TRANSPORTATION RESEARCH

Number 381, October 1991

CIRCULAR

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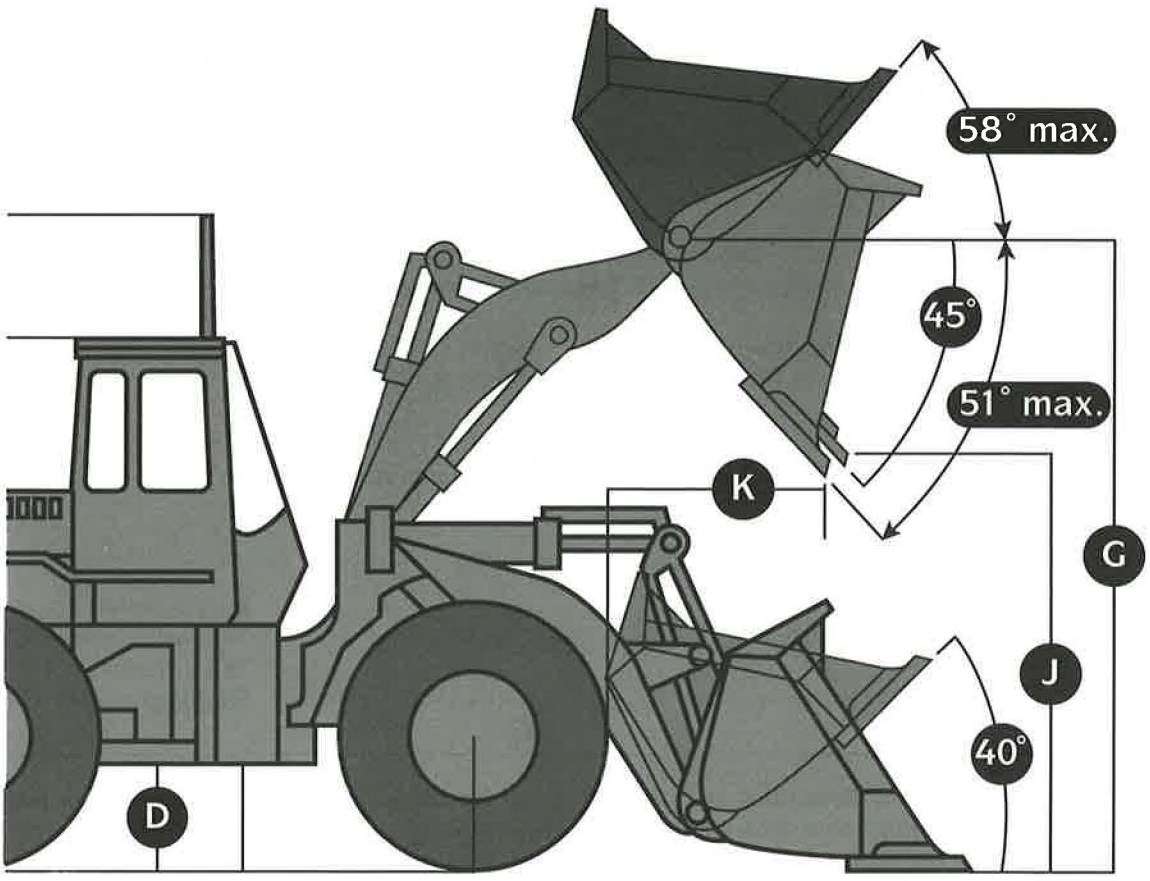
HOW TO DEVELOP AND USE EQUIPMENT PERFORMANCE SPECIFICATIONS



TRANSPORTATION RESEARCH BOARD / NATIONAL RESEARCH COUNCIL

TRANSPORTATION RESEARCH *CIRCULAR*

Number 381, October 1991
ISSN 0097-8515

HOW TO DEVELOP AND USE EQUIPMENT PERFORMANCE SPECIFICATIONS

Developed by Committee on Maintenance Equipment

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Transportation Research Board
National Research Council
2101 Constitution Avenue, N.W.
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SELECTING THE RIGHT MACHINE

Equipment purchasing officials are often called on to purchase a wide variety of goods and services without the aid of prior experience or working knowledge of the products. This process becomes critical when the official is asked to purchase major products such as four wheel drive (4WD) loaders, backhoe loaders, motor graders or other heavy equipment which often remain in use for several years.

Armed with limited information, it is possible for an organization using the traditional, "award going to the low bidder meeting specifications," method of purchasing to end up with a unit that can't do the job for which it was purchased. Experienced specification writers have developed numerous techniques to avoid this situation. This *Circular* documents some of these techniques and how they can be used.

Equipment performance on the job reflects on how skillfully it was selected for the task. Done well, machine selection follows a systemic process.

FIVE EASY STEPS TO SUCCESSFUL SPECIFICATION WRITING

The five step method to successful specification writing is an excellent approach for reducing guesswork and post-purchase surprises. The basic steps include:

1. Understand Job Requirements
2. Determine What's Most Important
3. Evaluate Equipment On-The-Job
4. Clearly State What Is To Be Purchased
5. Identify the Bid Award Criteria

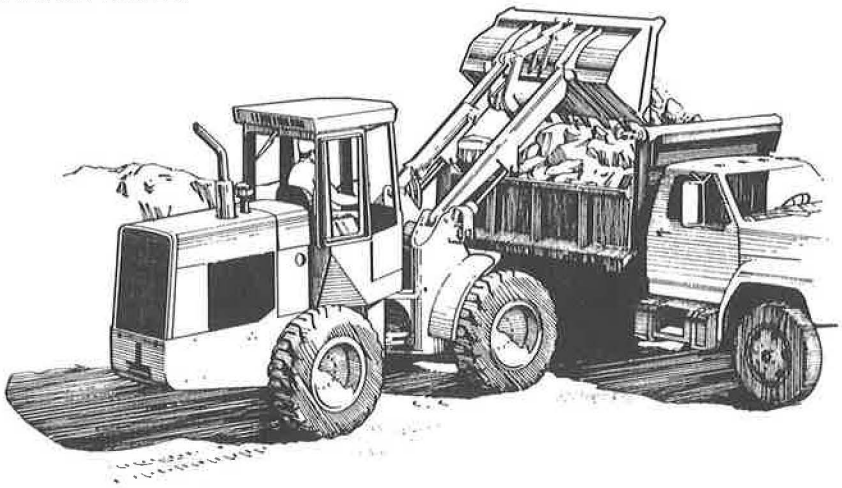
STEP ONE - Understand the Job Requirements

The specification writer must understand what the machine will be doing on the job. An elaborate checklist is not needed, but some basic questions should be answered.

☞ Approximately, what percentage of the machine's time will be spent doing prime job functions?
- ✓ Loading material
- ✓ Digging trenches or ditches
- ✓ Transporting to and from job site
- ✓ Grading
- ✓ Cleaning job site
- ✓ Other appropriate activities

☞ What are the physical restrictions on the machine during storage or transport?
- ✓ Length, width, height
- ✓ Operating weight
- ✓ Size of existing transport trailers

☞ What are the machine performance requirements to do the job?
- ✓ Lifting capacity
- ✓ Digging depth
- ✓ Horsepower
- ✓ Blade pull
- ✓ Break-out force
- ✓ Material carrying capacity
- ✓ Job versatility
- ✓ Servicing ease
- ✓ Convenience of switching attachments
- ✓ Other appropriate performance requirements



☛ What are the time requirements for completing job assignments?

☛ How well has the current machine performed?
- ✓ Ability to do job
- ✓ Reliability
- ✓ Operating cost
- ✓ Dealer/manufacturer service support
- ✓ Purchasing flexibility
- ✓ Ease of repair

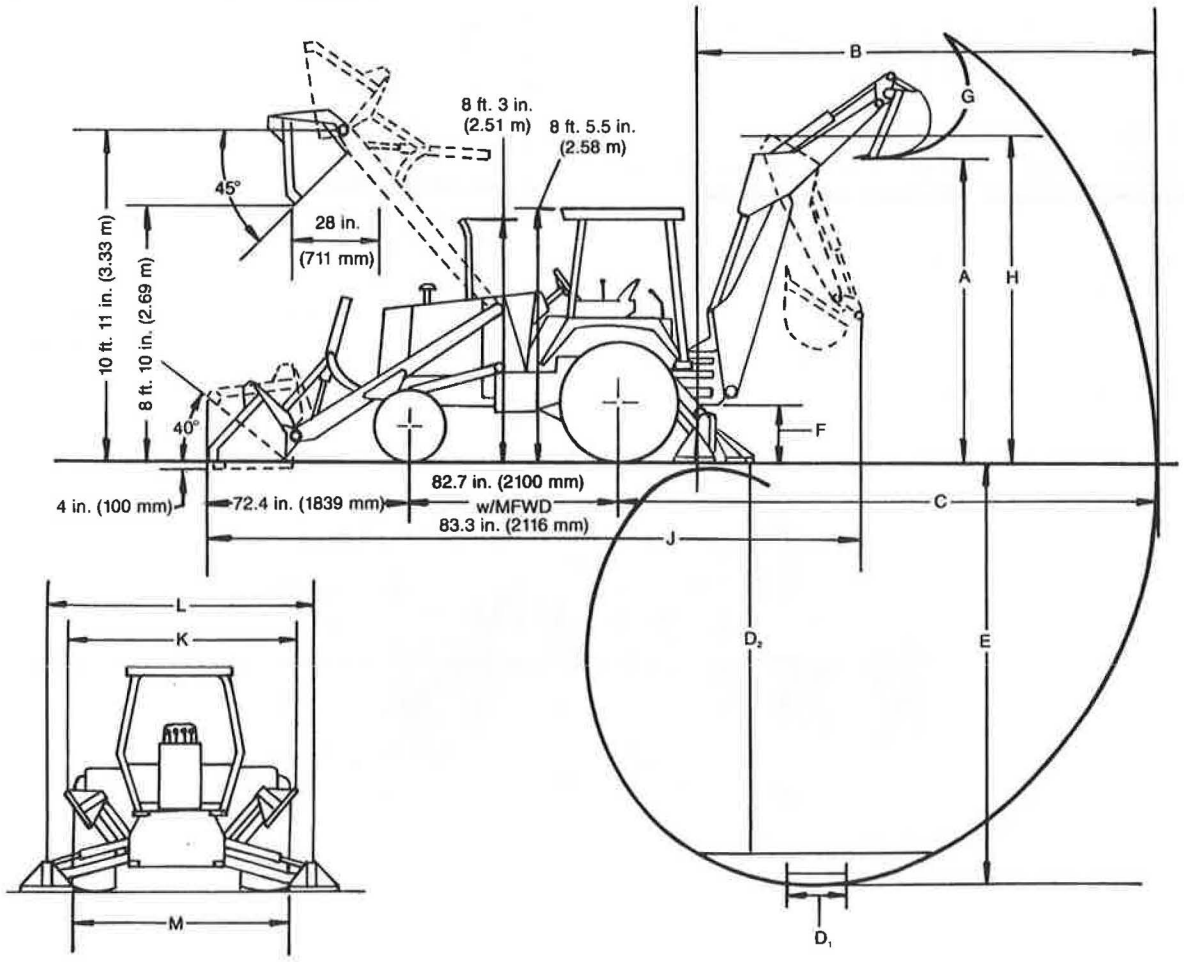
Knowing approximately what percentage of time the machine will be doing different job functions will help identify what major machine type is appropriate for your requirements--A backhoe loader or a 4WD loader? High transport speeds between job sites to help eliminate the need for a transport trailer? High traction effort in difficult excavating or soft soil conditions?

Identifying the actual physical characteristics of the machine required will help to avoid purchasing a machine that is too tall to fit through the opening of the old storage garage, or too long or heavy to fit safely on the old transport trailer.

Knowing the machine performance requirements will help avoid purchasing the wrong machine. If the unit is to be used to lift and set a 4,000 pound manhole section, certainly this performance requirement must be met by any machine purchased. If a proposed machine can't do that, no matter what its bid price, it is of little value to the organization.

The time requirements for completing jobs influences the size of the machine needed. Theoretically, if a 4WD loader is being considered, the only major difference between a 2.5 cubic yard loader and a 3 cubic yard loader, should be how much material per hour each can move. Examining job productivity requirements can help size the machine required to handle the anticipated job.

A source of information often overlooked in identifying job requirements is the organization's success and satisfaction with its current equipment. Don't ignore the favorable or unfavorable track record a piece of equipment/bidder/manufacturer has already established with the organization when the time comes for specifying a replacement unit.



STEP TWO - Determine What's Most Important

Now that the job requirements are known, a clear statement of what is most important must be developed. Key considerations should include at least the following:

- ☛ Machine performance characteristics
- ☛ Evaluation of dealer/manufacturer's prompt parts and service support, warranty, and machine field availability (up time)
- ☛ Machine delivery schedule
- ☛ Life-cycle cost analysis

Certain machine performance characteristics, such as versatility, can be essential for its satisfactory performance. If the machine will be needed for loading trucks and handling debris, plus be the prime mover for a snowblower in the winter, then this versatility must be identified in the purchase specifications.

Prompt parts and service support, good warranty and machine field availability are usually very important to an organization, yet often do not appear in purchase specifications. If prompt dealer parts and service are important, then they should be included. An organization needs to know about a bidder's parts and service capability before it experiences a winter when it's 40 degrees below zero, the roads are drifted shut, and the machine is down. The example shown below illustrates one approach for specifying bidder parts and service.

> Since the continuous operation of this machine is of the utmost importance and sometimes of an emergency nature, the successful bidder must be able to render prompt parts and service. The successful bidder shall maintain or have access to parts inventory within _____ (list city, county, state, or mileage requirement). Said parts inventory shall be of sufficient size and variety to offer a level of parts availability of 95% within 48 hours from time of order by the customer. Availability of normal wear items, such as filters, vee belts, hydraulic lines, and hoses shall not exceed 24 hours. Review of bidder's ability to provide prompt parts and service will be used in determining the qualified bidder.

The delivery schedule for a machine sometimes is critical. If there is a specific time schedule to be met, then that information should be included in the purchase specifications. In an emergency situation when delivery becomes a primary purchasing consideration, the organization may elect to accept a machine immediately off a dealer's yard.

Many organizations confuse machine bid price with machine cost and often incorrectly conclude that the lowest priced machine represents the best value. How much importance should be placed on the actual bid price? Should the organization buy any machine as long as it is low bid? Why purchase a machine if it can't lift and set a 4,000 pound manhole section, if that is part of the job performance requirements? The bid price must be put in proper perspective to the overall capabilities of the machine, parts and service, field availability, and other requirements before the organization can determine the importance of the bid price.

A more important element to consider, other than bid price, is the life cycle cost of the machine. What is the fuel consumption rate? What level of repair parts and labor costs can be expected over the life of the machine? These two items alone could easily outweigh a low bid price. The example shown below details some of the items to consider in determining life cycle cost.

Example 1 Life-cycle cost analysis.

	Bidder #1	Bidder #2
A. Acquisition & Finance Costs		
✓ Down Payment	___	___
✓ Trade-In	___	___
✓ Total Payments	___	___
✓ Acquisition & Finance Costs	___	___
Sub-Total - A	___	___
B. Ownership Period Operating Costs		
✓ Fuel Cost	___	___
✓ Lube, oil, filter, grease cost	___	___
✓ Tire Cost	___	___
✓ Undercarriage Cost	___	___
✓ Repair, Parts & Labor Cost	___	___
✓ Ownership Period Operating Cost	___	___
Sub-Total - B	___	___
C. Critical Use Hours Cost	___	___
D. Equipment Resale Value	___	___
E. Life Cycle Cost (A+B+C-D)	___	___

STEP THREE - Evaluate Equipment On-The-Job

If an organization is going to invest thousands of dollars in a machine, it makes good sense to see what the machine will do on-the-job before spending purchasing dollars. After reading the product literature and listening to presentations by sales representatives, organization officials should request a demonstration to see if the machine will do what the manufacturer/dealer claims it will do. Some organizations use a short-term rental as a method for evaluating equipment on-the-job.

A demonstration (or rental) is also a good opportunity for evaluating key machine features. If sealed brakes are important, then placing the machine in muddy or water conditions will help show how a particular machine's brakes function under these conditions. If a certain attachment is being considered, a demonstration (or rental) is also a good time to verify its merits in overall job operation.

On the manufacturer's specification sheet all machines may look identical. For example, they may all have a 150 horsepower rated engine. However, a demonstration (or rental) may reveal that the working power of each machine under actual job conditions may not be equal. Example 3 illustrates a field evaluation form for a backhoe loader. The demonstration (or rental) is a true "try before you buy" approach where the organization has a low-cost opportunity to discover the meaning of a manufacturer's machine specifications based on actual machine performance on the job. The results of Step Three for several machines should be compared to and integrated with the results of Steps One and Two.

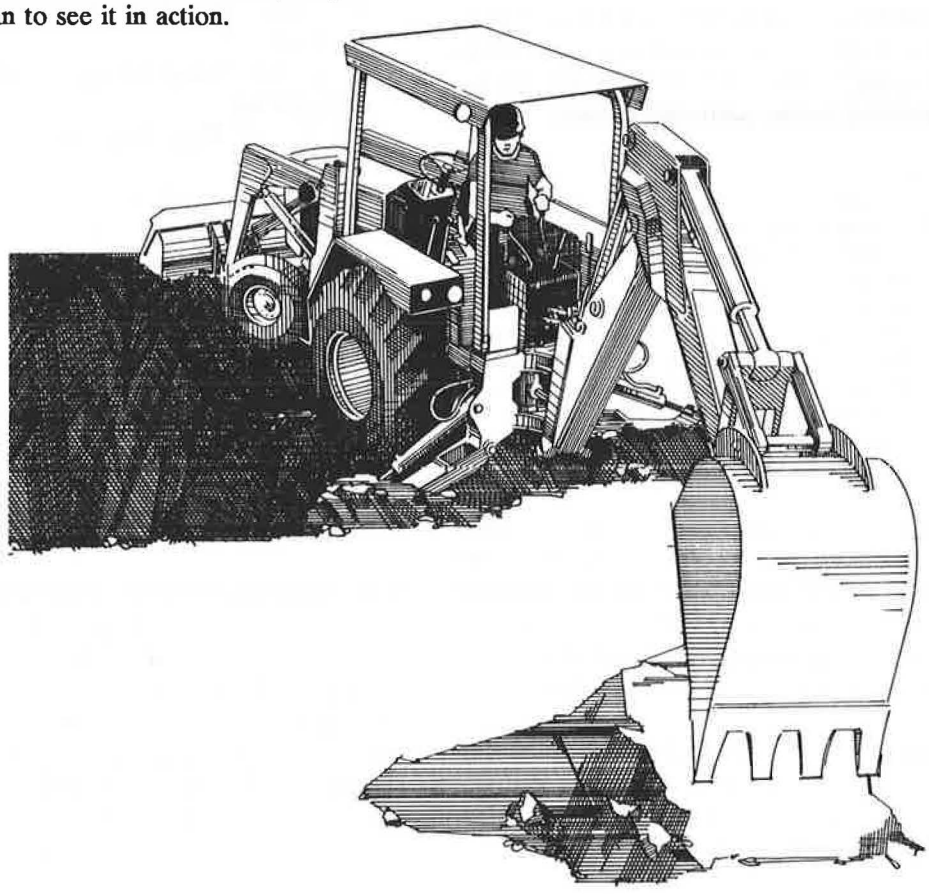
Following the field evaluation, adjustments in the purchasing specifications should be made to insure that all job requirements are included. There's no better way to determine if a machine can lift and set a 4,000 pound manhole section than to see it in action.

STEP FOUR - Clearly State What Is To Be Purchased

To write effective purchase specifications you must understand the job requirements, know what's most important, and evaluate equipment on-the-job. When you complete these steps, you are ready to start the actual writing of the purchase specifications.

Technical vs Performance Specifications. Technical specifications for the purchase of equipment are often drafted after reading several manufacturers' published technical brochures. As a result, it sometimes appears that an organization has described one manufacturer's machine. The description and requirements developed in this manner may be difficult to justify and too restrictive to allow more than one bidder to qualify, and may encourage bid protests from suppliers precluded.

Technical specifications normally describe machine requirements only. The bid award is often based on only a few considerations such as "lowest bid price meeting specifications as written." Adding the clause "reserve the right to accept bids in the best interest of the organization" is a smart choice for providing purchasing flexibility.



Example 2 Field evaluation form for a backhoe loader.

FIELD EVALUATION OF BACKHOE LOADER	YES	NO
1. SIZE		
The operating weight is approximately 11,100 pounds. Does this size ...		
✓ Have adequate weight and balance to provide good operational stability?	____	____
✓ Have good digging stability, so it's not jerked around when working with backhoe in tough ground conditions?	____	____
Comments:		
2. ENGINE		
The unit develops 60 SAE net hp and uses a wet-sleeve, four cylinder design.		
✓ Does the engine provide good lugging power?	____	____
✓ Is the engine fuel consumption level acceptable?	____	____
Comments:		
3. TRANSMISSION		
The unit has a four speed transmission and full power shift direction reverser.		
✓ Is on-the-go shifting ability from 2nd-3rd-4th gear important?	____	____
✓ Is full power reversing of transmission important for such jobs as back filling trenches or working in narrow rights-of-way?	____	____
Comments:		
4. STEERING		
✓ Does the steering system have sufficient power to turn from full-left to full-right when the loader bucket is fully loaded?	____	____
✓ Is the unit's turning clearance circle acceptable?	____	____
Comments:		
5. BRAKES		
✓ Do the brakes effectively stop the machine and provide good control?	____	____
✓ Is any fade or waver of the service brakes noticed?	____	____
✓ Is any fade or waver noticed after operation in mud and water?	____	____
Comments:		
6. LOADER		
✓ Is the loader's lift capacity of 4,600 pounds at full height adequate?	____	____
✓ Is bucket return-to-dig a desirable feature?	____	____
✓ Is the loader's breakout force of 6,700 pounds adequate?	____	____
✓ Does the bucket cut-width cover the full width of rear tires?	____	____
✓ What attachments would be beneficial for year around versatility? (e.g.: quick coupler hitch, clamp bucket, jaw bucket, forks)	____	____
Comments:		
7. BACKHOE		
✓ Does the standard backhoe provide adequate digging depth and reach?	____	____
✓ Would an extendable dipper-stick be a desirable feature?	____	____
✓ Is the unit's rated lifting power available through the full 180-degree swing arc? Was it adequate for most jobs?		
✓ Is the unit's backhoe bucket digging force adequate?	____	____
✓ Should a backhoe with less digging depth, digging power, or lifting power be considered?	____	____
✓ What attachments would be beneficial for year around job versatility? (e.g.: quick coupler hitch, jaw bucket, hydraulic hammer, hydraulic drill, thumb, compactor wheel, earth auger)	____	____
Comments:		

FIELD EVALUATION OF BACKHOE LOADER	YES	NO
8. OPTIONAL FRONT WHEEL DRIVE		
✓ Is the front wheel drive beneficial for most job applications?	____	____
✓ Is the ability to engage or disengage the drive in any gear or direction, on-the-go, and under full engine rpm important?	____	____
✓ Does the drive improve loader bucket fill in hard materials?	____	____
Comments:		
9. OPTIONAL CAB		
✓ Is the cab certified to meet SAE roll-over protection and falling overhead objects protection standards?	____	____
✓ Does the cab meet requirements of visibility, ventilation, noise level, and comfort?	____	____
✓ Are the operating controls convenient, easy to access, and comfortable to work?	____	____
Comments:		
10. TIRES		
✓ Are the tires on the demo unit adequate for most jobs?	____	____
o If not adequate, what tire size is required? _____		
Comments:		
11. DIFFERENTIAL LOCK		
✓ Is the ability to engage the differential lock on-the-go in any gear or direction under full engine rpm important for job performance?	____	____
Comments:		
12. HYDRAULIC SYSTEM		
✓ Are the hydraulics responsive, easy-to-use, and do they provide good control throughout the engine rpm range?	____	____
✓ Is the hydraulic system cooling capacity adequate?	____	____
Comments:		
13. RECOMMENDATION		
✓ Based on your evaluation of the demo unit, would you recommend that this size/class of backhoe loader be considered for purchase?	____	____
Comments:		
14. Evaluation Conducted By _____ **District/Department** _____		

Performance purchase specifications, on the other hand, accurately describe the organization's requirements for not only the performance of the equipment but also the performance of the dealer and manufacturer that is supporting the machine. Performance specifications requirements should be formulated based on knowledge of job requirements, information gained by actual machine demonstrations, and a thorough understanding of available equipment designs and dealer/manufacturer support capabilities. Bid award is determined by several performance considerations.

Organizations sometimes accept features or performance below their requirement level to qualify many bidders. This will most often result in the purchase of inadequate equipment and poor dealer support. Effective performance bid specifications can be written in a manner that allows numerous bidders to qualify. Performance specifications are described in terms of the performance level required rather than the manufacturer's technical specifications. This will allow a bidder or manufacturer to decide if they can add a particular performance feature to their machine (or alert the

organization to the cost) instead of crying "foul" when faced with restrictive technical requirements. The example below illustrates the difference between technical and performance specifications.

Technical:
Service brakes shall be at least 2-wheel, oil cooled, wet disc, self-adjusting type brakes.

Performance:
Service brakes must be sealed and fully enclosed to allow operation in water, mud, snow, and other adverse conditions without encountering brake fade.

Quality performance bid specifications also include a checklist of how many manufacturers meet or do not meet a particular requirement when the specification was written. This listing allows the organization to evaluate the importance of a particular requirement considering the number of manufacturers that can meet the requirement. In writing specifications, it's important to state clearly what the organization intends to purchase.

Getting Started. Suppose the organization wants to draft a four or five page specification for a backhoe loader. Many organizations may begin with the technical specification as shown below:

One, new, backhoe loader, 14-foot digging depth, 60 hp, etc.

This style will certainly get bidders to respond, but normally will not get the machine the organization requires. Is there a better way to state what the organization wants to purchase? The next example is better, but it is still a technical specification:

One, new, backhoe loader, 14-foot SAE 2-foot flat bottom rated digging depth, 60 SAE net hp, 1-cu. yd. bucket, etc.

The SAE (Society of Automotive Engineering) rating is a manufacturing industry standard, so all bidders will have to measure their bid machines the same way. The organization wants 60 SAE net hp, and a 1-cubic yard rated loader bucket, which helps to more precisely define the size of the machine needed.

Is there a better way to state what the organization wants to purchase? The next example shows the organization stating they want a current-year manufactured machine to ensure that the organization is not actually buying a new zero-hour, two-year-old machine that is starting to rust:

One, new, current year manufactured _____ (list specific manufacturers and models) backhoe loaders or approved equal complete per following specifications and all manufacturer's standard equipment, etc.

The organization is also clearly stating they are looking at a specific model and manufacturer of backhoe loader or its approved equal. This is a very accurate way to identify the type, size, and class of machine that the organization has evaluated and has determined will meet its performance requirements. The words "or approved equal" signals to all bidders and manufacturers that the organization will also consider their machine as long as it is equal to the identified unit which the organization knows will do the job. It is important to understand that the wording in the third example is not restrictive. It states that the organization is willing to accept anyone's

proposal, but the organization is reserving the right to evaluate any proposed machine to see if it indeed is equal to what the organization requires. To further protect its right to evaluate an unknown machine before its purchase, an organization should include a machine bid evaluation clause in its specifications:

> The vendor or manufacturer of a machine which is considered for award shall, at the request of the organization, demonstrate the equipment, at a location chosen by the organization and in the presence of authorized organization personnel, to prove any features or performance capabilities which may be in question. Failure of the demonstration machine to meet organization requirements may be adjudged as non-conformance to bid specifications.

If parts and service availability is important to an organization, this requirement must also be clearly stated in the performance specifications:

> Since the continuous operation of this machine is of the utmost importance and sometimes of an emergency nature, the successful bidder must be able to render prompt parts and service. The successful bidder shall maintain or have access to parts inventory within _____ (list city, county, state, or mileage requirement). Said parts inventory shall be of sufficient size and variety to offer a level of parts availability of 95% within 48 hours from time of order by the customer. Availability of normal wear items such as filters, vee belts, hydraulic lines, and hoses shall not exceed 24 hours. Review of bidder's ability to provide prompt parts and service will be used in determining the qualified bidder.

If an organization wants recourse with a bidder for non-performance under terms of the parts and service performance specification requirements, additional wording can be very effective:

> If the bidder fails to provide parts within the time limits specified, said parts shall be provided at no cost to the customer. If the parts delivery exceeds more than ____ hours past the time limit specified, the bidder shall provide a replacement machine (of similar size and capacity) to the organization at a nominal cost of $____/hour until said parts are delivered. Continued failure to deliver parts, as required, may be used as a basis for disqualification of the bidder on future solicitations.

Warranties and Repair Contracts. Standard warranty, extended warranty, purchased warranty, and maintenance guarantees can sometimes be confusing and require detailed documentation to insure that all bidders are offering similar coverage. Simply stating that the machine shall be fully covered for a certain time and usage doesn't insure that the coverage expected by the organization will be provided.

To clarify the issue, request in the purchase specifications that a copy of the warranty be provided with the bidder's proposal. Remember, most manufacturer's warranties do not cover wear items.

> Manufacturer's warranty shall be a minimum of six months on entire machine and 18 additional months on power train. Bidder shall attach copy of warranty.

If additional coverage is required (including wear items), then the additional requirements should be addressed in a separate heading for clarity.

> In addition to the manufacturer's warranty, the bidder shall provide a machine repair parts and labor contract covering all items as specified on attached table for a minimum of ____ months or ____ hours, whichever occurs first. Bidder shall attach copy of proposed extended coverage.

Examples 3 and 4 provide examples of performance specifications for additional power train coverage and for full machine coverage of all major components, respectively. These examples show how an organization can accurately list those items (in addition to the standard manufacturer's warranty) that the bidder must warrant. This helps insure that all bidders are providing the minimum coverage required and have included the cost (if any) for the coverage in their bid proposal.

EXAMPLE 3 Additional power train coverage.

ITEMS TO BE COVERED BY THE BIDDER'S REPAIR CONTRACT

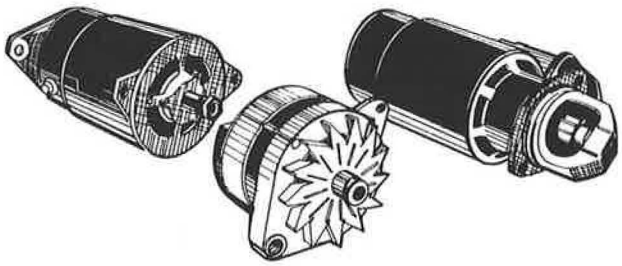
OPTION I: POWER TRAIN COVERAGE

Items in Power Train Coverage shall include:

ENGINE
Rocker Arm Cover and Gasket, Cylinder Head and Gasket, Oil Pan and Gasket, Injection Pump and Gasket, Water Pump and Gasket, Engine Block, Ring Gear and Flywheel, Timing Gear and Flywheel, Timing Gear Cover, Front and Rear Engine Seals, Turbocharger and Gaskets, Flywheel Housing and Gasket, all parts fully enclosed within above components, Manifold and Gaskets, Front Damper, Oil Coolers and Inter-coolers, and Engine Thermostats.

TRANSMISSIONS & TORQUE CONVERTERS
Electronic or Hydraulic Control Valves, Clutch Housing (except Dry Clutch Disc), Torque Converter, Reverser with Control Valve, Splitter Drive, Transfer Drive, Drive Shaft with Universal Joints, Hydrostatic Transmission, Pump or Motor Assemblies (including Control Valve, Hoses, and Lines), Propel Motor, Pump, Brakes and their Control Valves, Swing Motor and Brake, Swing Gearbox and Bearings, Rotary Manifold, Control Valves for propel and swing functions only (not dig functions).

FRONT & REAR DIFFERENTIALS/AXLES
Axle(s) and Differential(s), Final Drive and Axles, Wet Steering Brakes, Wet Brakes and Wet Disk Parking Brakes, Mechanical Front Wheel Drive: Differential/Axle Assembly with its Drive Shaft with Universal Joint and Control, Hydraulic Front Wheel Drive: Axle and Wheel Drive Assembly (including the Drive Pump and Motor, Electronic Control, and Solenoid Control Valve and Divider Valve), Front Wheel Drive Sensors (not Wire Harness), Park Brake Pinon Shaft and Bearing Quill, Bearing on motor grader only



EXAMPLE 4 Additional full machine coverage.

ITEMS TO BE COVERED BY THE BIDDER'S REPAIR CONTRACT

OPTION II: ALL MAJOR COMPONENTS & SYSTEMS

Items covered by the All Major Components and Systems Option II, include those items covered by the Power Train Only Option I, and the following listed additional items:

ENGINE
Oil Filler Tube, Fuel Lines, Fuel Transfer Pump and Gasket, Pulleys, Engine Speed Controls and Linkage, Radiators and Radiator Hoses, Engine Oil Lines, Water Piping, Fuel Tank and associated parts, Engine Sensors and Sending Units, Engine Mounts and Supports and Engine Wiring.

TRANSMISSION
Shift Control Linkage, Levers, Pedals, Control Rods, Sending Units, and Senders, External Oil Lines, Filler Tubes, Filter Screens, Accumulator and related Relief Valves, Transmission Oil Cooler.

DIFFERENTIAL
Differential Lock Valve and associated parts.

STEERING
Steering Pump, Steering Valve and Cylinder(s), Axle, Spindles and Supports, Tie Rods and Tie Rod Ends, Axle Steering Linkage, All secondary Steering System Components, Crossover Relief Valve, and Priority Valve.

HYDRAULIC COMPONENTS
Hydraulic Pumps and Motors and Related Control Valves, Saddle Locking Pin Cylinder, Hydraulic Cylinder, Cylinder Packing Kits, Hydraulic Hoses, Lines, and Fittings, Control and Load Holding Valves, Hydraulic Reservoir.

ELECTRICAL
Starter Motor, Starter Drive, and Solenoid, Alternator and Voltage Regulator, Charging System Wiring, Wiring Harness, Instruments, Indicators, and Sensors, Wiper Motor(s).

BRAKES
Brake Pump, Brake Valve(s), Accumulator(s), Unloading Valve, Pressure Reducing Valve.

FACTORY AIR CONDITIONING
Compressor, Clutch and Pulley, Condenser, Dryer, Evaporator, Accumulator, Expansion Valve, Temperature Control Programmer, Seals and Gaskets, Heater Hoses.

OTHER
Loader Boom, Bucket Linkages, Backhoe Boom, Dipper-stick and Linkages, Scarifier and Ripper Linkages, Scraper Elevator Drive and Gearbox, Conveyor and Elevator Device, Scraper Bowl, Draft Frame and Sliding Floor, Skidder Arch, Boom or Grapple, Forklift Mast and Frame.

STEP FIVE - Establish Bid Award Criteria

The last step in developing clear, accurate, and useful performance specifications is to establish how the organization will select the best proposal. The bid award point system provides a means of integrating the results of the first four steps into a comprehensive process for selecting the best overall proposal. To develop this system, the organization must establish and test its bid proposal evaluation criteria before bid opening, and must identify the relative importance of each criteria. The following example shows the components and the processes required in the development of a bid award point system. This information is provided to all prospective bidders with the bid solicitation.

Example 5 Basis of award.

Successful bidder shall be determined using the following point system. Any bidder not providing mandatory features, or not meeting minimum requirements, may be disqualified. Bidder receiving the highest number of points shall be considered the successful bidder.

*** * * * AWARD CRITERIA POINTS * * * ***

A. Conformance to Bid Specifications	60 Points
B. Machine Job Performance	60 Points
C. Warranty	40 Points
D. Parts & Service Availability	40 Points
E. Lowest Bid Price	40 Points
F. Previous Experience with Bidder	20 Points
G. Machine Delivery	10 Points
MAXIMUM POSSIBLE SCORE	270 Points

The decision on number of points awarded to each proposal will be a judgment by the organization evaluation committee. This committee will rank each bid in each category and award a percentage of possible points based on the following judgments: "Outstanding" = 100%, "Good" = 80%, "Fair" = 60%, "Poor" = 40%, "Unacceptable" = 0%.

NOTE: The technique of making a bid award based on a point system may be viewed as "subjective" under some organization/state purchasing guidelines. Although effective for many organizations, the point method of bid evaluation should be examined by the organization's legal staff to ensure conformance with applicable state's bid laws.

Example 5 shows just one way an organization might decide to award points in their evaluation process. This time the organization has decided that conformance to bid specifications is worth 60 points. (They could have used 100, 1000, or even a dollar amount). Any bidder meeting all specifications as written would receive 60 points. Based on a pre-established scoring procedure, a bidder meeting all but one or two minor items in the specifications might get 45 to 50 points.

The organization could also decided that machine performance gets 60 points. The high relative point value for the first two criteria indicates to the bidders that the organization has carefully researched what machine is needed and will award points to those who bid the machine of the size and performance the organization needs. Fewer points or no points, depending on what the organization pre-establishes, will be given to any bidder who chooses not to bid such a machine. This helps prevent a bidder from second-guessing the organization and bidding a smaller machine, in the interest of lowering the bid price, than what the organization needs.

Some of the non-technical areas important to the organization include the type of warranty provided with the machine (40 points), and parts and service availability (40 points). Lowest bid price is worth 40 points. By alerting bidders of its criteria for low bid price, the organization is indicating it will not sacrifice machine specifications, the ability of the machine to do the job, the warranty, or parts and service availability simply for a low bid price. The organization is showing that it believes that bid price needs to be part of the evaluation, but not the total evaluation. Thus, they are considering the best overall value.

Previous experience with a bidder enables the organization to award points for good past performance and to keep a successful bidder committed to earning future business from the organization. On the other hand, poor past performance will "come back to haunt a bidder" in the form of fewer or no points in this area. Previous experience with the bidder could be based on a variety of areas including: past performance under similar bids, past performance as a vendor of parts, or past performance as a vendor of repair service and warranty.

With proper planning and scheduling, delivery should not be a major issue. This time the organization assigned 10 points to machine delivery. In an emergency situation where the organization needs a machine quickly, machine delivery could be assigned a higher priority.

NOTE: For those organizations that require that the bid be awarded to the lowest bid price, the point system still works. If bidders meet all requirements of the bid--machine specifications, job performance, warranty, parts and service, etc--then the award will be made to the bidder with the lowest bid price. Bidders not meeting requirements of the bid, no matter what bid price, would be disqualified.

UTILIZING THE FIVE STEP METHOD

Successful specification writing involves more than just putting technical information on paper. It requires that the specification writer understand how the machine is going to be used on-the-job. This information will be used to determine the required size and performance capabilities of the machine. It means an organization must determine the relative importance of the machine's performance, prompt parts and service support, acquisition price, warranty, and delivery schedule.

Demonstrating equipment on-the-job to evaluate key machine features and performance, along with clearly stating what is being purchased, are important steps to ensure bidders understand what is required. Identifying the bid award criteria clearly communicates the basis for selection of successful bidder.

By conscientiously following the five step method, an organization can discover just how easy it is to write successful specifications. Development of quality performance specifications, however, takes a serious dedication of time, personnel, and effort.

As a reference, the following pages show some examples of how an organization might layout a spread sheet analysis--using yes, no, or can answer--of their purchasing specifications for: 1) industrial wheel backhoe loader, 2) four wheel drive loader, and 3) all-hydraulic, articulated frame, tandem drive motor grader. This style of spread sheet format can also be used when considering other capital goods such as: automobiles, trucks, cranes, crawlers, and mowing tractors.

Analyzing the specification wording before mailing solicitations (similar to the manner shown in the examples) will allow the organization to clearly pre-determine if the bid specifications meet all of its requirements. Knowing which bidder or model/manufacturer of equipment meets or doesn't meet the performance requirements (as written) and resolving the issue before bid opening will also go a long way in helping make sure the organization can acquire a machine that can do the job for which it was purchased.

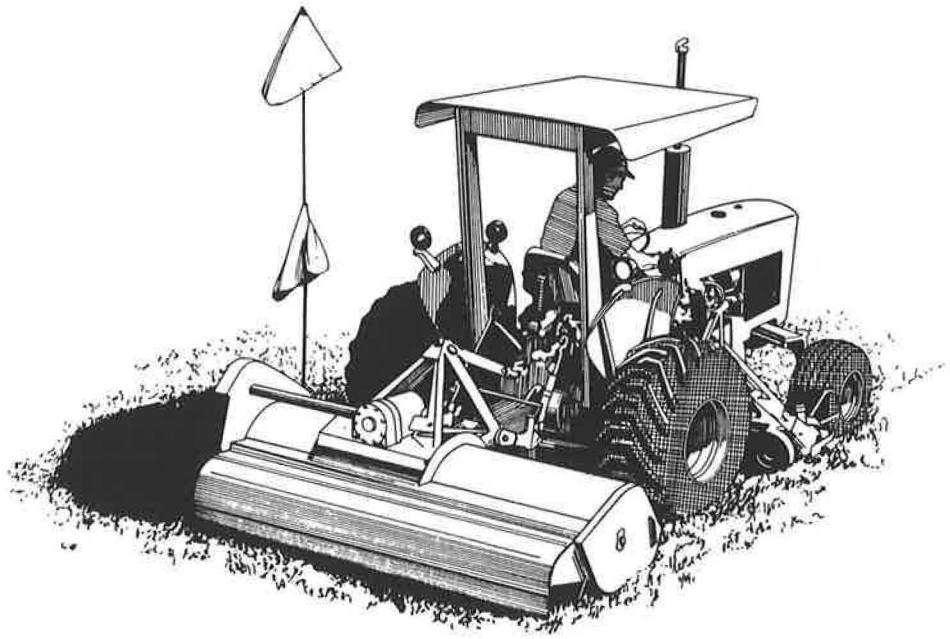
The spread sheet format shown in the examples can also prove handy for pre-bid specification review conference meetings with bidders and organization end users. After bid opening, the spread sheet can serve as a quick guide to review bidder responses.

ADDITIONAL INFORMATION

"Making the right machine decision" for some organizations will also mean understanding various purchasing alternatives, acquisition alternatives, and financing options. It is the intent of the Committee on Maintenance Equipment to investigate and develop future *Circulars* that address areas of interest to Maintenance Operations.

If you would like to receive information on new *Circulars*, have questions on any of the material presented in this booklet, or would like to make a recommendation on subject matter for future *Circulars*, please contact the Committee thru:

Committee on Maintenance Equipment (A3C08)
Transportation Research Board
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418



APPENDIX
PERFORMANCE SPECIFICATION WORKSHEET
(STEP FOUR - Clearly State What Is Being Purchased)

This Appendix contains sample performance specification worksheets for (A1) an industrial wheel backhoe loader - 60 SAE NET HP & 14-foot digging depth class, (A2) a four wheel drive loader - 16,400 pound full turn tipping load class, and (A3) an all-hydraulic, articulated frame, tandem drive motor grader - 27,500 pound operating weight class.

EXAMPLE A1 Sample performance specification worksheet for a backhoe loader.

INDUSTRIAL WHEEL BACKHOE LOADER 60 SAE NET HP & 14-FOOT DIGGING DEPTH CLASS Unit described below shall be a new, current year manufacture, Backhoe Loader that is manufacturer's latest design and production, complete, serviced, ready for work, and includes all standard equipment.						
LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	OTHER	OTHER
1. SIZE						
✓ Equipped per following specs, unit shall have a maximum SAE digging depth of at least 14 feet.	YES	YES	YES	YES	____	____
2. OPERATING WEIGHT						
✓ SAE minimum operating weight of 12,000 pounds exclusive of tire ballast and equipped per the following specs.	YES	YES	YES	NO	____	____
3. ENGINE						
✓ Four cylinder diesel.	YES	YES	YES	YES	____	____
✓ Wet-sleeve cylinder liner design.	YES	NO	NO	NO	____	____
✓ Minimum SAE net hp - 60.	YES	YES	NO	YES	____	____
4. TRANSMISSION						
✓ Transmission shall have a full power shift direction reverser. Minimum 4F-4R speeds.	YES	YES	YES	YES	____	____
✓ Maximum transport speed shall be no less that 20 mph.	YES	YES	NO	NO	____	____
5. STEERING						
✓ Full power steering with emergency dead engine steering capability.	YES	YES	YES	YES	____	____
✓ Turning clearance circle to outside bucket edge shall not exceed 34 feet 9 inches without brakes applied.	YES	YES	DNA	YES	____	____
✓ Turning radius to outside tire edge shall not exceed 13 feet 4 inches without brakes applied.	YES	DNA	DNA	DNA	____	____
6. DRIVE AXLES						
✓ Inboard planetary gear drive to each wheel.	YES	YES	YES	NO	____	____
✓ Foot-operated, automatic release, rear axle differential lock engageable under full engine rpm required. Torque proportioning rear axle not acceptable due to the tire scuffing and work surface damage it can generate.	YES	CAN	CAN	CAN	____	____

INDUSTRIAL WHEEL BACKHOE LOADER
60 SAE NET HP & 14-FOOT DIGGING DEPTH CLASS

Unit described below shall be a new, current year manufacture, Backhoe Loader that is manufacturer's latest design and production, complete, serviced, ready for work, and includes all standard equipment.

LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	OTHER	OTHER
7. BRAKES						
✓ Service brakes shall be 2-wheel, disk type, sealed and fully enclosed to allow operation in water, mud, snow and other adverse conditions without encountering brake fade.	YES	YES	YES	NO	____	____
✓ Service brakes shall be self-adjusting.	YES	YES	NO	YES	____	____
✓ Service brake engagement shall be all-hydraulic.	YES	YES	NO	NO	____	____
✓ The parking/secondary brake system shall be independent of service brakes and be of sufficient design to hold weight of machine on slope.	YES	YES	NO	YES	____	____
✓ The parking/secondary brake system shall have a warning light or buzzer.	YES	YES	CAN	CAN	____	____
8. TIRES (for units without MFWD)						
✓ Front tires shall be a minimum of 7.50-16, 10PR, F3. Rear tires shall be a minimum of 16.9-24, 8PR, R4.	YES	CAN	CAN	CAN	____	____
9. VEHICLE FRAME						
✓ Unit shall feature a single piece weldment, full-length unitized main frame for increased operating reliability and component serviceability.	YES	YES	NO	YES	____	____
10. OPTIONAL FRONT WHEEL DRIVE						
✓ Mechanical front wheel drive shall be engageable on-the-go.	YES	NO	NO	NO	____	____
✓ Front axle shall have a limited slip differential.	YES	NO	NO	NO	____	____
✓ Front tires shall be a minimum 12.00-16.5, 8PR. Rear tires shall be a minimum 16.9-24, 8PR, R4.	YES	CAN	CAN	CAN	____	____
✓ Turning clearance circle to outside bucket edge shall not exceed 34 feet 4 inches without brakes applied.	YES	NO	DNA	NO	____	____
✓ Turning radius to outside tire edge shall not exceed 13 feet 4 inches without brakes applied.	YES	DNA	DNA	DNA	____	____
11. LOADER						
✓ Loader shall be self-leveling.	YES	YES	YES	YES	____	____
✓ Equipped with an automatic return-to-dig.	YES	YES	NO	YES	____	____
✓ Equipped with a G.P. bucket rated at a minimum.87 cubic yards SAE heaped capacity and cuts the full width of rear tires.	YES	CAN	CAN	CAN	____	____
✓ Minimum SAE J732C bucket breakout force of 6,500 lbs required.	YES	YES	YES	YES	____	____
✓ Minimum SAE loader lift rating of 4,500 pounds to full height required.	YES	YES	YES	YES	____	____
12. HYDRAULIC SYSTEM						
✓ System shall have a minimum flow of 24 gpm to the backhoe and provide adequate cooling for hydraulic tools and attachments.	YES	YES	YES	NO	____	____
✓ Backhoe stabilizer hydraulic lock-outs shall be provided in both the work and transport positions.	YES	YES	NO	NO	____	____
13. BACKHOE						
✓ SAE maximum digging depth of at least 14 feet.	YES	YES	YES	YES	____	____
✓ SAE J31 minimum backhoe lifting capacity of 2,200 pounds to 12-foot lift height through the full 180 degree swing arc.	YES	DNA	YES	NO	____	____
✓ Minimum backhoe bucket cylinder digging force of 10,000 pounds.	YES	NO	YES	NO	____	____
14. OPTIONAL EXTENDABLE DIPPER-STICK						
✓ Extendable dipper-stick shall have a minimum extension of 4 feet.	YES	NO	NO	NO	____	____
✓ A minimum of 175-degree bucket rotation shall be maintained to help decrease bucket spillage during truck loading operations.	YES	YES	YES	NO	____	____

INDUSTRIAL WHEEL BACKHOE LOADER
60 SAE NET HP & 14-FOOT DIGGING DEPTH CLASS

Unit described below shall be a new, current year manufacture, Backhoe Loader that is manufacturer's latest design and production, complete, serviced, ready for work, and includes all standard equipment.

LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	OTHER	OTHER
15. COOLING SYSTEM ✓ Pressurized liquid cooling system with thermostat. Radiator shall be filled with manufacturer's approved anti-freeze solution that provides protection to at least -30 degrees F.	YES	CAN	CAN	CAN	____	____
16. ELECTRICAL ✓ Batteries shall have a minimum reserve capacity rating of minutes. Alternator shall be a minimum of 78 amps. Unit shall have a minimum of two front halogen work/driving lights, one combination stop/tail light, and a lighted instrument panel.	YES	CAN	CAN	CAN	____	____
17. STANDARD INSTRUMENTATION ✓ Unit shall have side mounted gauges or monitoring system that includes: transmission temperature, engine coolant temperature, engine oil pressure, parking brake engagement, hydraulic filter restriction, fuel, alternator, and electric hour meter. Engine coolant temperature, engine oil pressure and parking brake system shall include audible and visual warning.	YES	CAN	CAN	CAN	____	____
18. OPERATOR'S STATION ✓ Station shall be SAE ROPS/FOPS certified. Station shall be isolation mounted and include a roof panel and seat belt. Instrumentation vandal protection shall be included on ROPS canopy unit.	YES	CAN	CAN	CAN	____	____
19. OPTIONAL CAB ✓ Cab shall be SAE ROPS/FOPS certified. Fully enclosed cab shall be isolation mounted and include seat belt, front defroster fan, heater, front and rear windshield wipers, tinted safety glass, latched windows, and lockable cab doors. Must also include additional lighting package of: two rear halogen work lights, two front and two rear turn and flashing lights, two stop lights, one tail light, dome light.	YES	CAN	CAN	CAN	____	____
✓ A minimum of one cab entry door shall open within the width of the machine to avoid opening into traffic lanes for improved operator safety.	YES	NO	NO	NO	____	____
20. ADDITIONAL EQUIPMENT ✓ Unit shall have all standard equipment and shall include: key ignition switch w/safety start, hand and foot throttle, horn, cold weather starting aid, dry-type air cleaner and restriction indicator, muffler, lockable engine side shields, reverse warning alarm and SMV emblem, engine fuel filter, mounting steps and safety hand holds, and backhoe boom transport locks.	YES	CAN	CAN	CAN	____	____
21. WARRANTY ✓ Manufacturer's warranty shall be a minimum of six months on entire machine and 18 additional months on power train. Bidder shall attach copy of warranty.	YES	CAN	CAN	CAN	____	____
22. EXTENDED COVERAGE CONTRACT ✓ In addition to manufacturer's warranty, bidder shall provide an extended coverage contract for machine repair, parts, and labor covering all items as specified on the attached sheet for a minimum of ___ months and ___ hours, whichever occurs first. Bidder shall attach copy of proposed extended coverage contract.	YES	CAN	CAN	CAN	____	____

INDUSTRIAL WHEEL BACKHOE LOADER
60 SAE NET HP & 14-FOOT DIGGING DEPTH CLASS

Unit described below shall be a new, current year manufacture, Backhoe Loader that is manufacturer's latest design and production, complete, serviced, ready for work, and includes all standard equipment.

LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	OTHER	OTHER
23. REPAIR PARTS AND SERVICE ✓ Since the continuous operation of this backhoe loader is of the utmost importance and sometimes of an emergency nature, it is necessary that the successful bidder be able to render prompt parts and service. The successful bidder shall maintain or have access to parts inventory within _____ (list city, county, state or mileage requirement). Said parts inventory shall be of sufficient size and variety to offer a level of parts availability of 95% within 48 hours from time of order by the customer. Availability of normal maintenance items such as filters, vee belts, hydraulic lines, and hoses shall not exceed 24 hours. Bidder shall attach his proposed program for parts and service availability for evaluation. Review of the bidder's ability to provide prompt parts and service will be used in determining low, qualified bidder.	YES	CAN?	CAN?	CAN?	____	____
24. MANUALS ✓ Successful bidder shall provide ____ copies of Operator's Manual and ____ copies current parts and repair manuals.	CAN	CAN	CAN	CAN	____	____
25. TRAINING ✓ Successful bidder shall provide ____ hours of on-site operator or preventive maintenance training. Any costs for such training must be noted by bidder.	CAN	CAN	CAN	CAN	____	____
26. DEMONSTRATION ✓ The vendor or manufacturer of the backhoe loader which is considered for award may be required to demonstrate his backhoe loader at a location chosen by the customer and in the presence of authorized customer representatives to prove out any features which may be in question. Failure of the demonstration machine to meet customer requirements may be adjudged as non-conformance to these specifications.	CAN?	CAN?	CAN?	CAN?	____	____
27. DELIVERY ✓ Time of delivery may be an important factor in determining successful bidder.						

28. BASIS OF AWARD

✓ Successful bidder shall be determined using the following point system. Any bidder not providing mandatory features or not meeting minimum requirements may be disqualified. Bidder receiving the highest number of points shall be considered the successful bidder.

* * * * AWARD CRITERIA POINTS * * * *

A. CONFORMITY TO BID SPECIFICATIONS	60 POINTS
B. MACHINE JOB PERFORMANCE	60 POINTS
C. WARRANTY PROVIDED	40 POINTS
D. PARTS AND SERVICE AVAILABILITY	40 POINTS
E. LOWEST BID PRICE	40 POINTS
F. PREVIOUS EXPERIENCE WITH BIDDER	20 POINTS
G. MACHINE DELIVERY	10 POINTS
MAXIMUM POSSIBLE SCORE	270 POINTS

The decision on the number of points awarded will be a judgement by the agency evaluation committee. The evaluation committee will rank the bidder in each category and award a percentage of possible points based on the following judgements of: "Outstanding" = 100%; "Good" = 80%; "Fair" = 60%; "Poor" = 40%; or "Unacceptable" = 0%.

EXAMPLE A2 Sample performance specification worksheet for a four wheel drive loader.

FOUR WHEEL DRIVE LOADER
16,400 POUND FULL TURN TIPPING LOAD CLASS

Unit described below shall be a new, current year manufacture, Four-Wheel-Drive Loader that is manufacturer's latest design and production, complete, serviced, ready for work, and includes all standard equipment.

LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	OTHER	OTHER
1. OPERATING WEIGHT						
✓ SAE minimum operating weight of 23,500 pounds exclusive of tire ballast and equipped per the following specs.	YES	YES	YES	NO	____	____
2. SIZE						
✓ Equipped per following specs, unit shall have a minimum 40- degree turn tipping load of 16,400 pounds.	YES	YES	NO	YES	____	____
3. ENGINE						
✓ Six cylinder, turbocharged, diesel.	YES	NO	NO	YES	____	____
✓ Wet-sleeve cylinder liner design.	YES	YES	NO	NO	____	____
✓ Minimum SAE net hp - 115.	YES	YES	YES	YES	____	____
4. TRANSMISSION						
✓ Full power shift with torque converter. Minimum 4F - 3R speeds.	YES	YES	YES	NO	____	____
5. STEERING						
✓ Full hydraulic articulated frame steering. Loader clearance turning circle shall not exceed 37 feet 6 inches.	YES	NO	YES	YES	____	____
6. DRIVE AXLES						
✓ Inboard planetary gear drive to each wheel.	YES	NO	NO	YES	____	____
✓ Lock/unlock differential or No-Spin in at least one axle. Torque proportioning axles alone DO NOT meet this specification requirement.	YES	CAN	CAN	CAN	____	____
7. BRAKES						
✓ Brakes must be sealed and fully enclosed to allow operation in water, mud, snow, and other adverse conditions without encountering brake fade.	YES	NO	NO	YES	____	____
✓ Parking/secondary brake shall be independent of service brakes and shall have a warning light or buzzer and be of sufficient design to hold weight of machine on slope.	YES	YES	YES	YES	____	____
8. TIRES						
✓ All tires shall be a minimum of 17.5-25 12PR, L2.	YES	CAN	CAN	CAN	____	____
9. LOADER						
✓ Loader shall have a General Purpose bucket that has a minimum SAE heaped capacity of 2.25 cubic yards. Loader shall include automatic return-to-dig and bucket self-leveling.	YES	CAN	CAN	CAN	____	____
✓ Minimum SAE J732C bucket breakout force of 22,600 pounds required.	YES	YES	YES	YES	____	____
10. DUMP CLEARANCE						
✓ Loader shall have a minimum dump clearance to the cutting edge of 111 inches at full height.	YES	YES	YES	YES	____	____
11. HYDRAULIC SYSTEM						
✓ Loader shall feature hydraulic lift, lower, dump, roll-back, and float.	YES	YES	YES	YES	____	____
✓ Bucket shall have sufficient "wrap-out" to knock sticky material out of the bucket.	YES	CAN?	CAN?	CAN?	____	____

FOUR WHEEL DRIVE LOADER
16,400 POUND FULL TURN TIPPING LOAD CLASS

Unit described below shall be a new, current year manufacture, Four-Wheel-Drive Loader that is manufacturer's latest design and production, complete, serviced, ready for work, and includes all standard equipment.

LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	OTHER	OTHER
12. COOLING SYSTEM ✓ Pressurized liquid cooling system with thermostat. Radiator shall be filled with manufacturer approved anti-freeze solution that provides protection to at least -30 degrees F.	YES	CAN	CAN	CAN	____	____
13. ELECTRICAL ✓ Batteries shall have a minimum reserve capacity rating of 160 minutes. Alternator shall be a minimum of 65 amps. Unit shall have a minimum of two front and two rear work lights, two separate front driving lights, two separate combination stop and tail lights, front and rear turn and flashing signals, lighted instrumental panel.	YES	CAN	CAN	CAN	____	____
14. CAB ✓ Unit shall have a fully enclosed steel sound-suppressed cab that provides roll-over protection in accord with SAE J394. Cab shall include: heater, defroster, pressurizer, front & rear windshield washers/wipers, dome light, floor mat, tinted safety glass, dual inside rear view mirrors. Operator's seat shall be fabric deluxe mechanical or air suspension type that is adjustable for operator height, weight, leg reach, and back angle preference. Seat belt and adjustable arm rests shall be included.	YES	CAN	CAN	CAN	____	____
15. CAB INSTRUMENTATION ✓ Cab instrumentation shall include dash-mounted gauges or monitor system to include: transmission oil temp., transmission oil pressure, fuel, engine coolant temp., engine oil pressure, electric hour meter, electric voltage. Engine coolant and engine pressure system shall include audible and visual warning.	YES	CAN	CAN	CAN	____	____
16. ADDITIONAL EQUIPMENT ✓ Unit shall have all standard equipment and shall include: key ignition switch w/safety start, foot throttle, horn, cold weather starting aid, pre-cleaner, dry-type air cleaner with safety element and restriction indicator, muffler, front wheel fenders, fixed drawbar, hinged lockable engine side shields, reverse warning alarm and SMV emblem, articulation locking bar and pin, engine fuel filter, lockable cab doors, mounting steps and safety hand holds. All locks shall be keyed the same.	YES	CAN	CAN	CAN	____	____
17. WARRANTY ✓ Manufacturer's warranty shall be a minimum of six months on entire machine and 18 additional months on power train. Bidder shall attach copy of warranty.	YES	CAN	CAN	CAN	____	____
18. EXTENDED COVERAGE CONTRACT ✓ In addition to manufacturer's warranty, bidder shall provide an extended coverage contract for machine repair, parts, and labor covering all items as specified on the attached sheet for a minimum of ____ months and ____ hours, whichever occurs first. Bidder shall attach copy of proposed extended coverage contract.	YES	CAN	CAN	CAN	____	____

FOUR WHEEL DRIVE LOADER
16,400 POUND FULL TURN TIPPING LOAD CLASS

Unit described below shall be a new, current year manufacture, Four-Wheel-Drive Loader that is manufacturer's latest design and production, complete, serviced, ready for work, and includes all standard equipment.

LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	OTHER	OTHER
19. REPAIR PARTS AND SERVICE ✓ Since the continuous operation of this loader is of the utmost importance and sometimes of an emergency nature, it is necessary that the successful bidder be able to render prompt parts and service. The successful bidder shall maintain or have access to parts inventory within _____ (list city, county, state or mileage requirement). Said parts inventory shall be of sufficient size and variety to offer a level of parts availability of 95% within 48 hours from time of order by the customer. Availability of normal maintenance items such as filters, vee belts, hydraulic lines, and hoses shall not exceed 24 hours. Bidder shall attach his proposed program for parts and service availability for evaluation. Review of the bidder's ability to provide prompt parts and service will be used in determining low, qualified bidder.	YES	CAN?	CAN?	CAN?	____	____
20. MANUALS ✓ Successful bidder shall provide ____ copies of Operator's Manuals and ____ copies of current parts and repair manuals.	YES	CAN?	CAN?	CAN?	____	____
21. TRAINING ✓ Successful bidder shall provide ____ hours of on-site operator or preventive maintenance training. Costs for such training shall be noted by bidder.	YES	CAN?	CAN?	CAN?	____	____
22. DEMONSTRATION ✓ The vendor or manufacturer of the loader which is seriously considered for award shall, at the request of the customer, demonstrate his loader at a location chosen by the customer and in the presence of authorized customer representatives to prove out any features which may be in question. Failure of the demonstration machine to meet customer requirements may be adjudged as nonconformance to these specifications.	CAN?	CAN?	CAN?	CAN?	____	____
23. DELIVERY ✓ Time of delivery may be an important factor in determining successful bidder.						

24. BASIS OF AWARD

✓ Successful bidder shall be determined using the following point system. Any bidder not providing mandatory features or not meeting minimum requirements may be disqualified. Bidder receiving the highest number of points shall be considered the successful bidder.

* * * * AWARD CRITERIA POINTS * * * *

A. CONFORMITY TO BID SPECIFICATIONS	60 POINTS
B. MACHINE JOB PERFORMANCE	60 POINTS
C. WARRANTY PROVIDED	40 POINTS
D. PARTS AND SERVICE AVAILABILITY	40 POINTS
E. LOWEST BID PRICE	40 POINTS
F. PREVIOUS EXPERIENCE WITH BIDDER	20 POINTS
G. MACHINE DELIVERY	10 POINTS
MAXIMUM POSSIBLE SCORE	270 POINTS

The decision on the number of points awarded will be a judgement by the agency evaluation committee. The evaluation committee will rank the bidder in each category and award a percentage of possible points based on the following judgements of "Outstanding" = 100%; "Good" = 80%; "Fair" = 60%; "Poor" = 40%; or "Unacceptable" = 0%.

EXAMPLE A3 Sample performance specification worksheet for a motor grader.

ALL-HYDRAULIC, ARTICULATED FRAME, TANDEM DRIVE MOTOR GRADER
27,500 POUND OPERATING WEIGHT CLASS

Unit described below shall be a new, current year manufacture, Motor Grader that is manufacturer's latest design and production, complete, serviced, ready for work, and includes all standard equipment.

LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	UNIT #5	OTHER
1. SIZE						
✓ Equipped per following specifications, SAE minimum operating weight without add-on weights or wheel ballast shall be at least 27,500 pounds.	YES	YES	YES	YES	YES	____
2. TYPE						
✓ Six wheels, four-wheel tandem drive, articulated frame.	YES	YES	YES	YES	YES	____
3. ENGINE						
✓ Six cylinder, turbocharged diesel.	YES	YES	YES	YES	YES	____
✓ Wet-sleeve cylinder liner design.	YES	YES	YES	YES	YES	____
✓ If grader has a torque converter transmission, engine shall develop a minimum of 150 SAE net hp. If grader has a FULL power shift, direct-drive transmission, engine shall develop at least 135 SAE net hp.	YES	YES	YES	NO	NO	____
4. TRANSMISSION						
✓ Full power shift. No operator clutching required for direction or gear changes.	YES	YES	YES	YES	YES	____
✓ Transmission shall provide five working speeds below 9 mph to better match engine rpm and travel speed to load for improved fuel economy and increased engine life.	YES	NO	NO	NO	NO	____
✓ Maximum transport speed shall be no less than 24 mph.	YES	YES	NO	YES	YES	____
5. STEERING						
✓ FULL hydraulic power steering. Minimum machine turning radius shall not be greater than 24 feet.	YES	NO	NO	NO	NO	____
6. DRIVE AXLES						
✓ Inboard planetary gear drive to each wheel.	YES	YES	NO	NO	NO	____
✓ No-Spin or foot-operated, hydraulically actuated rear axle differential lock-unlock engageable on-the-go under full engine rpm in any gear.	YES	CAN	YES	YES	YES	
7. BRAKES						
✓ Brakes must be sealed and fully enclosed to allow operation in water, mud, snow, and other adverse conditions without encountering brake fade.	YES	CAN	DNA	DNA	YES	____
✓ If air brake equipped, air dryer must be provided.	N.A.	N.A.	N.A.	N.A.	CAN	____
✓ The parking/secondary brake system shall be independent of service brakes and shall have warning light or buzzer and be of sufficient design to hold weight of machine on a slope.	YES	CAN	CAN	CAN	CAN	____
8. TIRES						
✓ All six tires shall be minimum of 14.00-24, 12PR, G2 on 10-inch rims.	YES	CAN	CAN	CAN	CAN	____
9. FRONT AXLE & WHEELS						
✓ Oscillating axle and left/right hydraulic power wheel lean.	YES	YES	YES	YES	YES	____
✓ Axle of sufficient strength to allow mounting of front V-plow, blade or attachments.	YES	YES	YES	YES	YES	____
10. SCARIFIER						
✓ Scarifier to be mounted ahead of front tires to serve as mounting point for V-plow, blade or other attachments.	YES	CAN	CAN	CAN	CAN	____
✓ V-type scarifier, 5 teeth with replaceable tips.	YES	CAN	CAN	CAN	CAN	____
✓ Minimum cut width of 48".	YES	YES	NO	NO	NO	____
✓ Hydraulically controlled, including float.	YES	NO	NO	NO	NO	____
✓ Scarifier to have adjustable pitch.	YES	NO	NO	NO	NO	____

ALL-HYDRAULIC, ARTICULATED FRAME, TANDEM DRIVE MOTOR GRADER
27,500 POUND OPERATING WEIGHT CLASS

Unit described below shall be a new, current year manufacture, Motor Grader that is manufacturer's latest design and production, complete, serviced, ready for work, and includes all standard equipment.

LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	UNIT #5	OTHER
11. MOLDBOARD & BLADE						
✓ 12-foot length, 24-inch height, 0.88-inch thickness.	YES	CAN	CAN	CAN	CAN	____
✓ Boron steel or equal cutting edges guaranteed against breakage.	YES	CAN	CAN	CAN	CAN	____
✓ Full hydraulic control including circle sideshift, blade sideshift, circle rotation, saddle rotation, blade pitch, and blade float. 90 degree and 2:1 bank cutting angle left or right obtainable without leaving operator's cab.	YES	CAN	CAN	CAN	CAN	____
12. COOLING SYSTEM						
✓ Pressurized liquid cooling system with thermostat. Radiator shall be filled with manufacturer approved anti-freeze solution that provides protection to at least -30 degrees F.	YES	CAN	CAN	CAN	CAN	____
13. ELECTRICAL						
✓ Batteries shall have a minimum reserve capacity rating of 180 minutes. Alternator shall be a minimum of 42 amps. Unit shall have a minimum of two front and rear work lights, two combination stop/tail lights, turn and flashing lights, and a lighted instrument panel.	YES	CAN	CAN	CAN	CAN	____
14. INSTRUMENTATION						
✓ Unit shall have dash mounted gauges or monitoring system that will include: transmission temperature, engine coolant temperature, engine oil pressure, parking brake engagement, rear steer indicator, hydraulic filter restriction, fuel, alternator, and electric hour meter. Engine coolant and engine oil pressure systems shall include audible and visual warning.	YES	CAN	CAN	CAN	CAN	____
15. CAB						
✓ Cab shall be low profile design not to exceed 10 foot 2 inch overall height and shall be SAE ROPS certified.	YES	NO	NO	NO	NO	____
✓ Cab shall be isolation mounted, sound insulated, and include a seat belt, deluxe cloth suspension seat that is adjustable for operator weight, leg reach, back angle, and arm rests; defroster fan, heater, front and rear windshield wipers, inside mounted rear view mirror, tinted safety glass, dome light, and lockable cab doors.	YES	CAN	CAN	CAN	CAN	____
16. ADDITIONAL EQUIPMENT						
✓ Unit shall have all standard equipment and shall include: key ignition switch w/safety start, foot throttle, horn, cold weather starting aid, dry-type air cleaner with safety element and restriction indicator, muffler, hinged & lockable full length engine side shields, reverse warning alarm and SMV emblem, engine fuel filter, mounting steps and safety hand holds, tool box with hinged cover, complete lock-up vandal protection, and transmission bottom guard. All locks shall be keyed the same.	YES	CAN	CAN	CAN	CAN	____
17. WARRANTY						
✓ Manufacturer's warranty shall be a minimum of six months on entire machine and 18 additional months on power train. Bidder shall attach copy of warranty.	YES	CAN	CAN	CAN	CAN	____
18. EXTENDED COVERAGE CONTRACT						
✓ In addition to manufacturer's warranty, bidder shall provide an extended coverage contract for machine repair, parts, and labor covering all items as specified on the attached sheet for a minimum of ____ months and ____ hours, whichever occurs first. Bidder shall attach copy of proposed extended coverage contract.	YES	CAN	CAN	CAN	CAN	____

ALL-HYDRAULIC, ARTICULATED FRAME, TANDEM DRIVE MOTOR GRADER
27,500 POUND OPERATING WEIGHT CLASS

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LEGEND: YES = Unit meets or exceeds requirements; NO = Unit does not meet requirements; CAN = Unit can meet requirements, but is not standard equipment; CAN? = Appears unit can meet requirements, but is not standard equipment; DNA = Data not available from published specifications.	UNIT #1	UNIT #2	UNIT #3	UNIT #4	UNIT #5	OTHER
19. REPAIR PARTS AND SERVICE ✓ Since the continuous operation of this motor grader is of the utmost importance and sometimes of an emergency nature, it is necessary that the successful bidder be able to render prompt parts and service. The successful bidder shall maintain or have access to parts inventory within _____ (list city, county, state or mileage requirement). Said parts inventory shall be of sufficient size and variety to offer a level of parts availability of 95% within 48 hours from time of order by customer. Availability of normal maintenance items such as filters, vee belts, hydraulic lines, and hoses shall not exceed 24 hours. Bidder shall attach his proposed program for parts and service availability for evaluation. Review of the bidder's ability to provide prompt parts and service will be used in determining low, qualified bidder.	YES	CAN?	CAN?	CAN?	CAN?	____
20. MANUALS ✓ Successful bidder shall provide ____ copies of Operator's Manual and ____ copies of current parts and repair manuals.	YES	CAN?	CAN?	CAN?	CAN?	____
21. TRAINING ✓ Successful bidder shall provide ____ hours of on-site operator or preventive maintenance training. Costs for such training shall be noted by bidder.	YES	CAN?	CAN?	CAN?	CAN?	____
22. DEMONSTRATION ✓ The vendor or manufacturer of the motor grader which is seriously considered for award shall, at the request of the customer, demonstrate his motor grader at a location chosen by the customer and in the presence of authorized customer representatives to prove out any features which may be in question. Failure of the demonstration machine to meet customer requirements may be adjudged as nonconformance to these specifications.	CAN?	CAN?	CAN?	CAN?	CAN?	____
23. DELIVERY ✓ Time of delivery may be an important factor in determining successful bidder.						

24. BASIS OF AWARD

✓ Successful bidder shall be determined using the following point system. Any bidder not providing mandatory features or not meeting minimum requirements may be disqualified and not assigned a score. Bidder receiving the highest number of points shall be considered the successful bidder.

* * * * AWARD CRITERIA POINTS * * * *

A. CONFORMITY TO BID SPECIFICATIONS	60 POINTS
B. MACHINE JOB PERFORMANCE	60 POINTS
C. WARRANTY PROVIDED	40 POINTS
D. PARTS AND SERVICE AVAILABILITY	40 POINTS
E. LOWEST BID PRICE	40 POINTS
F. PREVIOUS EXPERIENCE WITH BIDDER	20 POINTS
G. MACHINE DELIVERY	10 POINTS
MAXIMUM POSSIBLE SCORE	270 POINTS

The decision on the number of points awarded will be a judgement by the agency evaluation committee. The evaluation committee will rank the bidder in each category and award a percentage of possible points based on the following judgements of "Outstanding" = 100%; "Good" = 80%; "Fair" = 60%; "Poor" = 40%; or "Unacceptable" = 0%.