ATTACHMENT J

SPECIFICATIONS FOR MOTOR GRADER, HEAVY, ARTICULATED

1. **DESCRIPTION**

The motor grader shall be a heavy-duty, articulated frame, tandem-drive type, mounted on six pneumatic tires. It shall be designed for ditching, sloping, bank cutting, grading, scarifying, and snow removal. It shall be suitable for mounting a hydraulic, rear-mounted sloper attachment. Unit shall meet all applicable requirements of OSHA, EPA, and ASHTO standards. 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 Using Entity's engineers and/or staff, is not satisfactory for the Using Entity's use in the proposed application.

3. **OPERATING WEIGHT**

Minimum 30,950 lbs., as bid, without tire ballast or additional counterweights, less scarifier and front blade.

4. **DIMENSIONS**

4.1. Wheelbase shall not exceed 21" 4".
4.2. Overall height of grader with warning light installed should not exceed 138 inches.
4.3. Overall height for transport on a 24-inch high lowboy deck with a 22' load concentration length shall not exceed 13ft 6 inches.
4.4. Overall width shall not exceed 8 feet 6 inches with blade angled.
4.5. Overall length shall not exceed 30 feet 3 inches.
4.6. Turning radius shall not exceed 25 feet 3 inches to outside of front tire with articulated frame.

5. **ENGINE**

The unit shall have a heavy-duty, water-cooled, diesel engine with a horsepower of at least 140 and not greater than 160, meeting all current EPA emissions standards. It is permissible for the manufacturer to program the engine control computer at the factory to limit max horsepower at 160 hp to meet this requirement. The engine shall be equipped, as a minimum, as follows:

5.1. Electrical system, with alternator, starter, voltage regulator, and heavy-duty battery(s).
5.2. Electronically controlled or governor.
5.3. Air cleaner, heavy-duty, two-stage, dry-type with restriction indicator.
5.4. Oil and fuel filter/water separator heavy-duty with replaceable elements.
5.5. Heavy-duty radiator and cooling system.
5.6. Fuel tank, of sufficient capacity for 8 hours run time and fuel gauge.

5.7. Muffler and exhaust pipe of sufficient length to exhaust fumes away from the operator's cab. If muffler is of a vertical design, exhaust pipe shall prevent rain from directly entering the exhaust system and prevent air from rotating turbocharger when the equipment is being transported.
5.8. Key switch or digital recognition mechanism.
5.9. Hourmeter, electric, with oil pressure or alternator switching device, with reading output up to 9,999.9 hours.
5.10. Hand and foot throttle or for the hand a mechanism that is capable of controlling engine acceleration (increase, decrease and hold).
5.11. Oil pressure gauge or low pressure indicator.
5.12. Coolant temperature gauge or high temperature indicator.
5.13. Engine warning system with audible and visible signal to warn of low oil pressure and high coolant temperature.
5.14. An electronic display system that incorporates the above indicators, gauges and annunciators is acceptable.

6. **FUEL SYSTEMS**

For Diesel powered vehicles and equipment, fuel system components and diesel engines shall be compatible with B20 bio-diesel blends, minimum. For gasoline powered vehicles and equipment, fuel system components and gasoline engines shall be compatible with E10 ethanol blends, minimum.

7. **STEERING RANGE**

Articulated frame with minimum of +/- 20 degrees movement, hydraulically operated. Front wheels shall have power steering, hydraulic lean, and oscillating axle.

8. **TRANSMISSION**

Transmission, heavy-duty, multiple speed, powershift type. A single lever or switch shall control forward and reverse travel. Minimum travel speed in forward shall be at least 20 mph and minimum travel speed in reverse shall be at least 17 mph.

9. **TANDEM DRIVE**

Rear axle shafts shall be full floating, carrying no grader weight. If chain drive is provided, minimum pitch shall be l 1/4 inches. Differential lock/unlock feature shall be furnished. The tandem rear axles shall provide four (4) wheel drive. A full differential (no-spin) may be furnished in lieu of the lock/unlock feature.

10. **HYDRAULICS**

The grader shall be designed with full hydraulic controls for operating the circle, moldboard, and blade. Controls shall provide for blade lift, blade pitch (tilt), blade shift, blade rotation, and blade float. System will include closed center, pressure and flow compensated piston-type main pump and filter with replaceable element (10 micron maximum) and relief valves. All hydraulic circuits will include lock valves to prevent cylinder drift.

11. **BRAKES**

Foot-operated, power-assisted brakes shall act on the four rear wheels. Parking brakes shall be provided.

12. **BLADE ASSEMBLY**

The grader shall be equipped with a heavy-duty, reinforced moldboard approximately 12 feet in length, 22 inches in height, and 0.87 inch thick.

12.1. The minimum bank-cutting angle shall be at least 90 degrees, right and left sides.

12.2. Blade angle shall be hydraulically adjustable.
12.3. The moldboard shall be equipped with renewable end bits and blades and shall be punched for blade mounting in accordance with the most recent revision to SAE J-739 and SAE J-740.
12.4. Horizontally positioned blade clearance above ground shall be at least 16.5 inches.
12.5. Blade cutting depth shall be at least 28 inches.

13. **CIRCLE**

The grader shall be equipped with a minimum 60 inch circle supported on replaceable wear plates with adjustable shims and shall include circle turn overload protection.

14. **TIRES**

Tires shall be radial, in sizes 14.00R24 or 17.5R25, tubeless, mounted on interchangeable rims of suitable width with multi-piece demountable rims. Total combined load rating of the tires and wheels shall exceed the maximum axle load anticipated during operations. Load ratings shall be determined by reference to the current yearbook of the Tire and Rim Association, Inc., or the manufacturer's published load rating.

15. **EQUIPMENT**

The unit shall be complete with all standard accessories normally furnished. In addition, equipment shall be furnished as follows.

15.1. Unit to meet applicable OSHA and SAE requirements.
15.2. Driving Lights: Two headlights, two red taillights, brake lights, turn signals, markers and hazard warning lights.
15.3. Two front and two rear work lights mounted on top portion of ROPS cab, switch controlled from the operator's station.
15.4. ROPS cab, full and integral type, providing roll-over protection. Standard equipped with, but not limited to, the following:
  15.4.1. Cab air conditioner, heater and defroster systems. Air intake shall not draw equipment exhaust gasses into cab enclosure.
  15.4.2. Windshield wipers and washers on both front and rear windows shall be provided.
  15.4.3. Tinted safety or shatterproof glass, with sliding or pop-out windows for fresh air and front window sun visor. Use of a clear 3M S80 or S400 safety and security film to meet this requirement is acceptable.
  15.4.4. Sound suppression to meet OSHA requirements measured in accordance with current SAE J-1166.
  15.4.5. Adjustable spring-cushioned, upholstered or vinyl seat and back rest with seat belt.
  15.4.6. Rear view mirrors, left outside mounted. Mirror shall be mounted on breakaway brackets to reduce damage from low-hanging limbs, etc.
  15.4.7. Cab dome light
  15.4.8. Cab pressurizer complete with filter.
  15.4.9. Cab floor shall be equipped with a one-piece, form fitting, rubber mat or coated with a skid-resistant material.
  15.4.10. Cab design and layout shall allow full unrestricted visibility.
  15.4.11. 12 VDC accessory power terminal to power 2-way radio and other accessories.
  15.4.12. Steering mechanism and instrument gauges.
  15.4.13. Rearview Mirrors, mounted inside.
15.5. Non-skid access steps and grab handles.
15.6. 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.
15.7. Horn.

15.8. Back-up alarm 107dB and permanently marked as such.
15.9. Vandal protection including battery and engine compartment and fluid fill caps not protected by a lockable panel. Locks to be keyed alike.
15.10. Towing hitch in rear.
15.11. Lockable tool box.
15.12. Transmission oil temperature gauge and bottom guard.

16. **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).
16.1. Wiring shall be AWG or equivalent. Appropriate sized wire shall be used for demands of circuit.
16.2. Wiring shall be routed in wire loom, grommets shall be used when wires pass through walls.

17. **MAINTENANCE**
Access to replacement filter elements for air, fuel, hydraulics, engine oil, lubricants, as well as replacement tires is critical to the operational success of any agency As a result, on the questionnaire vendors will be asked for the make, size or type of element/tire as well as brand and type of lubricant for engine oil, hydraulic fluid, gear oil, and grease

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.

18. **EQUIPMENT OPTIONAL**
The following items should be available as optional equipment but not included in the standard equipment offered:
(All attachments to come with float and locking ride positions, as well as any necessary ballast, hydraulics or controls necessary for operation.)
18.1. If available, add for front-mounted scarifier with full set of shanks, hydraulically operated.
18.2. If available, add for mid-mounted scarifier with full set of shanks, hydraulically operated.
18.3. Additional Safety lights and installation details/pricing shall be provided to purchaser at time of quote.
18.4. 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 at manufacturer's current list price less a discount to be specified.)