

ATTACHMENT I

SPECIFICATIONS FOR LOADER, WHEEL TYPE

1. **DESCRIPTION:** The units shall consist of multiple sizes of articulated front-end loaders with pneumatic-tires, rear-mounted engines, operator cabs with A/C, and a general purpose bucket. Adequate cooling shall be provided for continuous operation of unit and continuous operation of optional equipment. Unit shall be built from the ground up as an integral loader for front-end loading operations. Units supplied to this specification shall meet or exceed these requirements.
2. **GENERAL:** Each unit shall be new, and of the latest design of a model in current production or an update of an existing model. Each unit shall be furnished with identical equipment, options and features as listed below. The items listed under “Optional Equipment” should not be included in the contract price but all items listed should be available as “options” as an add or deduct under the cost plus 10% rule contained in Section VII B of the solicitation. It shall be furnished completely assembled, fully serviced, and ready for immediate operation. The right is reserved to reject any and all bids proposing to furnish equipment, which, in the opinion of the Department's engineers and/or staff, is not satisfactory for the Department's use in the proposed application.
3. **WEIGHT/PERFORMANCE:** The unit shall weigh in a range associated with its designed cubic yard capability.
 - 3.1. **Medium:**
 - 3.3.1 Not less than 42,000 lbs as bid, without additional counterweights
 - 3.3.2 Shall weigh not more than 60,000 lbs. Liquid or foam-filled tires as ballast will not be acceptable.
 - 3.3.3 Minimum horsepower of 220 with a minimum torque rating of 725 lbft at 1600 RPM or less.
4. **ENGINE:** The unit shall be powered by a heavy-duty, water-cooled, diesel engine.
 - 4.1. Engine shall be equipped, as a minimum, as follows:
 - 4.1.1. Electrical system (12 or 24 volt) with alternator, starter, voltage regulator, and heavy-duty battery.
 - 4.1.2. Governor.
 - 4.1.3. Air cleaner, heavy-duty, two-stage, dry-type with restriction indicator.
 - 4.1.4. Oil filter, heavy-duty with replaceable element.
 - 4.1.5. Fuel filter/water separator, heavy-duty with replaceable element.
 - 4.1.6. Heavy-duty radiator and cooling system, with 50-50 mix-of water and permanent-type antifreeze.
 - 4.1.7. Fuel tank, min.10 hour run time at full power.
 - 4.1.8. Muffler, exhaust system, a bent style pipe or rain cap.
 - 4.1.9. Key switch and/or Keypad.
 - 4.1.10. Hourmeter, electric, with oil pressure or alternator switching device, with reading output up to 9,999.9 hours.
 - 4.1.11. Oil pressure gauge or low pressure indicator.
 - 4.1.12. Coolant temperature gauge or high temperature indicator.
 - 4.1.13. DEF Level Indicator
 - 4.1.14. Hydraulic system temperature gauge.

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- 4.1.15. Foot throttle.
 - 4.1.16. Engine warning system with audible and visible signal to warn of low oil pressure and high coolant temperature.
 - 4.1.17. Meet current EPA emission requirements.
5. **HYDRAULICS:** Each unit shall be equipped with a load-sensing main hydraulics system. The hydraulic reservoir shall include a level sight glass. Return oil from the main, steering, and brake hydraulics shall be filtered through a 10 micron maximum filter sized for the full flow capacity of the hydraulics.
 - 5.1. System shall be sealed against contaminants and any necessary air vents shall be filtered.
 - 5.2. Cooling system shall maintain hydraulic oil at satisfactory operating temperatures up to at least 110 degrees F ambient temperature during continuous heavy-duty operations.
 - 5.3. Pressure-relief valve(s).
 - 5.4. Hydraulic oil filter(s) with replaceable element(s).
 - 5.5. Reservoir with visual oil level indicator or dipstick.
 - 5.6. All hydraulic cylinders shall be double acting type.
 - 5.7. Electrohydraulic controls.
 6. **STEERING:** Articulated frame.
 - 6.1. **Medium:** Minimum of 80 degrees total movement (40 degrees each direction), power assisted. A straight ahead locking bar shall be provided to lock the steering system for servicing.
 7. **TRANSMISSION:** Transmission, heavy-duty, multiple speed, hydrostatic, powershift, shuttle or equivalent. Adequate cooling shall be provided for the converter and transmission fluid for continuous operation of unit and continuous operation of optional equipment. Forward and reverse travel shall be controlled by a single lever. Maximum travel speed shall not be less than 22 mph.
 8. **BRAKES:** Power assisted brakes shall act on all four wheels. Brakes shall be adequate to hold the unit, with full bucket load, on the steepest grade it is able to negotiate. Adequate means shall be provided for immobilizing the unit for parking. The brakes shall be in accordance with the current SAE J1473 Standard.
 9. **TIRES:** Tires to be tubeless radial construction and of sufficient capacity to support the weight of the unit complete as specified, fully serviced, with operator and maximum operating load. The capacity shall be determined by the current yearbook of the Tire and Rim Association, Inc.
 10. **LOADER, FRONT END:** The heavy-duty, front-end loader bucket shall be a coupler-mounted, general purpose bucket and equipped with one (1) or (2) double-acting dump cylinders.
 - 10.1. The SAE heaped capacity of the bucket shall be:
 - 10.1.1 **Medium:** Not less than 3.5 cu. yd. and not more than 5.0 cu. yd.
 - 10.2. Minimum SAE tipping load based on standard general purpose bucket and without coupler at full turn.
 - 10.2.1 **Medium:** Shall be 23,000 lbs. The full-turn tipping load shall be permanently posted in the cab clearly visible to the operator.
 - 10.3. Minimum breakout force.
 - 10.3.1 **Medium:** Shall be at least 31,000 lbs. based on standard general purpose bucket without coupler.
 - 10.4. Bucket width shall not exceed 120 inches.

- 10.5. Maximum dumping clearance under the bucket at 45 degree angle, based on standard general purpose bucket and without coupler shall not be less than 8 ft 11 inches.
 - 10.6. Quick-disconnect fittings in the area of the coupler shall be provided to connect the hydraulic hoses on the bucket to the hydraulic lines on the boom to allow the bucket to be removed from the machine. Dust caps with retainers shall also be provided.
 - 10.7. Bucket control shall be the one or two lever type.
 - 10.8. The loader shall be designed to provide full hydraulic controls for operating the bucket and forklift attachment, providing (1) power up, (2) power down, (3) hold, (4) float at ground level, (5) automatic return to dig, (6) tip, (7) raise, and (8) tilt stop.
 - 10.9. The loader hydraulics shall be equipped with ride control to reduce pivot point stresses and increase operator comfort and control. Ride control shall be selectable either ON or OFF by the operator.
 - 10.10. The coupler shall enable the operator to unlock, change, and lock attachments from the loader cab, except for auxiliary quick disconnect hydraulic hose connections for attachments.
 - 10.11. The bucket cutting edge shall be punched for a minimum of seven (7) bolt-on teeth with replaceable tips (although the teeth are not to be furnished). The bucket edge shall be provided with a bolt-on replaceable cutting edge (s).
 - 10.12. Loader arms shall incorporate a parallel lift front linkage, keeping the load level throughout the entire operating range
11. **EQUIPMENT:** The unit shall be complete with all standard equipment and accessories normally furnished. Units shall provide information in the U.S customary units. In addition, equipment shall be furnished as follows:
- 11.1. Unit to meet all applicable OSHA requirements.
 - 11.2. Two headlights, two red taillights, brake lights, turn signals, and emergency flashers.
 - 11.3. Two front and two rear work lights mounted on top front and top rear of ROPS cab, switch controlled from the operators station.
 - 11.4. ROPS and FOPS cab, full and integral type, providing roll-over protection in accordance with the current SAE J1040 Standard equipped with, but not limited to, the following:
 - 11.4.1. Unit shall include air conditioner meeting design and performance requirements of the current SAE J169 and SAE J1503 standards and heater-defroster. A/C system component locations shall not hamper the operator entering or exiting the cab or operating the equipment. Air intake shall not draw equipment exhaust gasses into cab enclosure.
 - 11.4.2. Windshield wipers on both front and rear windows shall be provided.
 - 11.4.3. Tinted safety or shatterproof glass.
 - 11.4.4. Sound suppression to meet OSHA requirements measured in accordance with the current SAE J1166.
 - 11.4.5. Adjustable spring-cushioned, upholstered high back seat with seat belt meeting the current SAE J386 Standard.
 - 11.4.6. Rear view mirrors, left and right outside mounted.
 - 11.4.7. Horn.
 - 11.4.8. Cab dome light
 - 11.4.9. Cab pressurizer complete with filter.
 - 11.4.10. Cab floor shall be equipped with heavy duty, form fitting, rubber mat or coated with a skid-resistant material.
 - 11.5. Non-skid access steps and grab handles.

- 11.6. Slow Moving Vehicle (SMV) Identification Emblem, meeting requirements of the current SAE J943 Standard, and mounted in accordance with the standard. Emblem shall not be mounted on or cover any portion of the radiator guard.
 - 11.7. Hydraulic oil filter, heavy-duty with replaceable element.
 - 11.8. Hydraulic relief valves to prevent overloads.
 - 11.9. Back-up alarm meeting current SAE J994 standard. 107dB minimum, and permanently marked as such.
 - 11.10. Vandal protection including battery and engine compartment and fluid fill caps not protected by a lockable panel. Locks to be keyed alike.
 - 11.11. Towing hitch in rear.
 - 11.12. Front and rear fenders. (**Standard Size, No Extensions**)
 - 11.13. Rear view mirrors, left and right outside mounted.
 - 11.14. Boom safety lock(s) or other mechanical means to hold boom in the raised position to allow servicing of the equipment.
 - 11.15. Fire extinguisher, minimum 2 ½ pounds, UL rating 1A-10B:C. The fire extinguisher shall be installed in a suitable and readily accessible location within the cab.
12. **ELECTRICAL:** System shall be designed to prohibit Radio Frequency Interference (RFI) & Electromagnetic Interference (EMI). Electrical system shall be shielded to prevent any internal / external interference which may impact how the equipment operates when exposed to 150-watt two-way mobile radios operating on Public Safety Frequencies designated by the FCC (CFR 47, Part 90) (Low Band VHF 40-50 MHz, High Band VHF 155-165 MHz, High Band SHF 700-800 MHz).
- 12.1. Wiring shall be AWG or equivalent. Appropriate sized wire shall be used for demands of circuit.
 - 12.2. Wiring shall be routed in wire loom, grommets shall be used when wires pass through walls.
13. **EQUIPMENT TRANSPORT:** Each unit shall be provided with the following:
- 13.1. The operating weight of the unit (in pounds) as delivered, including standard equipment and all specified options and with full fluid capacities, shall be stenciled in two inch high black letters/numerals on each side of the machine in a conspicuous location.
 - 13.2. Four tie-down points for safely securing the unit during trailer transport. One tie-down point shall be located as close as practicable to each of the unit's lower four corners. The tie-down points shall have an aggregate rated strength of at least one and one-half times the unit's gross weight. If lashing (D) rings are provided, the rings shall accommodate a 1/2 inch (13 mm), grade 80, grab hook.
 - 13.3. The weight centerline, computed with full fuel tank and bucket resting on the ground, without operator, shall be clearly marked on each side of the unit with a green vertical line approximately 3 inches wide and 5 inches high. (This is for safe loading on trailers).
14. **TRAINING:** In conjunction with delivery of the first unit, the successful bidder shall conduct a minimum one-day school on the safety, operation, maintenance, and diagnostics of the unit by factory trained expert personnel at the SCDOT Equipment Depot or at their facility in South Carolina. In addition and for each subsequent unit, the successful bidder will conduct a minimum one day school in the county where the unit is to be assigned with the Department's operator(s) and service personnel, after the equipment has been delivered to the county where it is to be assigned.

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15. **TRAINING MATERIALS:** In conjunction with the delivery of each unit, the successful bidder shall supply one complete set of video operator training materials (DVD/Thumb Drive). This material shall adequately cover the safe and correct operation of the equipment.
16. **MAINTENANCE:** Access to replaceable filter elements for air, fuel, hydraulics, and engine oil and replacement lubricants is critical to the operational success of SC DOT. As a result, on the questionnaire vendors will be asked for the make, size or type of element as well as brand and type of lubricant for engine oil, hydraulic fluid, gear oil, and grease. Details concerning the manufacturer and item names or part number for the above maintenance items shall be provided as requested on the bid questionnaire.
- Note: All threaded fasteners, hydraulic fittings, belts, hoses, and electrical fasteners shall be metric or U.S., and shall meet one or more of the following standards, SEA, JTC, DIN, ISO, UNC, UNF, NPTF.**
16. **SERVICE FACILITIES:** Each unit must have product support available in the form of authorized sales, parts, service, and training personnel located within South Carolina or within a reasonable distance of all potential sites. A reasonable distance is one that can be traveled by a technician in a service truck in less than four (4) hours driving time.
17. **SERIAL NUMBER:** Each unit shall be provided with a manufacturer's serial number, unique to each unit, permanently attached by plate or engraving, and easily identified. The serial number shall be used by the Department and the manufacturer to identify units for recall, to aid in the recovery of stolen units, to establish ownership, and for other similar reasons.
18. **DATA PLATE:** A data plate shall be attached to each unit indicating serial number, manufacturing date, and model using block lettering. Permanent plaques mechanically attached are preferred to decals
19. **SAFETY PLAQUES OR DECALS:** Product safety plaques or decals shall be furnished and affixed at the operator's station and at any hazardous area. The safety plaques or decals shall describe the nature of the hazard, level of hazard seriousness, how to avoid the hazard, and the consequence of human interaction with the hazard. Permanent plaques mechanically attached are preferred to decals. Type, size and location of product safety plaques or decals shall be in accordance with current ANSI Z535.4, or latest revision thereto.
20. **COLOR:** The majority of areas to be painted shall be cleaned and primed prior to application of the finish paint. Paint and primers used shall be lead-free.
- 20.1. Serial and data plates shall be protected from being painted over. All manufacturers' standard warning, safety, instructional, and identification decals shall be provided, however, there will be no vendor or dealer identification or advertising decals allowed.
- 20.2. Each unit shall be thoroughly cleaned and prime coated with a rust preventative and painted the manufacturer's standard color or the South Carolina Department

of Transportation's standard yellow (FED Standard 595 yellow 3538 or 3655, latest edition). Finish coat shall be first quality.

21. **EQUIPMENT OPTIONAL**: The following items should be available as optional equipment but not included in the standard equipment offered. Optional equipment shall include installation of additional valves or controls required for optional equipment operation from the operator station.

- 21.1. 4-1 Bucket Deduct
- 21.2. A/C Deduct
- 21.3. Broom
- 21.4. Snow Plow
- 21.5. Grapple
- 21.6. General purpose bucket
- 21.7. Fork Lift, hydraulically adjustable
- 21.8. Optional equipment additions, deletions and/or substitutions of equipment in accordance with special conditions of the bid invitation (allows purchasing of units from the term contract with various option combinations).