MOTOR GRADERS
BID SPECIFICATION FOR 120M2 AWD OR EQUIVALENT

Compliant?

BASIC SPECIFICATIONS

Y____ N____ Machine shall be designed and built by the manufacturer.
Y____ N____ Base Machine Weight shall not be less than 37,214 lbs. Weight shall include: standard machine configuration, lubricants, coolants, full fuel tank and operator of 200 lbs and, shall not include wing, plow, or, scarifier.
Y____ N____ Machine height to top of the cab shall not exceed 131 in.
Y____ N____ Machine length from the front outside edge tire to end of tow hitch shall not be less than 344 in.
Y____ N____ Machine Wheel Base (distance from front axle to mid tandem) shall not be less than 233 in.
Y____ N____ The rear frame shall have two box section channels with an integrated bumper as standard.
Y____ N____ A toolbox shall be provided.

BASIC SPECIFICATIONS-OPTIONAL ATTACHMENTS

Y____ N____ Machine shall have vandal protection standard including locks for cab doors, engine side shields (4), top tank radiator access door, engine coolant surge tank, hydraulic reservoir cap, fuel tank cap and tool box.

Y____ N____ A rear hitch shall be provided
Y____ N____ Machine shall be equipped with a front mounted hydraulic lift group that shall pick up the 11 shank scarifier attachment as well as the front one way plow attachment.
Y____ N____ Machine shall be equipped with an OEM supplied 11 shank scarifier attachment that coupler mounts to the front lift group
Y____ N____ Machine shall be equipped with an OEM supplied 11' one way snow plow that will attach to the front lift group via coupler system. The machine shall also be equipped with an OEM supplied 12' wing attachment with hydraulics to fully operate.

ENGINE

Y____ N____ Engine shall be designed and built by the manufacturer.
Y____ N____ Engine shall be a turbo-charged, direct injection, four stroke, 6-cylinder diesel engine.
Y____ N____ Engine shall be certified EPA Tier 4 Interim and European Union Stage IIIb
Y____ N____ Engine shall be electronically controlled for more efficient fuel injection and fuel burn.
Y____ N____ Engine shall achieve rated power requirement with engine displacement not less than 428 in3 for better fuel economy.
Y____ N____ Engine shall develop as standard while AWD is ON a rated net flywheel of at least 161 HP in 1st gear, 179 HP in 2nd gear, 184 HP in 3rd gear, 189 HP in 4th gear, and 209 HP in gears 5 through 8.
Y____ N____ Engine will increase its low idle speed to 1,000 rpm when the battery voltage is below 24.5 volts for more than 5 minutes to ensure adequate system voltage and battery reliability.
Y____ N____ Peak engine power shall not be achieved at an engine speed greater than 1800 rpm.
Y____ N____ Rated engine power shall not be achieved at an engine speed greater than 2100 rpm.
Y____ N____ Engine will have an minimum torque rise of 56% from 2100 rpm to peak torque following SAE J1349 (net power with max fan).
Y____ N____ Engine enclosure and daily service points shall be accessible from ground level and grouped on the left side of the machine.
Y____ N____ Engine fan shall automatically adjust fan speed via a variable hydraulic fan pump to meet engine cooling requirements thus reducing demand on the engine, putting more horsepower to the ground, reducing noise, improving fuel economy, and reducing heat.
Y____ N____ Engine shall allow for at least 500 hours of operation between oil changes.
Y____ N____ Engine shall be isolation/resilient mounted to minimize sound and vibration.
Y____ N____ Engine compartment doors shall be lockable without the use of external locks.
Y____ N____ Engine shall automatically lower engine torque and alert the operator if critical conditions are detected.

Y____ N____ Engine shall have an air-to-air after cooler for superior engine performance.
Y____ N____ Engine oil cooler shall be a water to oil shell and tube cooler system.
Y____ N____ Machine shall have a 12000 hour coolant interval from factory.
Y____ N____ The cooling package air intake shall have 2.8 mm perforated inlet screen.
Y____ N____ The charged air cooler (ATAAC) shall have 9 fins per inch.

POWERTRAIN/TRANSMISSION

Y____ N____ Transmission shall be designed and built by the machine manufacturer.
Y____ N____ Transmission shall be a direct drive, power shift, countershaft type.
Y____ N____ Transmission shall be equipped with built-in self-diagnostic capability.
Y____ N____ Transmission shall have no less than 8 forward speeds and 6 reverse speeds(for added safety).
Y____ N____ Transmission shall have 5 working gears between 0-10.4 mph.
Y____ N____ Transmission shall be isolated/resilient mounted to reduce sound and vibration.
Y____ N____ A controlled throttle shifting system shall be standard to smooth directional gear changes wihtout use of the inching pedal.
Y____ N____ Electronic Throttle Control (cruise control) shall be standard and shall be controlled by a push button, located on a 3-axis joystick as standard on the right joystick control for resuming and decreasing throttle set.
Y____ N____ Electronic Throttle Control modes, set and accelerate functions, shall be located on the right control column for easy access.
Y____ N____ A load compensating system for the transmission shall be standard to ensure consistent shift quality in all applications.
Y____ N____ Automatic Differential Lock/Unlock feature shall be standard and shall not have speed, shuttle shifting or tandem spinning restrictions for engaging/disengaging. System must be load-sensing for optimal performance. .
Y____ N____ Differential Lock/Unlock shall be a multi-disc design.
Y____ N____ Final drive shall be a planetary design.
Y____ N____ The rear axle shall be a bolt-on modular design offering easy access to differential components, improving serviceability and contamination control.
Y____ N____ The total surface area of all the transmission clutch packs shall not be less than 1495 in^2.
Y____ N____ Machine shall be equipped with an electronic inching pedal for improved modulation and machine control.

Y____ N____ Machine shall be equipped with electronic over-speed protection to prevent the engine and transmission from over speeding, as a standard feature.
Y____ N____ Machine shall have no drive shafts that cross over the articulation hitch.
Y____ N____ Machine must be equipped with auto shift operational in all forward and reverse gears.

STEERING & IMPLEMENT CONTROLS

Y____ N____ Joystick steering capabilities shall be ISO 5010.
Y____ N____ Machine shall employ a friction pack style steering mechanism, utilizing the follow steer concept.
Y____ N____ Machine shall be equipped with a single joystick that performs all steering tasks. Steering shall be ground speed sensitive and position sensitive. There shall be no steering wheel.
Y____ N____ Machine shall be equipped with a single joystick that performs most critical blade movements. Blade lift and lower shall be on both joysticks.
Y____ N____ Joystick controls shall be mounted to adjustable pedestals, hard mounted to the cab floor, independent of the operator seat.
Y____ N____ Secondary steering shall have a primary and secondary power supply in the event the primary source is lost.
Y____ N____ Transmission direction control shall be a 3-position rocker switch for selecting forward, neutral, and reverse incorporated left hand joystick control.
Y____ N____ Transmission gear selection shall be controlled by dual push buttons for up shifting and downshifting and shall be incorporated into left-hand joystick control.
Y____ N____ Manual Differential Lock/Unlock shall be operator controlled, via a push-button on right-hand joystick control.
Y____ N____ The machine shall have two redundant articulation sensors.
Y____ N____ Three redundant sensors shall be provided in the steering joystick for additional safety.

BRAKES

Y____ N____ Machine shall have primary and secondary service brakes.
Y____ N____ Entire braking system shall meet all requirements of ISO 3450: 1996.
Y____ N____ Two separate left and right hydraulic brake accumulators shall be standard for safety.
Y____ N____ Parking brake shall be multi-disc, oil-cooled, spring-applied, hydraulically released, sealed, adjustment-free, and integrated into the transmission. Park brake shall not be externally located.
Y____ N____ Parking brake shall be serviceable without removing the transmission.
Y____ N____ Service brakes shall be multi-disc, oil-cooled and completely sealed; they will also provide access to check and determine brake wear without removing or disassembling the brake assembly.
Y____ N____ Service brake disc surfaces shall be grooved and carry oil between discs and plates with brakes fully applied.
Y____ N____ Service brakes shall be hydraulically actuated, utilizing dual independent brake circuits.
Y____ N____ Brakes shall be continuously pressurized, filtered, oil cooled.
Y____ N____ Machine shall have individual brake pods for each rear wheel, located at each rear wheel inside the tandem box, independent of tandem chains.
Y____ N____ Brake line protection, including tandem walkways and hydraulic brake line guarding, shall be required to prevent line damage.
Y____ N____ Service brakes shall provide a minimum of 3,565 in^2 of total friction material surface area used at each of the four tandem wheels to eliminate braking loads on the power train.

HYDRAULIC SYSTEM

Y____ N____ A standard triple redundant hydraulic relief system shall protect machine hydraulic components.
Y____ N____ Hydraulic implement pump shall produce between 0 and 55.5 gal/min of oil flow at high idle.
Y____ N____ Hydraulic system shall be a closed center, load sensing type, with a variable displacement, axial piston-type pump.
Y____ N____ Hydraulic system shall be fully sealed, using Duo-cone and O-ring face seals to prevent leaks,contamination, and spillage.
Y____ N____ The hydraulic tank shall have a baffling system to reduce potential pump cavitations.
Y____ N____ The maximum hydraulic system pressure shall be no more than 3,500 psi.
Y____ N____ Implement valves shall be electro-hydraulic, designed and built by the machine manufacturer.
Y____ N____ Implement pump shall not be mounted under cab floor, minimizing sound and vibration.
Y____ N____ Implement valves shall be proportional priority pressure compensating for consistent response, when multi-functioning any combination of implement controls and independent of engine speed.
Y____ N____ Implement pump shall be solely dedicated to implement controls and not shared with any other components.
Y____ N____ Lock valves shall be integrated into the main implement valve to prevent cylinder drift.
Y____ N____ Machine shall be equipped with an minimum of 13 valves to operate all blade functions, steering functions, and attachments.
Y____ N____ Hydraulic valves shall not be mounted under the cab floor, minimizing sound and vibration.
Y____ N____ Left and right blade lift cylinders shall have independent float capability as a standard feature.
Y____ N____ A sight gauge will be provided for checking hydraulic reservoir fluid.
Y____ N____ Hydraulic oil change service interval shall be no less than 6000 hours with oil sampling
Y____ N____ Hydraulic system shall have a separate oil tank solely dedicated to the implement pump.

FRONT AXLE AND TANDEMS

Y____ N____ Front axle oscillation shall be no less than 32 degrees total, per side 16 degrees up, 16 degrees down.
Y____ N____ Front axle shall be an arched design for maximum ground clearance.
Y____ N____ Front wheel spindle maintenance intervals shall be no less than 2000 hrs.
Y____ N____ Front wheel steering angle shall be no less than 47.5 degrees left or right.
Y____ N____ Maximum front wheel lean shall be no less than 18 degrees left or right.
Y____ N____ Machine turning radius shall not exceed 24 ft. 3 in. using front steering, full articulation and unlocked differential.
Y____ N____ Distance between center of tandem wheels shall be no less than 59.5 in

Y____ N____ Tandem chain pitch shall not be less than 1.8 in
Y____ N____ Tandems shall be capable of oscillating 15 degrees front tandem up and 25 degrees front tandem down, with full machine articulation and having no interference between tandem wheel and machine structure.
Y____ N____ Electronic and mechanical steering stops located at each wheel and steering cylinder relief valves shall be present to prevent steering system damage during normal operation.
Y____ N____ Machine shall provide 2 steering cylinders for maximum steering force.

TIRES AND RIMS

Y____ N____ Machine shall be equipped with 17.5R25 Bridgestone VSW 1* MP tires or equivalent on 14" X 25" multi piece rims.

OPERATORS STATION

Y____ N____ A 42,075 BTU/h heater shall have an integral pressurizer and four-speed fan along with A/C.
Y____ N____ Cab shall have angled floor design allowing direct visibility to moldboard.
Y____ N____ Seat shall be a cloth-covered suspension seat with, 3-inch retractable seat belts, with adjustments for fore-aft position, seat height, seat back angle, thigh support, and lumbar support.
Y____ N____ An enclosed cab with ROPS (Rollover Protective Structure) according to ISO 3471shall be provided.
Y____ N____ Cab door shall have a hold-open clasp with a ground-level release and in addition to, a release in the cab.

Y____ N____ Cab shall be isolation-mounted to the front frame section of the machine.
Y____ N____ Cab shall have fixed front window of laminated glass with intermittent wiper.
Y____ N____ FOPS (Falling Object Protective Structure) shall be provided according to ISO 3499.
Y____ N____ Machine shall have no less than 17 adjustable vents, positioned to direct air to front windows and operator.

Y____ N____ AM/FM Radio with CD player installed
Y____ N____ Radio ready arrangement will include 24V to 12V converter, two speakers, antenna and wiring.
Y____ N____ An instrument cluster shall be provided that includes a speedometer, tachometer, coolant temperature, fuel and articulation angle gauge.
Y____ N____ Operator cab fresh air-filter shall be accessible for clean out and replacement, from outside of the cab at ground level.
Y____ N____ A real-time information system shall monitor all system data and alert the operator of any faults through a digital text display. This information system shall be programmable for multiple languages.
Y____ N____ Left and right side cab doors shall be provided.
Y____ N____ Wipers shall be provided on side and rear windows.
Y____ N____ Digital machine hour meter shall be provided.
Y____ N____ The forward visibility shall be continuous and unobstructed glass from roofline to floor providing visibility of the blade, heel and toe, back of the cutting edge, and front tires.
Y____ N____ Access to cab shall be three anti-skid steps.
Y____ N____ Cab shall have cup holder, personal cooler holder/storage compartment for operator's manual, with a molded floor mat.
Y____ N____ Window washer fluid bottle refill spout shall be located external of the cab.
Y____ N____ Machine shall be equipped with an integral rear view camera capable of being on at all times without interfering with guage or diagnostic display.
Y____ N____ Cab shall be equipped with in cab circulation fan.
Y____ N____ Machine shall be equipped with an air suspension seat.

CIRCLE & MOLDBOARD

Y____ N____ Drawbar, circle, and moldboard shall be controlled with a maximum of two multifunction, 3-axis joysticks, as standard.
Y____ N____ Machine shall be equipped with minimum of 6 drawbar wear strips that shall be replaceable drop-in inserts made from nylon composite material, replaceable and adjustable from the top of the drawbar plate via removable cover plates.
Y____ N____ The drawbar shall feature welded protective wear plates to prevent lift group contact with the primary drawbar structure.
Y____ N____ The standard moldboard shall be at least 12 ft long, 24 in high and no less than 7/8 in thick.

Y____ N____ Moldboard shall have a bank slope angle capability of at least 90 degrees to both sides.
Y____ N____ Moldboard side-shift cylinder shall be installed on the left-hand side, to prevent snow wing interference, with the cylinder rod.
Y____ N____ The moldboard retention system shall have no more than two retention points located on the left and right side of the moldboard. The surface area shall not be less than 50408 mm^2 .
Y____ N____ Moldboard shall have a hydraulic tip control through a range of 40 degrees fore and 5 degrees aft.
Y____ N____ Moldboard wear strips shall be adjusted with lock screws, providing shim-less adjustment capability both vertical & horizontal.
Y____ N____ The moldboard shall be pre-stressed during manufacturing for superior strength and durability.
Y____ N____ Moldboard slide rails shall be constructed of a heat-treated, high carbon steel and have replaceable bronze alloy wear inserts on top and bottom.
Y____ N____ Circle shall be a single piece, rolled-ring forging, with raised wear surfaces on the top and bottom.
Y____ N____ Circle shall be rotated by a hydraulically driven motor with a minimum circle pinion torque capability of 44253 ft-lb.
Y____ N____ Moldboard drive shall be equipped with a circle drive slip clutch.
Y____ N____ Blade lift and center shift cylinders shall have replaceable bronze-alloy wear inserts in the ball sockets with removable shims to insure the ability to remove free play throughout the useful wear insert life.
Y____ N____ The lift cylinder casting shall be welded to the front frame for added strength and structural integrity.
Y____ N____ Link bar shall have 7 positions for increased versatility, the 5 inner-most of which bear replaceable bushings..
Y____ N____ Linkbar pin shall be separate from pin pulling mechanism for easier service and lower O&O costs.
Y____ N____ The draft frame pivot connection shall have a single ball stud with grease zerk. Ball stud shall be bolt-on, shimable and adjustable to allow for quick and easy field serviceable design.
Y____ N____ There shall be 3 sideshift anchor positions shall be provided for extended reach capability as standard.
Y____ N____ Pinion Gear shall be separate from the Pinion Shaft to allow for a quick and easy serviceable design.
Y____ N____ Circle outside diameter shall be no less than 60.2 in.
Y____ N____ There will be at least 6 replaceable wear inserts between the circle and drawbar providing at least 163 in^2 of wear surface area.
Y____ N____ Blade lift accumulators shall be provided, protecting cutting edge and other components from damage from shock loads.

ELECTRICAL

Y____ N____ Machine shall have a 200 amp-hour, 1400 CCA heavy-duty batteries.
Y____ N____ Machine shall have a minimum 150-amp alternator at 24 volts provided which is brushless for increased life and durability.
Y____ N____ Six 3 x 3 in (76 x 76 mm) halogen mounted cab lights shall be provided.
Y____ N____ Machine shall be equipped with ripper lights, blade heel work lights, mid frame work lights, and, high mounted front work lights. Machine shall also be equipped with foldable roof mounted beacon.
Y____ N____ A 24 V to 12 V converter with 10-amp capacity shall be provided.
Y____ N____ Starting system shall be a 24V direct electric type.
Y____ N____ Incandescent white reversing lamps and LED stop lamps shall be provided.
Y____ N____ Electrical system shall have a master disconnect switch with a removable key (in addition to the ignition switch), accessible from the ground level.
Y____ N____ All core machine systems shall be electronically connected, optimizing performance and preventing machine damage.
Y____ N____ All wiring shall be arranged and located so as to facilitate regular visual inspections, not be in contact with hot surfaces and not routed with other services lines (e.g. fuel, oil, etc.).
Y____ N____ All harnesses / cabling are secured with clipping clamps providing a gap between the conduit/harness and the mounting surface preventing material build-up.
Y____ N____ Machine shall be equipped with HD starter for cold weather starting.

SERVICEABILITY and SAFETY

Y____ N____ High-speed oil drain system shall be standard with ground level quick connect access.
Y____ N____ Machine shall have a lockable swing-out cooling fan housing featuring a latch-style mechanism (shall not be of a bolted design), allowing easy access to cores. Ability to open/close shall be ground level accessible, eliminating need to climb on machine.

Y____ N____ The dip stick for checking transmission fluid shall be at ground level.
Y____ N____ Hydraulic tank site gauge shall be readable from the ground.
Y____ N____ Hydraulic tank filter shall be a cartridge style filter providing a separate filter element, housing, and drain valve for quick and clean servicing.
Y____ N____ Ability for ground level fueling shall be provided.
Y____ N____ Sampling ports shall be accessible from the tandem level and provide access to the engine, hydraulic, coolant, and fuel ports.
Y____ N____ A two-way communication tool shall give service technicians easy access to stored diagnostic data and allow configuration of machine parameters.
Y____ N____ Machine shall provide 3 points of contact on all areas of the machine, for mounting and dismounting.
Y____ N____ The articulation joint shall have mechanical locking device to prevent frame articulation while servicing or transporting machine.
Y____ N____ Left and right side tandem case assemblies shall be covered with punched steel plate to provide an adequate platform for standing and walking.
Y____ N____ Engine primary and final fuel filters shall have 500 hour service replacement interval.
Y____ N____ Engine shall have primary fuel filter with fuel water separator and electronic sensor, quick release dual stage filter and primer pump.
Y____ N____ The centralized lube bank shall be at the articulation joint to give access to difficult zerks.
Y____ N____ Transmission filter restriction indicator shall be displayed in the cab.
Y____ N____ Lock out Tag out capabilities shall be provided standard and increase the safety levels during down time. This ensures that an energy isolating device and the machine which are being worked on and cannot be operated
Y____ N____ Machine shall be equipped with transmission guarding.

MINIMUM SERVICE FILL CAPACITIES

Y____ N____ Standard fuel tank capacity shall not be less than 90 gallons.
Y____ N____ Standard cooling system capacity shall not be less than 12.9 gallons.
Y____ N____ Standard hydraulic tank capacity shall not be less than 16.9 gallons.
Y____ N____ Standard engine oil capacity shall not be less than 7.9 gallons.
Y____ N____ Standard tandem housing capacity shall not be less than 15.6 gallons each.
Y____ N____ Standard front wheel spindle bearing housing capacity shall not be less than 0.1 gallons.
Y____ N____ Standard circle drive housing capacity shall not be less than 1.8 gallons.

SAFETY AND ENVIRONMENTAL

Y____ N____ A circle drive slip clutch shall be provided to reduce horizontal moldboard impact damage.
Y____ N____ Black glare-reducing paint shall be used on the front frame and engine enclosure to decrease glare from other equipment lights and reflection from the sun and snow.
Y____ N____ Operator not present monitoring system will lockout implements, shall not allow gear shift out of neutral, and lock parking brake if system detects operator not present for increased safety.
Y____ N____ Hydraulic implement lockout shall be achieved by actuating a single electrical switch within the operator station.
Y____ N____ An external emergency kill switch shall be available for ground level engine shut down.
Y____ N____ Secondary, electric steering pump with redundant wiring shall be provided as a backup to the primary implement hydraulic pump.
Y____ N____ Machine shall have laminated glass for the front windows and doors, to protect the operator from shattered glass.
Y____ N____ Machine shall provide dual exits allowing for emergency egress should one side become obstructed.
Y____ N____ Electrical system shall have a master disconnect switch with a removable key and lock for added safety.(in addition to the ignition switch).
Y____ N____ Machine shall have a steering software system shall automatically reduce steering sensitivity as the ground speed increases.
Y____ N____ Machine shall have back-up lights and sounding alarm when reverse gears are selected.
Y____ N____ Environmentally friendly drain valves shall be provided for the hydraulic oil, engine oil, engine coolant, transmission, differential and fuel tank.
Y____ N____ Cooling fan shall have both a shroud and rear grill for protection during service.

Y____ N____ Machine shall allow cab interior and exterior lights to remain on separate from ignition switch, for safe exit of the machine during night operation.

Y____ N____ Engine and transmission shall be rubber isolation mounted to reduce noise and vibration.

ALL WHEEL DRIVE SYSTEM

Y____ N____ Machine shall be equipped with a steering compensation system that enables a “powered turn” by adjusting the outside front tire speed up to 50% faster than the inside tire.

Y____ N____ The AWD arrangement utilizes dedicated left and right pumps for precise hydraulic control.

ADDITIONAL

Y___N___ Bidder must supply an OEM parts price list and agree to sell parts to Town for listed prices or less.

Y___N___ Bidder must state parts fill rates over the counter and by 7AM next day and associated freight charges.