Washington Metropolitan Area Transit Authority
600 5th Street, NW
Washington, DC 20001

SPECIFICATIONS PACKAGE

Heavy Duty Scissor Lift Truck w/Rail Capabilities

REV.	DATE	REVISION DETAILS	RELEASE NO.	INIT.
0	4/21/2015	Draft	RLN-000	CB
1	10/16/15	Preliminary Specification	RLN-001	JF
2	11/12/2015	Preliminary Final Specification	RLN-002	JF
3	11/17/2015	Preliminary Final Specification	RLN-003	JF
4	11/17/2015	Preliminary Final Specification	RLN-004	JF
5	12/3/2015	Final Specification	RLN-005	JF

EDITED BY: _____ **DATE:** 12/3/15
WMATA Joseph Fowler Acting Assistant Director

APPROVED BY: _____ **DATE:** 12/3/15
WMATA Lisa Woodruff– Acting Director

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
Supply and Service Contract

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1.0 **General:** This package includes specifications for the design, manufacture, delivery, testing and commissioning of vehicle(s), including any or all exercised option quantities. The vehicle(s) shall comply and conform to all applicable Federal, State and Local environmental, safety, and health regulations in force at the time of delivery.

1.1 **Scope:** This Technical Specification (TS) defines the technical requirements set forth by **WMATA's** Track Access and Support Services (TASS) Department for the procurement of the Heavy Duty Scissor Lift Truck w/ Rail Capability.

1.2 **Description:** This vehicle specification describes a Heavy Duty Scissor Lift Truck w/ Rail Capability. Under normal conditions this vehicle will be used by **WMATA's** Track Access and Support Services (TASS) department in the Washington Metropolitan Area. The vehicle(s) is intended to assist in operations of the **WMATA** System. It is expected that the vehicle(s) shall be able to maneuver within all **WMATA** facilities throughout the Washington DC, Maryland and Virginia regions at a minimum, as well as on roads, highways and train rails between the **WMATA** properties. The technical requirements in this Specification document are expressed primarily in terms of performance and function, with technical features specified only when necessary. The vehicle shall meet all the applicable DOT requirements for similar road vehicles.

1.3 **Requirements:**

1.3.1 All craftsmanship shall be of the highest degree and will be subject to periodic inspection during fabrication and assembly.

1.3.2 Chassis and equipment must be equipped with all-standard items and features, unless upgraded or deleted by this specification.

1.3.3 Upon submission of bid, vendors shall supply technical data and manufacturer's literature containing the specifications for all specialized equipment and options added or proposed for this vehicle.

1.3.4 Vehicle must comply with 50 State emission standards with the exception for idle shut-down requirement.

1.3.5 Vehicle cargo capacity may not be less than specification. Weight analysis must be performed and must show the weight of all components and distribution between front and rear axles.

1.3.6 Each completed vehicle type must be furnished with a certified weight certificate showing the following:

1.3.6.1 Actual weight on front axle.

1.3.6.2 Actual weight on rear axle.

1.3.6.3 Total weight of completed vehicle.

1.3.7 The vendor is to supply a layout-drawing (to scale) showing the component placement on the completed vehicle. Drawing must also show approach angle, break-over angle and departure angle as described in **Item 17.4** Obstruction Clearances. Drawing is to be submitted to the COTR prior to the start of the fabrication process.

1.3.8 Vehicle and Hi-Rail gear must meet **WMATA** Standard Clearance Diagrams. **Ref. 22.0**

1.3.9 Warranty to be completed and supplied at time of delivery. Warranty on vehicle and components will start at time of in-service.

1.3.10 The vehicle(s) shall be put into service by a factory trained representative. The Contractor shall have after sales service support with available factory trained service technicians to assist in start-up and training.

1.3.11 The Contractor shall provide a list of optional equipment that is not identified within this Specification but which the Contractor feels would be beneficial for **WMATA** to have in order to operate or maintain the vehicle(s). The unit price for each piece of optional equipment shall be provided along with the Contractor's bid proposal. If the functional or technical requirements specified in this document cannot be met, the Contractor shall identify this and may propose alternatives which are equivalent or better, for **WMATA's** consideration.

1.3.12 All fluids, with the exception of fuel, shall be checked and topped off if necessary, prior to delivery. Supply four (4) complete sets of tested keys for each vehicle.

1.3.13 The vehicle Manufactures Certificate of Origin to be reassigned at delivery to **WMATA's** Service Vehicle Shop as listed below:

WMATA
3500 Pennsy Dr.
Hyattsville, Md. 20785

1.4 Evaluation Criteria:

1.4.1 Equipment Capability: Proposals must discuss in detail equipment being proposed, Heavy Duty Scissor Lift Truck w/Rail Capability. Vehicle(s) proposed must comply with specifications and requirements included in the Technical Specifications.

1.4.2 Firms Experience: Contractor must demonstrate at least (2) contracts of similar nature within the last 10 years. Overview of the Contractor's abilities and their commitment to the services set forth in this RFP.

1.4.3 Training: The successful Contractor must include a proposed training plan that meets requirements specified in this Technical Specification. An overview of the planned curriculum will be provided for the operation of the vehicle. The Contractor must provide qualifications of the training instructor; a minimum of 5 years of experience on the specified equipment is required.

1.4.4 Delivery Schedule: Successful proposal shall provide lead time for the fully specified vehicle(s). The lead time must include the manufacture time, delivery time, and optional equipment installation time. Delivery and acceptance for all Items must be completed by June 30, 2016, or earlier unless stated otherwise by authorized **WMATA** employee.

2.0 Chassis:

2.1 Wheelbase: To be determined by manufacturer to meet the vehicle and equipment requirements in this spec.
2.2 Cab to Axle: Approx. 84"
2.3 Frame shall be 120 PSI with C-channel inner frame reinforced.
2.4 Fuel Tanks: 50 gal.
2.5 GVW: 42,000 lb. minimum
2.6 Front Axle rating: 16,000 lb.
2.7 Rear Axle rating: 26,000 lb.
2.8 Rear Axle Ratio: Manufacturer to determine appropriate gear ratio for vehicle as specified.
2.9 Front Springs: 16,000 lbs.
2.10 Rear Springs: 30, 000 lbs.
2.11 Power Steering

3.0 Engine:

3.1 Type: Diesel
3.2 Net Horsepower: 300 hp @ 2,000 rpm
3.3 Oil Filter: Std. spin-on
3.4 Air Filter: Std. dry element
3.5 Cooling System: Heavy Duty
3.6 Engine Block Heater shall be 1000 watt with a 115 volts AC cord and plug mounted under driver's door.
3.7 Must include an auxiliary winter/cold weather starting aid (e.g., pre-heater, etc.)
3.8 Exhaust system shall be a single vertical exhaust and tail pipe that meets the most recent emission standards with dash mounted warning & derate device as well as an in dash manual regeneration device. Exhaust from the manifold back to the tailpipe should be made of stainless steel material.
3.9 Vehicle must be equipped with Fuel/ water separator.

4.0 Driveline:

4.1 Transmission: Allison Model MD 3500 RDS 5 speed or WMATA approved equal automatic w/ PTO (power take off) provisions (PTO mounting on LH side).
4.2 External auxiliary transmission oil cooler.
4.3 Warranty shall be as specified in **Item 19.0**
4.4 Lubricant shall be Transynd synthetic, or OEM recommended.
4.5 PTO: **Ref. 13.2**
4.6 PTO must include dash mounted indicator light and operating placards.
4.7 Reversing Transmission: Eaton Model AT1202RT or WMATA approved equal shall be capable of traveling at a minimum of 15 MPH in reverse without over-revving the engine. Transmission must only operate in reverse mode and with rail gear lowered. Speedometer must read the actual vehicle travel speed.
4.8 Control: The shifter shall be an Electro-Glide or WMATA approved equal. Install aircraft type protected toggle switch on cab dash, with direction indicator light. Light shall be incorporated on TST/Rail Tek control panel.
4.9 Placard: An operating instruction placard must be located near control indicating forward and reverse modes.
4.10 Reversing Transmission shall handle a minimum input torque of 17,000 ft. /lbs.

4.11 An operating instruction placard must be located near control indicating forward and reverse modes.

5.0 Electrical:

5.1 System: 12 volts DC negative ground.
5.2 Batteries: (3) with 2850 CCA, with a lockable hinged cover.
5.3 Alternator: 160 amp. Minimum.
5.4 Shall have engine protection derate system and alarm.
5.5 Electronic Backup Alarm: Preco 1040 (or equal) adjustable from 87 to 112 DB, with automatic adjustments to ambient noise level.
5.6 Rear Detection System (Proximity Sensor): Preco model PV-2060 (or equal) shall include a cab display and an audible alarm.
5.7 Battery Cutoff – An InPower/RailTek Model RT-LVD-20-Automatic battery cutoff shall be installed in the main electrical system, to cutoff the battery from the main electrical system, if system voltage falls below a pre-set rating; so that vehicle still maintains starting power.

6.0 Brakes:

6.1 Type: Air, ABS; Rail gear operation must not set off ABS fault codes.
6.2 Front: 16.5 x 6"
6.3 Rear: 16.5 x 7"
6.4 Parking Brakes: Spring type maxi.
6.5 Air Dryer: Heated; must include moisture ejectors on all tanks.
6.6 Front and Rear automatic slack adjusters.
6.7 Emergency Brake Connection: The pneumatic portion of the brake system shall be equipped with front and rear model FM 3103- 3" MPT male quick disconnects. This shall allow charging and full operation of the brake system using an air supply from a compatible external source. Both quick disconnects shall be easily accessible and marked clearly. The failure of the engine, onboard electric, hydraulic systems, shall have no effect on the brake system in the emergency mode.
6.8 Safety: The override and bypass components in the brake system shall be protected to prevent accidental or inadvertent venting of the charged brake system.

7.0 Wheels and Tires:

7.1 Rims:
Front: 22.5 x 9.0" 10H steel disc one-piece
Rear: 22.5 x 13.0@ 10H steel disc one-piece

7.2 Tires:
Front: 315/80R22.5 18 ply radial steel tire
Rear: 445/65R22.5 20 ply radial steel tire

NOTE: Consult tire mfg. for the proper rating, as tires must match the front axle capacity. Super singles must not be used on front tires due to system clearances.

7.3 Tread: 2 highway, 2 mud & snow.

NOTE: Tires shall be of like manufacturer.

8.0 Cab:

8.1 Instrumentation: Fuel, Speedometer, Tachometer, Oil pressure gauge, Engine temperature gauge with warning lights and buzzer, Transmission temperature gauge, Air pressure gauge, Voltmeter, Engine hour meter and PTO hour meter. (Lights are not acceptable)

NOTE: Truck hour meter to function only when engine is running.

8.2 Windshield wiper 2-speed w/intermittent control and washer.
8.3 Heater/ Defroster/Air Conditioner - High output
8.4 Mirrors shall be R&L stainless steel extended West Coast with 7" x 16" mirror heads, for 102" wide application; heated with thermostatic control. Street side shall be a model 356H-12RT or approved equal, with breakaway feature.
  8.4.1 Convex Mirrors shall be eight-inch diameter offset mount, bolt on type, model 904H-4RT shall be installed on street side and curbside mirrors; both curbside and street side must be heated.
8.5 Horn: Std. electric plus air
8.6 Bumper: Std. for rail gear
8.7 Seat: Drivers and Passenger to have air ride, (National Cush-N-Air) or equal. Both to be vinyl covered.
8.8 Paint: **Ref. 15.0**
8.9 Four (4) grab handles (or two (2) full length handles); two (2) curbside and two (2) Curbside located for best road and rail cab access; must be 3-point access.
8.10 One piece tilt hood and fender assembly.
8.11 AM/ FM Radio
8.12 Mobile Radio: Vehicle will be equipped with the following radio
  8.12.1 Astro Digital Spectra Mobile Series (T99DX)
  8.12.2 Mobile Astro Spectra W5 482-512 MHZ 20-40 Watts 128 Channel (120w)
  8.12.3 ENH: Software Astro Digital Common Air Interface Operations (G806)
  8.12.4 ENH: Software Smartnet System (G50)
  8.12.5 ENH: Digital ID Display (G114)
  8.12.6 ALT: Remote Mount W4, W5, or W7 with 17 Foot Cable (W496)
  8.12.7 Antenna with cables
  8.12.8 Programming: Talkgroup, templet, etc.
  8.12.9 Antenna: Shall be compatible with Astro Digital Spectra Mobile Series Radio listed in section 8.12.1
8.13 Contractor shall supply one Handheld Portable Radio as listed below:
  8.13.1 XTS3000 Portable (H09SDH9PW7BN)
  8.13.2 Carry Strap (NTN5243A)
  8.13.3 Case/Belt Loop/T-Strap (NTN8385B)
  8.13.4 Speaker Microphone (NMN6193)
  8.13.5 Battery (NTN8923A)
  8.13.6 Antenna
  8.13.7 Detachable Belt Clip

8.13.8 Programming: Talk group template, etc.
8.13.9 Single and Multi-Unit Charger (NTN1168 & NTN1177)
8.13.10 Installation - The mobile radio shall be securely mounted within the cab and protected from the weather in a container capable of radio associated accessories.
8.13.11 The radio shall be positioned for easy operator accessibility, while seated in the vehicle. The radio shall be tied into the Rail Tek control panel and shall include the proper circuit protection.

9.0 Aerial Scissor Lift

9.1 Platform
- 9.1.1 Platform Dimensions:
  - 9.1.1.1 Work Platform shall measure 20' L x 96" W
  - 9.1.1.2 Platform shall include two-(2) 36" power side extensions, for a total of 14' W.
  - 9.1.1.3 Platform height shall be a minimum of 19' fully extended and 60" in the stowed position.
  - 9.1.1.4 Working height shall be a minimum of 24'
  - 9.1.1.5 Platform width shall be a minimum of 96"
  - 9.1.1.6 Platform handrails shall be 42" H.
    - 9.1.1.6.1 Handrails shall include slats at approx. 21", mid point.
  - 9.1.1.7 Platform deck shall be sprayed with Linex, Rhino-Liner or approved equal; to create a non-slip surface.
  - 9.1.1.8 Recessed Tie Downs – install ten-(10) recessed swivel type "D" rings in platform floor; five-(5) each side of platform, just outside of longsills. Start at 24" from front of body and space evenly from front to rear of platform.
- 9.1.2 Platform lift capacity shall be a minimum of 10,000 lbs.
- 9.1.3 Platform shall include four (4) safety harness rings, two (2) center curbside and two (2) center curbside.
- 9.1.4 Platform handrails shall be removable and extendable.
- 9.1.5 Maximum platform height shall be controlled by limit switch(es).
- 9.1.6 Platform must include a lowering alarm and both side platform extension/retraction alarm.

9.2 Hoist shall be above frame design.
- 9.2.1 Two (2) 3-stage cylinders shall elevate the platform.
- 9.2.2 Upper and lower frames shall be fabricated with all structural steel channel.
- 9.2.3 Scissor arms shall be fabricated with heavy wall rectangular steel tubing.
- 9.2.4 All pivot pins shall be cold rolled steel in steel pin bushings; all pivot pins shall include accessible grease fittings.
- 9.2.5 Scissor rollers shall be steel in bronze bushings.

9.3 Hydraulic System:
- 9.3.1 Hydraulic pump shall be gear type; 18GPM @ 1,200 RPM.

9.3.2 Hydraulic reservoir: **Ref: 13.4**

9.3.3 Hydraulic system must also include an emergency hand pump in case main hydraulic system and 12VDC back up pump are not operational.

9.4 Controls:

9.4.1 Upper Platform Controls shall be pedestal mounted and shall include lift platform enable, up, down, emergency stop, engine remote; this control console must also incorporate the Platform Side Extension Controls and shall include the side extension platform enable, side platform extension and retraction.

9.4.2 Lower Platform Controls shall be installed at the front street side access steps; shall include lift platform enable, up, down, emergency stop engine remote.

9.4.3 Controls shall be fully proportional hydraulic.

9.4.4 Manual override controls shall be easily accessible at the unit base.

9.4.5 Scissor lowering speed shall be adjustable at the base controls.

9.4.6 Outrigger controls shall consist of four (4) independently operated controls; controls for the front and rear curbside outriggers shall be accessible from the front curbside and the controls for the front and rear street side outriggers shall be accessible from the front street side.

9.5 Outriggers: Four (4) independently operated articulated type; curbside shall include one (1) front mount and one (1) rear mount and street side shall include one (1) front mount and one (1) rear mount.

9.6 Platform Access: Shall include one (1) front curbside mounted access steps and one (1) front street side mounted access steps. Both access steps shall include full length access handles.

9.7 Emergency back-up power: **Ref: 13.7**

9.8 Testing of aerial scissor platform must meet or exceed most recent ANSI standards for stability both on and off rail.

9.9 A safety interlock shall installed in the control system to prevent vehicle movements when aerial lift is out of stow or the outriggers are deployed.

9.10 Portable Work Lights: **Ref: 14.13**

9.11 Manuals: **Ref. 16.0**

10.0 **Railgear:** Railgear shall be convention front and rear arrangement that shall meet vehicles GVW. The front and rear Rail Gear will be raised and lowered with manual hydraulic valve controls.

10.1 Rail Gear Capacity:

10.1.1 Front Capacity shall be minimum 40,000 lbs.; behind cab mount. Front Rail Gear will have a center pivot with cushioned pivot to dampen free movement. Rail Wheels to be forged steel and to comply with AAR M-107 Class B standards.

10.1.2 Rear Capacity shall be minimum 50,000 lbs.; Installed conventionally. Rear railgear shall include a hydraulic suspension for the ability to handle irregularities in the track, so the rail wheels will maintain a constant load in order to maximize traction and for the best possible

braking. Rail Wheels shall be forged steel and to comply with AAR M-107 Class B standards.

10.2 Brakes Shall be front and rear disc type; this type of system must be utilized, due to rail lubricators. Shall include all necessary valves; include parking brake.

NOTE: **Must conform with the FRA 49CFR, Part 214, Section 214.525 regulations (or the most recent FRA regulation) for safe braking capabilities.**

10.3 Steering Wheel Lock – Supply a mechanical system for locking steering wheel to prevent front tires from turning into rail wheels when on rail. **Velcro is unacceptable.**

10.4 Front Axle Lock (If Required) Must be automatic type that engage when the front railgear is lowered and disengages when the Rail Gear is fully stowed.

10.5 Railgear Mounting must be positioned to allow a long wheelbase vehicle to negotiate a 22°/262 ft. track radius with up to a 2 % grade without derailing or loosing traction on standard 56 ½ inch gauge track.

4.5.1 Front Railgear Arrangement shall be conventional mount if possible with pivot railgear axle. Railgear mounting must be mounted to negotiate the specified track radius.

4.5.2 Rear Railgear shall be behind the rear axle.

10.6 Safety Pins Locks shall be manually operated in the rear, for both the stowed and deployed positions; front shall be automatic/hydraulic type.

10.7 Suspension – Front Rail Gear will pivot under load and automatically return to its original position. Rear Rail Gear shall include hydraulic suspension, allowing the vehicle's rear rail wheels to maintain a constant rail to wheel load when negotiating crossings, embedded rail, raised guardrail, system inclines, etc.

10.8 Sight Rods are not required with under cab rail gear.

10.9 Hydraulic Power Supply shall be hydraulically powered through diverter valve. Rail Gear manufacturer shall specify pump.

10.10 Shunt System shall be a Brooks Enterprise model MB558112 or approved equal; install on front and rear rail units.

10.11 Railgear Lighting **Ref. 14.11**

10.12 Railroad Lighting Package shall consist of rear facing headlights (One on each side), to be mounted into rear of the Platform Body and front facing taillights/brake lights to be installed on front bumper or fenders. Front and rear lighting must switch automatically when vehicle changes direction on rail (only). System shall be activated by sensor on front curbside rail wheel and shall include a InPower RailTek model HRCM-1-SPC-205, which will automatically reverse the railroad lighting. In reverse, this system will automatically shut off the front headlights, engage the front tail lights, turn on the rear headlights and shut off the rear tail lights. Removable expanded metal access covers shall be provided to protect rear lights. **Final layout must be approved by WMATA at the pre-production meeting.**

10.13 Proximity Sensor must be installed at the front curbside rail wheel is deployed. **Ref: 9.15.5**

10.14 Jacking Pads – Install front and rear reinforced pads at front and rear railgear mounting locations for re-railing the vehicle. Chassis must include front and rear HD frame extensions for use with the re-railing equipment.

10.15 Tow Plates – Front and rear; reinforced for use during rescue. Shall also have the capabilities to pull rail and equipment carts. Must have 2 1/16" towing eyes. The tow plates shall be centered 14" ± ½" from the top of the running rail as measured with new wheels. A 2" pin and ball lock will be provided for each tow plate, and shall be secured to bumper to prevent loss.

10.16 Tow Bar – Include one-(1) adjustable tow bar for emergency rescue. Tow bar must include convenient storage brackets on the vehicle. The tow bar must be properly sized and compatible with the tow plates both on this vehicle and on the rescue vehicle.

10.17 Rear Vision System: **Ref: 14.14**

10.18 Emergency Power Unit: **Ref: 13.7**

11.0 Lift Gate: Interlift model IKL55 or approved equal.

11.1 Design shall be cantilever/rail lift type, to maximize capacity.

11.2 Capacity shall be a minimum of 5,500 lbs.

11.3 Platform shall offer 105° of tilting, with automatic leveling through the entire range of operation.

11.4 Dimensions: 69" L x 98" W

11.5 Overall stowed height must not exceed 11' - 1", due to system clearances.

11.6 Lubrication points and bushings must be supplied at all pivot points, including ground rollers.

11.7 Power Pack shall be 12VDC; shall include thermo protection. Unit shall be installed in a lockable control box.

11.8 Control: Include a hand held remote.

11.9 Bumper: 3-piece ICC impact type.

11.10 Shut-off switch shall be located in cab, at street side seat.

12.0 Welder/Generator: Fabco Hydro-Arc 6000 or approved equal.

12.1 Hydraulic Power shall be supplied by the main hydraulic system through a three position diverter.

12.2 Hydraulic Motor shall be an axial piston type with 11cc displacement.

12.2.1 Motor Shaft shall be 1" diameter

12.2.2 Flow Control shall be cartridge type; shall maintain a constant generator RPM and voltage output.

12.2.3 Rated Flow shall be 11.5 GPM

12.2.4 Rated PSI shall be 2,400

12.2.5 Motor Speed shall be 3,600 RPM – Maximum 4,200 RPM

12.2.6 Port Sizes shall be 11/16" – 12 S.A.E.

12.3 Welder: Incredible
- 12.3.1 Peak Welding AMPS shall be 240 DC
- 12.3.2 Amperage Range shall be between 40 AMPS – 240 AMPS
- 12.3.3 Strike Voltage shall be 60 – 90 VDC
- 12.3.4 Welding Voltage shall be 12 – 36 VDC
- 12.3.5 DC Welding AMPS shall be 240 peak; 140 continuous
- 12.3.6 Thermal Protection shall automatically reset.
- 12.3.7 Duty Cycle shall be 60% @ 240 AMPS, 80% @ 140 AMPS
- 12.3.8 Drive Power shall be 12 HP

12.4 Generator:
- 12.4.1 AC Frequency Output: 60 HZ
- 12.4.2 Generator RPM: 3,600
- 12.4.3 Voltage AC: 120/240VAC
- 12.4.4 Output Watts: 6 KW
- 12.4.5 Motor Starting Surge: 300% of continuous
- 12.4.6 AC AMPS @ 120V: 62% peak; 50% continuous
- 12.4.7 AC AMPS @ 240V: 31% peak; 25% continuous
- 12.4.8 Power Outlets; shall include one (1) 240 Volt single outlet; One (1) 120 Volt duplex outlet w/GFI.
- 12.4.9 Circuit Protection – Circuit breakers for all receptacles.

12.5. Control Panel: Shall include rheostats, receptacles, circuit breakers, weld meters and polarity switch.

12.6 Dimensions: 15" H x 15" W x 27" L

12.7 Cover: Unit must include a removable weather proof cover with a hinged access door for the control panel. Hinges and all hardware shall be stainless steel.

12.8 Installation: Must be located with a secure mount, on top of curbside cribbing compartment. Control panel shall face rear and must be easily accessible.

13.0 Hydraulics:

13.1 Must match Scissor Lift, Rail gear and Generator requirements.

13.2 PTO/Pump(s): Hot-shift with over speed (matched to RDS transmission) close coupled pump(s).

13.3 Hydraulic System shall be 2,000 psi; Scissor Lift: 28 gpm, Rail gear: 5-7 gpm.

13.4 Hydraulic Reservoir shall be thirty-five (35) gallon capacity, installed under curbside equipment; to include pressure and return line shut-off valves, pressure line strainer and return line filter, sight gauge, and magnetic drain plug and filler breather.

13.5 Hydraulic System circuits must include pressure protection and pressure reduction valves where necessary. All cylinders shall include counterbalance valves.

13.6 All Hoses shall be high-pressure wire braid reinforced, with minimum safety factor of 4 to 1. All hoses must be protected when routed across chassis frame, chassis cross members, equipment, or bodies with sharp or aggressive edges and openings. All hoses must be tied up and secured properly. All hoses must be covered with Kevlar sheathing. Sheathing must be secured properly to prevent bunching. Shroud all hoses that are routed close to the exhaust system.

13.7 Emergency Power Unit shall be installed in an enclosed vented compartment. Power unit shall supply hydraulic power to both the rail gear and the aerial lift platform in the event of engine failure.

13.8 Hydraulic Oil shall be AW32 or **WMATA** approved equal.

14.0 Lighting & Electrical: Must meet all recent Federal, State and FRA 49 CFR Part 214 regulations.

14.1 Chassis and Body Lighting: All lights and reflectors supplied shall meet or exceed all applicable FMVSS 108, state and local regulations. All standard chassis and line body lighting must be LED; where possible.

14.2 Brake/Taillights shall be mounted on rear body tail shelf for best visibility.

14.3 Circuit Protection: All lighting must be protected by circuit breakers.

14.4 Clearance Lights: Side body lights shall be recessed to protect from damage during loading, unloading and off road driving activities. Lighting shall not be installed below rear bumper level.

14.5 Marker Lights: Triple markers lights and clearance lights shall be recess mounted in top rear of body for best possible protection.

14.6 Chassis Lights: Rear chassis lights shall be recess mounted in rear body and shall be visible after all equipment is installed.

14.7 Strobe Lights:

14.7.1 Bulkhead Mounted: Install two (2) Whelan model 800DLAP with branch guards on bulkhead mounted brackets; one (1) installed on curbside, one (1) installed on street side. Strobes must be low body mount (cab mounts are not acceptable). Mounting must not interfere with aerial rotation. Locate for best visibility. (**WMATA** will confirm mounting location at time of installation)

14.7.2 Body Strobe System: D.O.T. 4, Whalen or approved equal. Install two (2) protected strobe lights on each side of vehicle. **WMATA shall approve location.**

14.8 Floodlights: Install two-(2) Go Light Model GL-3067 (or approved equal) floodlights on top of cab guard; mounted on offset bracket, so that they do not interfere with rotation or strobe lights; one (1) curbside, one (1) street side. Install protective shrouds or branch guards on each floodlight

14.9 Compartment Lighting: Shall be American Lighting model MPRL12C or approved equal; 12-volt, ⅜" rope lighting. Each compartment shall have lighting around inside perimeter. All curbside and street side compartments shall be on one (1) individual pilot lighted switch (included on dash mounted switch panel).

14.10 Underbody Lights: TST model 20154-1RST LED, or approved equal; four (4), Two (2) curbside and two (2) street side. Shall be enclosed in stainless steel housing with Lexan lens. All connections must be sealed automotive type. Locate for best illumination.

14.11 Rail gear Lighting: Two (2) Arrow model (or approved equal), 4" Rubber grommeted LED spotlights; one (1) mounted at front rail gear, one (1) mounted at rear rail gear. Switch (es) must be installed at master control panel.

14.12 Railroad Lighting Package: Shall consist of rear facing headlights (One on each side), to be mounted into rear of the Platform Body and front facing taillights/brake lights to be installed on front bumper or fenders. Front and rear lighting must switch automatically when vehicle changes direction on rail (only). System shall be activated by sensor on front curbside rail wheel and shall include a InPower RailTek model HRCM-1-SPC-205, which will automatically reverse the railroad lighting. In reverse, this system will automatically shut off the front headlights, engage the front tail lights, turn on the rear headlights and shut off the rear tail lights. Removable expanded metal access covers shall be provided to protect rear lights.

NOTE: Final layout must be approved by WMATA at the pre-production meeting.

14.13 Work Lights: Two (2) Whalen Kwik Raze model Alpha 2000 light fixtures; two-2) stationary mounted on the rear of platform mounted compartments and two (2) with model 800 telescopic tripod and model TM Quick Release brackets. Include 30' of HD coil cord with twist-lock plug with the removable light units. Install Four (4) single twist-lock receptacles to match plug; one (1) at each corner of platform body. WMATA will confirm installation location at pre-production meeting.

14.14 Rear Vision System: Provision model RailTek TV-10825 bumper camera (with swivel) and 7" Quad View Monitor or approved equal, mounted in a protected area in the rear channel or protected area of the body. Camera shall be dash mounted for the best possible driver's line-of-sight. Monitor must be cab dash mounted. Cable must be minimum of 35'; all cables and wiring shall be routed through conduit.

14.14.1 Collision Avoidance Two (2) zone, rear end system; Provision or approved equal. Must work with Provision rear vision system, utilizing same control cable.

14.15 Wire Loom/Harness: RailTek RT-REWL-40 pre-engineered wiring system or approved equal; shall be equipped with automotive type harness, fasteners and connectors. All holes for wire routing shall be grommeted. All connections must be soldered and sealed with shrink tube where possible. Adhesive clips or securing devices are not acceptable. All electrical wiring under body shall be shielded from exhaust system and protected from damage during off road operation.

14.16 Control System: InPower/RailTek RST-VCMS-2014 with PDS (Power Distribution System) will be the central distribution point for all auxiliary electrical device buss feeds, fuses, circuit breakers and relays.

14.16.1 PDS shall consist of the following components:

14.16.1.1 Control Box: InPower/Railtek switch panel control box mounted onto PDS base. Enclosure must be NEMA-4 rated with a clear view cover. Must have easy access for trouble shooting and diagnostics.

14.16.1.2 Interlock Relays: Must include interlock relays for ABS disable, vehicle back up alarm disable, 3 second change of direction alarm and railroad light package.

14.16.1.3 Power Connections: Central battery buss and ground stud.

14.16.1.4 Circuit Breaker Block: 10 way, for future use by **WMATA** for bussing radios and other electrical components.

14.16.1.5 Master Circuit Breaker: appropriate capacity shall protect the main PDS buss feed installed as close to the battery positive terminal as possible.

14.16.1.6 Main Ground Stud: Shall be wired directly to the chassis battery negative only. Frame grounding is not acceptable.

14.16.1.7 Installation: PDS shall be installed in a convenient location inside of the truck cab and shall be constructed with a quick release type cover to provide protection to installed components.

14.16.1.8 System Schematic: A complete auxiliary electrical system schematic shall be laminated and affixed to the inside of the PDS cover.

14.16.2 Switch Panel: InPower/RailTek RST-TTCS-10 or approved equal, illuminated switch panel shall operate all lighting and auxiliary functions. All functions must be labeled clearly, identifying each individual function. Control Panel shall be shut off with ignition switch.

14.16.3 Switch Panel Configuration:

14.16.3.1 Switch # 1 – Hot Shift PTO - Power Unit

14.16.3.2 Switch # 2 – Curbside Bulkhead Mounted Floodlights

14.16.3.3 Switch # 3 – Street side Bulkhead Mounted Floodlights

14.16.3.4 Switch # 4 – Underbody Lighting

14.16.3.5 Switch # 5 – Rear Observation System

14.16.3.6 Switch # 6 – Rail gear Lighting

14.16.3.7 Switch # 7 – Compartment Lighting

14.16.3.8 Switch # 8 – DOT 4 System

14.16.3.9 Switch # 9 – Amber Strobe Lights

14.16.3.10 Switch #10 – Spare

14.16.4 Gearbox Engage: A separate switch for gear box engage shall be mounted on RailTek control panel; shall include a spring-loaded safety cover to prevent accidental engagement of the gearbox. Rail gear Lighting Package engage to automatically reverse. Headlights and Tail Lights/Brake Lights for proper direction when gearbox is engaged. This system must meet the most recent FRA Regulation.

14.16.5 Proximity Sensor: A sensor shall be installed in the front curbside rail wheel to disable the ABS brake system (if required for the supplied brake system), disable the back-up alarm, enable the railroad lighting package and change of direction alarm when rail gear is deployed.

14.16.6 Status Indicator Legends: The Indicator Legends are off until device is enabled. Indicator Legends shall be engraved style over single stage high intensity red L.E.D.'s. Railroad Lighting Package engage to automatically

reverse Headlights and Tail Lights/Brake Lights for proper direction when gearbox is engaged. This system must meet the most recent FRA Regulation.

14.16.6.1 Indicator legend #1: ABS disabled – *Indicates that ABS is disabled when activated by curbside rail wheel proximity sensor.*

NOTE: This system must only be installed if the ABS system does not reset when rail gear is stowed.

14.16.6.2 Indicator legend #2 – Back up alarm disabled - *Indicates when activated by curbside rail wheel proximity sensor.*

14.16.6.3 Indicator legend #3 – Railroad lighting package - *Indicates when system is activated through curbside rail wheel proximity sensor.*

14.16.6.4 Indicator legend #4 – Reversing gearbox engaged - *Indicates when reversing gear box is engaged.*

14.17 Change of Direction Alarm: Three-second change of direction alarm activated by front curbside rail wheel proximity sensor. This device shall be tied into the Allison transmission and must be set to activate the three second alarm any time that the vehicle changes direction.

14.18 Battery Jumper Package: Install a quick attachment plug from chassis batteries in two locations; one (1) at front grille and one (1) at rear of platform body, between chassis frame. Include 30 Foot of heavy duty jumper cables with quick attach plug on one end and heavy duty jumper clamps on the other.

14.19 Electronic Backup Alarm: Automatically adjusts volume of alarm signal to ambient noise levels. **Alarm function must shut off when on rail.**

15.0 Paint:

15.1 Entire body will be natural aluminum; body toolboxes shall be prime painted and finish color painted both on the exterior and the interior.

15.2 Primer coat - 1.2 mil thickness

15.3 Finish coat - 1.5 to 1.8 mil thickness

15.4 Cab - Chrome yellow or National School Bus yellow, Imron or approved equal.

15.5 Scissor Lift is natural aluminum.

15.6 Rail gear and below body line - gloss black, Imron or approved equal.

15.7 Tank painting - (for quick visual fluid ID):

15.7.1 Diesel Fuel - To be painted according to Federal Standard#595 with green # 14062.

15.7.2 Hydraulic Oil - To be painted according to Federal Standard #595 with blue # 15180.

15.8 Decals - Type of fluid shall be stenciled or decaled with 1 2" letters on each tank in a conspicuous place using a contrasting color. Supply all operational and safety decals.

15.9 Conspicuity Tape shall be 3M or equal; 2@ red and white. Install on rear of body and on bumper.

15.10 Rustproofing and Undercoating - Chassis shall be Standard OEM; Body Rustproof/Undercoat underbody and all bare metal components below body line.

16.0 Manuals: All manuals must be delivered to the SVMT Body Shop with vehicle delivery. If the manuals are available on CD-ROM, one (1) of the additional copies must be provided as such.

16.1 Chassis: One (1) operator's manual per vehicle; and a total of two (2) additional sets for **WMATA's** Track Access and Support Services (TASS) Department (3) Total.

16.2 Scissor Lift: One (1) operators manual per vehicle; and a total of two (2) additional sets for **WMATA's** Track Access and Support Services (TASS) Department (3) Total.

16.3 Rail gear: One (1) operator's manual per vehicle; and a total of two (2) additional sets for **WMATA's** Track Access and Support Services (TASS) Department (3) Total.

16.4 Gearbox: One (1) operator's manual per vehicle; and a total of two (2) additional sets for **WMATA's** Track Access and Support Services (TASS) Department (3) Total.

16.5 Lift gate: One (1) operator's manual per vehicle; and a total of two (2) additional sets for **WMATA's** Track Access and Support Services (TASS) Department (3) Total.

16.6 Generator: One (1) operator's manual per vehicle; and a total of two (2) additional sets for **WMATA's** Track Access and Support Services (TASS) Department (3) Total.

17.0 Prints & Salient Characteristics:

17.1 Layout Drawings: Supply one (1) set with proposal **(Ref. Item III G, Pg2)**

17.2 As Built Drawings: Supply one (1) set at delivery

17.3 Vehicle Height: The overall height must be part of the layout print submitted with the bid package.

17.4 Obstruction Clearances: Approach Angle: Approx. 18° with Rail gear and Front Mounted Winch; 34° on all other vehicles

17.4.1 Break over Angle: Approx. 23° under 200" WB 15° over 200" WB

17.4.2 Departure Angle: Approx. 13° with Rail gear; 15° on all other vehicles

17.4.3 Ground Clearance: Minimum 12"

17.5 Diagrams: Include all electrical, hydraulic and operation schematics at time of delivery.

17.6 System Salienta Characteristics:

17.6.1 Power Source: Contact Rail Voltage is 600 – 750VDC

17.6.2 Track Gauge: 56.5 Inches

17.6.3 Minimum Radius: 250'

17.6.4 Maximum Grade: 7%

17.6.5 Maximum Super Elevation: 6 Inches

17.6.6 Maximum Retaining Rail Height: 1.5 Inches

17.6.7 Track Turnouts: #8 thru #32

17.6.8 Minimum Flange Way Gap: 1.75 Inches

17.6.9 Maximum Vehicle on Rail Height: 11'-1 ⅛"

17.6.10 Standard Clearance and Loading Package – **Ref: 22.1.1**

18.0 Weight Distribution:

18.1 Front Axle weight distribution must be submitted with bid package.

18.2 Rear Axle weight distribution must be submitted with bid package.

18.3 Total vehicle weight distribution must be submitted with bid package.

19.0 Acceptance Testing and Safety Certification

19.1 Acceptance Testing:

19.1.1 **WMATA** representatives may inspect the equipment at the manufacturing facility any time during the manufacturing period. In Addition, **WMATA** representatives shall perform onsite testing and acceptance at the manufacturing facility at key milestones of the manufacturing process and before delivery to **WMATA.**

19.1.2 Upon equipment delivery, the Contractor shall perform acceptance testing at **WMATA**. Acceptance test plans shall be submitted by the Contractor ten (10) working days prior to performing the test and approved by **WMATA**, prior to testing. As a minimum acceptance tests shall include:

- Tow Capacity Verification
- Braking Capability Verification
- Air-Compressor Capacity Verification
- Hydraulic System Performance Check
- System Clearance Checks (within the **WMATA** System)
- AC Generator Capacity Verification
- Scissor Lift Operation Verification & Load Capacity Verification
- Radio Frequency & Power Test
- Coupling Test
- Vehicle Lighting Test
- Heating & Cooling Test
- Noise Level Measurements

19.1.3 On Site **WMATA** Acceptance Start Date: 390 days after contract Award.

Acceptance Testing Location:

WMATA
3101 Eisenhower Avenue
Alexandria, VA 22314

19.1.4 A Manufacturer's Representative shall place equipment in service and instruct the Authority operators, mechanics, and supervisors at a location, to be specified by the Authority (not necessarily at the machine delivery point).

19.2 Safety Certification:

19.2.1 The Contractor shall comply with the U.S. Department of Labor's

Occupational Safety and Health Administration (OSHA) standards.

19.2.2 The Contractor shall conduct a safety program, which ensures to the greatest extent possible, that the equipment delivered to **WMATA** are operationally safe and secure for passengers, employees, emergency responders, and the general public.

20.0 Warranty: Vendor must specify for each component.

20.1 Transmission - Provide 60 months/150,000 miles extended warranty on truck transmission.

20.2 Engine: Provide Manufacturers extended warranty; 72-month/100,000 mile (0 dollar deductible) on truck engine.

20.3 Towing: 12 month OEM (0-dollar deductible)

20.4 Activation: All warranty coverage to be activated on delivery to **WMATA**; All additional equipment must include a minimum one year warranty.

21.0 Delivery: 210 days after receipt of order. **All vehicles and manuals must be delivered to the following address:**

NOTE: All vehicles must be delivered between the hours of 6:00am. and 1:30pm. with a 4 hour notice prior to delivery.

21.1 Training: When purchases of materials or equipment are made by **WMATA**, the Supplier or vendor is responsible for providing:

21.2 Training in the operation of the contracted item(s),

21.3 Training materials sufficient to support continued in-house **WMATA** training, and

21.4 Updated training and training materials when, in the scope of the contract, Changes or modifications are made that affect the operation of the item(s) Contracted for. This addendum specifies the nature of the training activities and training materials that are required from vendors.

21.5 Scope of Work: Training for the Scissor Lift with Liftgate, Rail gear, Reversing Gearbox and Generator will require a minimum of eight (8) hours for operators. The training shall cover safe operation and maintenance of the chassis, aerial platform, rail gear and gearbox.

21.5.2 Maintenance training will be tailored specifically to WMATA equipment, and be designed to develop the knowledge and skills required to maintain all item(s) delivered under the contract. Maintenance training will be subdivided into two major levels. They are: System Level Maintenance Training, covering:
a.) Theory of operation of the system and its major components.
b.) System configuration
c.) Preventative maintenance, consisting of written procedures and schedules for

the periodic maintenance of all equipment.
d.) Written and validated inspection procedures and a system level troubleshooting guide (to the lowest field replaceable unit). Shop Level Maintenance Training, covering:
Detailed theory of operation to module, board, and device level.
Component level troubleshooting and component replacement.
Testing and alignment procedures of repaired units.

21.6 All training, as described below, shall take place by the vendor prior to acceptance of equipment or materials by **WMATA**. The number of **WMATA** employees to be trained will be specified on a contract-by-contract basis. However, the minimum number shall be 10 for operation training, and 10 for Maintenance training. Those persons shall be identified by **WMATA**.

21.6.1 **Operations training** will be tailored specifically to **WMATA** equipment, and designed to teach the day to day operations of all equipment. The training will be sufficient to bring personnel to a level of operating proficiency such that routine vendor support is not needed.

21.7 **Deliverables:** The Department of Technical Training and Document Control (TTDC) requires the following non-copyrighted course materials to be delivered by the vendor, according to the following specifications:

21.7.1 Training Plan containing the data necessary to begin scheduling instruction. The plan must be submitted to **WMATA** ten days after NTP. The plan must address for approval a proposed time line that ensures that all deliverables are approved and training is presented before the equipment is placed into service.

21.7.2 A List of courses and their duration.

21.7.3 Recommended class size.

21.7.4 Student qualifications. Prerequisites. For the purpose of course development and presentation, vendors should assume all **WMATA** students are high school graduates (or equivalent).

21.7.5 Instructor qualifications. A description of instructor qualifications, a resume, curriculum vitae, or other description of instructional qualifications must be submitted to **WMATA** as part of the Training Plan. The description should document a thorough knowledge of the subject equipment, an understanding of the adult learning process, and demonstrated experience in vocational instruction.

21.8 Instructor's Guide containing all the information and direction necessary for the Instructor to make an effective presentation. It shall include adequate guidelines to conduct a comprehensive training program. Individual lessons within the course will be organized as separate blocks (or modules) which may be taught as a unit. In some instances, the same standard operating procedures could be used for train operators, transportation supervisors, and central control supervisors. The Instructor Guide should contain, at a minimum:

21.8.1 Program Overview
21.8.2 A statement of overall program goals
21.8.3 Lessons plans (a session by session outline containing the following):
- a.) Student learning objectives, stated in measurable terms
- b.) Overview of each lesson
- c.) Suggested instructional methods/learning activities
- d.) Required equipment and /or resources
- e.) Required time for each topic, lesson and course.

21.9 Evaluation device(s) (written and /or practical tests) designed to measure the extent to which student has met the learning objectives, with an answer key for each of the tests developed. Tests should use a multiple choice format, and have been validated in a pilot course or by some other means agreed to by **WMATA**. Whenever possible, a practical hands-on test shall be developed to demonstrate the transference of skills.

21.9.1 Student Manual, to include all materials for the student to interact in the learning situation. It shall contain, at a minimum:
- a.) Program overview/introduction
- b.) Statement of overall program goals.
- c.) Learning objectives, stated in measurable terms that specifically describe desired behaviors or knowledge to be gained.
- d.) Prose treatment (not outline format) fully developed content presentation, developed in the same modular format as the Instructor's Guide.
- e.) Illustrations, charts, graphics, and duplication of each visual aid used during course presentation in order to enhance content presentation and provide a course reference.
- f.) Problems/questions related to lesson content, as appropriate.
- g.) Audio-visual aids (handouts, transparencies, slides, films, and computer presentations). Visual aids are required for each circuit or wiring diagram and all activities not demonstrable in the classroom.
- h.) Supplemental materials. A functional mockup, or a functional representation, is required of any equipment which requires theoretical discussion. This may be in the form of an animated schematic, a model of the equipment, an actual device, an interactive video training device, or a **WMATA** approved substitute. All ock-ups become the property of **WMATA**.

21.10 **Number of Copies:** The vendor shall deliver final copies to **WMATA** as follows:

21.10.1 One complete set of training materials that is in a specified electronic format or camera ready copy.

21.10.2 Five copies of all student and instructor materials, to be used for archival purpose in the **WMATA** Technical Document Center (TDC).

21.10.3 A set of complete student materials for each participant enrolled in training classes.

21.11 **Delivery of Instruction**: All instruction will be presented in accordance with approved training materials as specified under deliverables.

21.11.1 All training will be coordinated through **WMATA** TRAINING. Courses

will be attended and monitored by **WMATA** TRAINING. Unsatisfactory performance may result in the suspension of the training until such time as the specified discrepancies are corrected.

21.11.2 Training shall cover safe operation of the Chassis, Aerial Platform, Rail gear and Gearbox. All Hi-Rail equipment must be demonstrated on rail.

21.11.3 All training shall be performed at the location and time specified by **WMATA** Training.

21.11.4 The Trainer must have a minimum of five (5) years of Experience on the specified equipment.

21.11.5 All Operators shall receive a ACertificate of Completion@ on the satisfactory completion of the training.

22.0 FleetWatch GP92 System:

22.1 Available from: S&A Systems Inc. Phone: 972-722-1009
www.fleetwatch.com/product-gp92.php

22.2 Component Mounting: Mounting of components as specified may not be possible due to some vehicle's specialized equipment. In those cases the contractor must first have component location(s) approved by **WMATA.**

22.3 Reader (White Box) Mounting: Heavy Duty (Large Trucks): Shall have the reader mounted on the interior side, rear window that is closest to the fueling door. If the view is obstructed from the rear by the truck bed/ body the unit shall be mounted on the interior of front windshield, fueling side as low and as close to the pillar as possible. The other option would be to mount the reader in close proximity to the doorjamb or seat on fueling side of vehicle. Mounting of equipment shall not interfere with entry or exiting of vehicle or operation of any equipment. Unit shall be easily accessible for maintenance.

22.4 Module (Black Box): Shall be securely mounted inside of vehicle in an area where it will not be damaged by normal operation. Ease of maintenance and replacement of unit also must be considered.

22.5 Antenna (Small GPS Module): Shall be mounted on the front dash or rear window deck so that there is clear (straight up) view of the sky. **WMATA's** preference is the rear deck. It shall not obstruct the operators view if is mounted on the front dash area.

22.6 System Ground: Must be attached to a dedicated chassis ground.

22.7 Battery Power (Red Wire): Must be hot at all times and shall be accessed from one of the vehicles existing fuse/ junction boxes in a manner not to compromise the integrity of the chosen circuit. The module must be protected with a dedicated fuse circuit by the use of an add-a-fuse tap (Cooper Bussman #BP/ HHH or equivalent). If the vehicle does not support this connection type, the contractor must submit an installation plan for **WMATA** to review and approve.

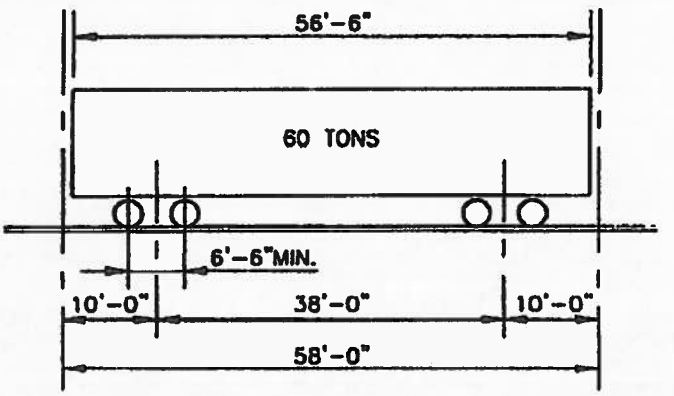
22.8 Ignition Power (White Wire): Must have battery voltage at all times when the key is on and the vehicle is in motion and be open when the key is off. It must be accessed from one of the vehicles existing fuse/ junction boxes in a manner not to compromise the integrity of the chosen circuit. The module must be protected with a dedicated fuse circuit by the use of an add-a-fuse style tap (Cooper Bussman #BP/ HHH or equivalent). If the vehicle does not support this connection type, the contractor must submit an installation plan for **WMATA** to

review and approve.

22.9 All Connections must be hard wired. No quick disconnect electrical terminals shall be used.

23.0 STANDARD CLEARANCE PACKAGE

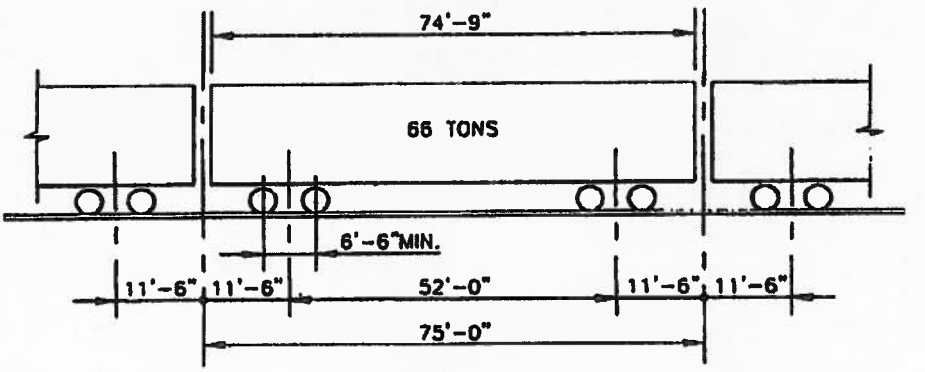
23.1. Car Design Loading



1.	DESIGN Loads	CAR	80,000 LB.
		PAYLOAD	40,000 LB.
		TOTAL CRANE CAR LOADING (LL)	120,000 LB.
2.	AXLE LOAD		30,000 LB.
3.	IMPACT		AS SPECIFIED
4.	CENTRIFUGAL FORCE		[0.0012 x SPEED^2 (MPH) x DEGREE OF CURVE (DEG)] % LL
5.	ROLLING FORCE		±10% LL
6.	LONGITUDINAL BRAKING AND TRACTIVE FORCE		15% LL
7.	LOADING COMBINATIONS		FOR COMBINATIONS OF ABOVE LOADS REFER TO SECTION E

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY	
DIVISION OF PLANNING, DEVELOPMENT, ENGINEERING AND CONSTRUCTION OFFICE OF CHIEF ENGINEER - FACILITIES	CRANE CAR DESIGN LOADING

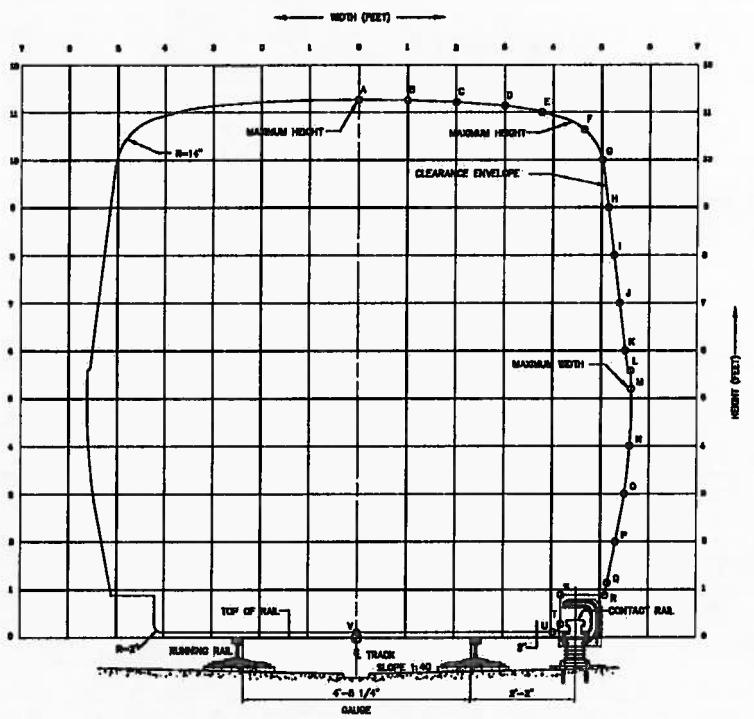
23.2 Rapid Transit Vehicle Design Loading



1.	DESIGN Loads	VEHICLE	82,000 LB.
		PASSENGERS	50,000 LB.
		TOTAL RAPID TRANSIT LOADING (LL)	132,000 LB.
2.	AXLE LOAD		33,000 LB.
3.	IMPACT		AS SPECIFIED
4.	CENTRIFUGAL FORCE		[0.0012 x SPEED ^{2} (MPH) x DEGREE OF CURVE (DEG)] % LL
5.	ROLLING FORCE		10% LL
6.	LONGITUDINAL BRAKING AND TRACTIVE FORCE		15% LL
7.	LOADING COMBINATIONS		FOR COMBINATIONS OF ABOVE LOADS REFER TO SECTION E

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY	
DIVISION OF PLANNING, DEVELOPMENT, ENGINEERING AND CONSTRUCTION OFFICE OF CHIEF ENGINEER - FACILITIES	RAPID TRANSIT VEHICLE DESIGN LOADING

23.3 WMATA Rapid Transit Car Clearance Envelope



COORDINATES		
POINT	WIDTH	HEIGHT
A	0.000	11.267
B	1.000	11.353
C	2.000	11.313
D	3.000	11.136
E	3.761	11.000
F	4.638	10.638
G	5.018	10.000
H	5.148	9.000
I	5.268	8.000
J	5.388	7.000
K	5.511	6.000
L	5.616	5.580
M	5.627	5.200
N	5.563	4.000
O	5.466	3.000
P	5.319	2.000
Q	5.149	1.139
R	5.100	0.885
S	4.198	0.885
T	4.198	0.351
U	4.031	0.167
V	0.000	0.167

NOTES:

1. THIS DIAGRAM IS TO BE USED TO VERIFY CLEARANCES TO WAYSIDE FACILITIES AND UNDERCAR FIXTURES. FOR EXAMPLE, FIRELINES, SPECIAL TRACK HARDWARE AND SAFETY WALKS.
2. THIS DIAGRAM DOES NOT APPLY TO PLATFORMS AND MAJOR STRUCTURAL ELEMENTS, SUCH AS TUNNEL WALLS AND CEILINGS, RETAINING WALLS, AND PIERS. USE THE MANUAL OF DESIGN CRITERIA.
3. THIS DIAGRAM IS DIRECTLY APPLICABLE ONLY FOR LEVEL, TANGENT TRACK. USE THE MANUAL OF DESIGN CRITERIA TO COMPENSATE FOR HORIZONTAL CURVATURE, TRACK SUPERELEVATION, AND MOVEMENT THROUGH TURNOUTS AND CROSSOVERS.
4. THIS DIAGRAM AND DIMENSIONS ARE BASED ON THE FOLLOWING:
   a. CAR BODY – THE CLEARANCE CAR FEELER OUTLINE, OR CLEARANCE ENVELOPE. THIS IS THE MAXIMUM POSSIBLE DYNAMIC OUTLINE PLUS AN ADDITIONAL ALLOWANCE OF 2 INCHES.
   b. UNDERCAR – THE LOWEST POINT OF THE VEHICLE MINIMUM PROJECTED CLEARANCE. THIS IS DEFINED BY THE COLLECTOR PEDESTAL ASSEMBLY OF THE UNDERCARRIAGE. THESE CLEARANCES ARE DEFINED BY THE CLEARANCE ENVELOPE AND SHOULD ALSO ALLOW FOR AN ADDITIONAL 1/2 INCH AVERAGE PERMISSIBLE TOP RAIL WEAR.
   c. CONTACT RAIL – THE RAIL CAR MAXIMUM POSSIBLE DYNAMIC OUTLINE FOR LOWER CAR BODY APPENDAGES.

REFERENCE DRAWINGS		REVISIONS		
NUMBER	DESCRIPTION	DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
OFFICE OF ENGINEERING SUPPORT SERVICES

SUBMITTED 10/2007 DATE — APPROVED 10/2007 DATE

CIVIL DESIGN DRAWING
WMATA RAPID TRANSIT CAR
CLEARANCE ENVELOPE

SCALE: NOT TO SCALE — DRAWING NO.: DD-C-001

23.4 METRO Rapid Transit Car -- Dynamic Outline, Under Floor Car Clearance