all elements of the system.

13. The warranty shall include the following support services, to be provided by the Contractor:
 - a. 8am to 5pm EST, Monday through Friday toll free telephone technical support line.
 - b. Maximum of three (3) business day on-site response time for issues that cannot be resolved.
or repaired over the phone.
 - c. On-site troubleshooting, removal, replacement, repair, re-configuration and testing as required to maintain the system in good operating condition.
14. The vendor will provide preventive maintenance visits on an ongoing basis for the entire duration of warranty and service agreements as required to maintain the system in good operating condition.
15. There shall be no repair cost applied to the Agency for warranted equipment, over the warranty period, unless there is reasonable evidence of damage due to misuse, negligence, improper operation or handling, or willful attack. This shall include all equipment, software, and services performed by the Contractor or any of their sub- contractors.
16. Proponents shall include a list of support services or items not covered under warranty.

Evaluation Criteria

3. EVALUATION CRITERIA AND BASIS FOR AWARD: BEST VALUE
4. Proposals will be evaluated based upon application of the following Evaluation Criteria:
 - a. Responsiveness to GRTC Transit Functional Requirements; (1)
 - b. Quality of Equipment; (2)
 - c. Geo-specific database project plan (3)
 - d. Total Price (4)
 - e. Warranty, Service support and Maintenance Objective; (5)
 - f. Vendor Qualification, Past Performance, Staff and Company Experience; (6)

Past Performance & Qualifications

2. REQUIRED QUALIFICATIONS: The following qualifications are the minimum required qualifications that a Proposer must have for a Proposal to be considered:
 - a. The Proposer has five (5) years of experience in providing bus driving simulators.
 - b. The Proposer has five (5) years of experience in the delivery, set-up and maintenance of bus driving simulators, and maintenance of the associated software.
 - c. The Proposer has successfully implemented the proposed bus driving simulators for at least five (5) clients, all of which are public transit agencies.

