CONTRACT AWARD CA2074-18

CONTRACTOR: M-B Companies, Inc.

1200 Park Street

Chilton, WI 53014

Contact: Scott Scharninger

(920) 898-1080

SECTIONS:

SECTION I – AIP SPECIAL TERMS AND CONDITIONS

SECTION II – AIP STANDARD TERMS AND CONDITIONS

SECTION III – SPECIFICATIONS

SECTION IV – PRICE SCHEDULE



CONTRACTING AUTHORITY:

STATE OF ALASKA

HQ, STATE EQUIPMENT FLEET

2200 E 42ND AVENUE

ANCHORAGE, AK 99508

CONTRACTING OFFICER: KRISTI FUTREL

(907) 269-0793

KRISTI.FUTREL@ALASKA.GOV

Contracting Authority Name & Title:

Kristi Futrel, Contracting Officer III

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contractor Authority Name & Title:

Steve Karlin,

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1. **CONTRACT:**
	1. ONE (1) YEAR CONTRACT WITH TWO (1) ONE YEAR EXTENTIONS for Purchase of Airport Improvement Project (AIP) Tractors and Towed Brooms.
		1. Contract Start Date: November 30, 2017
		2. Contract Expiration Date: October 31, 2018, Renewal 1 and 2 Executed, New Expiration Date October 31, 2020.
		3. Renewals expire: October 31, 2020
	2. Quantities: Contingent on approval of FAA grants. Anticipate 2 Tractors and 3 brooms within the first year on the contract.
		1. Funding is appropriated through the Federal Aviation Administration. All future orders are dependent upon approved yearly grants.
	3. Location of Use: Various Alaska Airports, Statewide
	4. Dealer warranty locations, at a minimum: ANCHORAGE.
	5. In addition to the State of Alaska requirements, the Municipality of Anchorage and other Alaska political subdivisions may cooperatively purchase from the resulting contract.
		1. At no time may the contractor change the terms and conditions, alter the price to another entity, which differs from the contractual price, nor charge undisclosed administrative fees to allow cooperative purchasing.
2. **DELIVERY:**
	1. **Pre-delivery service:** Prior to delivery, each vehicle, piece of equipment or attachment shall be serviced and inspected by the dealer or his agent. A certification of this inspection must include the following (as applicable to the type of equipment):
		1. Dealer and vehicle identification.
		2. Check-off of service and inspection performed including a list of all fluids including type weight and specification that are in the equipment as delivered for all fluid compartments.
		3. The vehicle's crankcase, differential and transmission, and other fluid compartments shall be filled to the manufacturer's recommended capacity.
		4. Fuel tank shall be filled to at least register a minimum ¼ full on the fuel gauge, unless restricted by the commercial carrier, when the vehicle arrives at the delivery location.
		5. The vehicle shall be clean and free from defects when delivered and should be ready for immediate and continued use upon delivery.
		6. Units delivered in an incomplete state, or which have deficiencies per the specification, are subject to the damage charges as noted in paragraph 4.0 below.
	2. **Delivery Receipt:**
		1. A delivery receipt will be required. The receipt must be filled out by the vendor, and acknowledged by state receiving personnel by signature and date of actual receipt of equipment. One copy of this delivery receipt is to be given to the state-receiving agency. The original shall accompany the vendor's invoice to support and properly identify the vehicle delivered.
		2. Vendors are cautioned and advised that such delivery forms or other receiving type documents will not in any way be construed to mean the state has formally and fully accepted unit(s) referenced thereon as complete and meeting every specification set forth. Only the Contracting Officer or designee may sign warranty documentation.
3. **F.O.B. POINT:**
	1. The F.O.B. point is as listed in Section IV, Bid Price Schedule. Ownership of and title will remain with the contractor until delivery is complete to final destination and accepted by the State.
	2. The cost of shipping and delivery for orders beyond the limits of Seattle/Tacoma dock will be handled as follows. The contractor will prepay the shipping and delivery charges to any destination named by the State in its order. The contractor will charge-back those shipping and delivery charges to the State as a separate line item on the State’s invoice.
	3. All shipping charges over $100 must be documented by a copy of the actual shipping invoice and received with the invoice charge to the State.
4. **DAMAGES FOR LATE DELIVERY AND NON-CONFORMING GOODS:**
	1. Time is of the essence in this contract. The bidder is expected to deliver goods that conform in all material respects to the contract specifications on or before the date provided therein, as may be amended by written agreement of the parties.
	2. In the event that the equipment is delivered late or does not conform to the contract specifications, the State shall be entitled to offset against the Contract Price, as liquidated damages and not as a penalty, an amount equal to the cost of renting like equipment, multiplied by the number of calendar days elapsing between the delivery date provided in the bid schedule and the delivery date to the State. In the case of a unit of this class, that daily rental fee is determined to be **$1,025.00**. The number of days for which liquidated damages shall apply shall include, in the case of non-conforming goods, the time reasonably necessary for the State to perform inspection.
	3. These liquidated damages represent a reasonable estimate of amounts necessary to compensate the State for loss of use of the goods during the period in which the goods would have been available to the State if conforming goods had been timely delivered.
5. **WARRANTY:**
	1. **Standard Warranty Package:** Unless otherwise stipulated by this ITB, the successful bidder will provide a one year (12-month) warranty.
		1. Full (100%) Parts and Labor Warranty Coverage components for the first 12-months, at the assigned location, from the date the unit is placed in service.
		2. Corrosion Warranty: Twelve (12) year warranty for corrosion inside the cab leading to premature wear of the cab floor. The State is responsible to take every precaution to insure that the units are properly cleaned and chemicals removed during preventative maintenance.
		3. Full (100%) Warranty Coverage includes all cost of labor, parts, freight, transportation, per diem, travel, lubricants, miscellaneous cost, etc., to place the unit in like-new condition.
		4. Should the manufacturer’s standard warranty exceed the minimum State warranty requirements, the manufacturer’s warranty will run in conjunction with and enhance the state’s warranty, then continue for the remainder of its term.
		5. If the state receives from any manufacturer or supplier additional or extended warranty on the whole or any component of the unit, in the form of time and/or mileage, including any pro rata arrangements, or the manufacturer generally extends to fleet customers a greater or extended warranty coverage, the state shall receive corresponding warranty benefits.
		6. For clarification, warranty does not apply to normal wear and tear or maintenance items, accident damages, misuse of equipment or failure to operate or maintain equipment as prescribed by vendor/manufacturer.
		7. Warranty on Attachments:Same as Standard Warranty Package.
		8. In-Service Date: Warranty on vehicles not placed in service immediately upon receipt because of time lag to construct body components and/or installation of special equipment, or due to seasonal usage or other delay, shall be warranted from the date the vehicle is placed in service. The receiving agency shall notify the vendor/manufacturer in writing of the actual "in service" date. Notification of the requirement for delayed warranty will be provided on delivery orders whenever possible.
	2. **Warranty Claims:**
		1. Warranty will be provided at the unit’s assigned (in-service). Because of the remote location of some equipment it is not always practical to deliver equipment to authorized warranty repair facilities. In these cases, the vendor may perform warranty work at the state's location or, the State of Alaska, at its discretion, reserves the right to perform the warranty work and be reimbursed by the vendor. If travel is required by State personnel to perform the work, actual costs will be used for reimbursement.
		2. The State of Alaska has established a warranty procedure whereby the vendor is to be notified via letter, telex, fax, telegram, etc. that warranty work needs to be performed. If time is of the essence, a telephone call confirmed by one of the above written procedures may be utilized.
		3. The vendor must notify the state within 24 hours of verbal or written notification that it will begin to perform the warranty work at the equipment location.
		4. The State may, at its discretion, proceed to make warranty repairs with its own work force in the case of emergency situation or to preclude excessive downtime (greater than 24 hours). The State will require a Purchase Order (PO) to perform the warranty work.
		5. Failure to notify the State that the vendor intends to begin to perform warranty work is considered a contractual breach.
		6. The vendor will be invoiced for required warranty work performed by the state.  Warranty work performed by the state will be charged at the current SEF shop labor rate at the time of the repair. Actual repair time will be used.
	3. **Warranty Performed by Vendor:**
		1. The State will reimburse travel costs not reimbursed by the manufacturer for travel to and from the bidder’s closest warranty service center within the State of Alaska to the location of the equipment under warranty. Travel costs will be billed as follows:
			1. Mileage Charge: mileage will only be reimbursed for travel within Alaska at the rate allowable by the IRS.
			2. Meals are paid at actual cost and charges must be accompanied by receipts. Receipts are not to exceed the State authorized amount of $60.00 per day.
			3. Transportation, such as airfare, shall be reimbursed at actual cost and all charges are to be accompanied by a receipt/copy of the coach ticket.
			4. Lodging shall be reimbursed at actual cost and shall not exceed $150.00 per night unless no other lodging is available. Requests for reimbursement must be accompanied by a receipt.
		2. Travel will only be reimbursed for time in Alaska.
		3. After hours, weekend and holiday travel must be approved by the Contracting Officer to be considered for reimbursement. The State will not pay for weather delays.
	4. **Authorized Warranty Dealer (Contractor):**
		1. Contractor (bidder) must have Authorized Warranty Dealer that has all required licenses, facilities and factory certified and trained personnel necessary to perform the warranty servicing and repair work.

Provide name and address for each Authorized Warranty Dealer for each location.

(\*) M-B Companies, Inc. 4535 East Greenstreet Circle, Wasilla, AK 99654

Provide contact name and contact information for Warranty Administrator:

(\*) Aaron Utecht (920) 898-1009 autecht@m-bco.com

Provide documentation of factory certified and trained personnel:

(\*) Spencer Martin (907) 707-8325 smartin@m-bco.com

* + 1. The ultimate responsibility for warranty lies with the contractor (bidder).
		2. The State reserves the right to inspect the warranty facility and diagnostic equipment prior to issuing the Notice of Intent to Award a contract.
	1. **Factory Recall:** Nationwide factory recall or product update programs are the responsibility of the vendor and/or manufacturer. The State will attempt to bring affected equipment to an authorized repair facility. However, because of the remoteness of some equipment this is not always practicable or economical. In such cases, factory recall and modification work will be handled the same as warranty work. Factory recall notices sent to the state should, in addition to serial number, include model, year, and dealer from who purchased.
		1. **Hazardous Material**: Due to concerns about liability resulting from hazardous materials being left at the work site on State of Alaska property, no vendors will be allowed to use the State rural airport facilities to perform warranty work unless they agree and sign a letter of intent stating that all waste products including oils, coolant and garbage will be removed from the work site. Vendors should note that in some village locations other suitable facilities might be available for rent from local residents or village authority.
1. **REPAIR ORDERS AND DOCUMENTATION:**
	1. Any work performed by the contractor or approved subcontractor, whether warranty or any other work on a piece of equipment purchased under this ITB, will require a copy of the repair order, any invoices showing parts and commodities, including oils and types used.
2. **PUBLICATIONS:**
	1. Paper publications are to be received by the State of Alaska no later than 10 days after receipt of the unit. Custom manuals may be delivered no later than 90 days after receipt of the unit. Delivery will not be considered complete until the publications for each unit have been received by the State of Alaska. Note: Publications, when required, will be ordered on the same Purchase Order as the unit itself.
		1. All paper manuals are to be pre-assembled in factory binders prior to delivery.
	2. **Service Manuals:**
		1. Complete set(s) to include applicable information covering prime unit and attachments:
		2. Body, chassis, and electrical
		3. Engine, transmission, and differential(s) (service and rebuild)
		4. Electrical and vacuum troubleshooting
		5. Wiring diagrams
		6. Service specifications
		7. Engine/emission diagnosis
	3. **Parts Manuals:**
		1. Complete set(s) including all updates. If updates are not provided during the warranty period, the State may order them from the manufacturer and bill the contractor for the full cost, including shipping.
		2. Parts manuals are to be customized by serial number.
	4. **Operator’s Manuals:** Complete set(s) to include prime unit and attachments.
	5. **Quantities:** As per Section IV – Bid Price Schedule.
	6. **Manuals:** To be delivered to, and receipt signed by person(s) as noted on the Purchase Order.
	7. **Line Sheets/Bill of Materials:**
		1. It is required within 30 days after delivery that the successful bidder provides a comprehensive listing of all components used to assemble the unit.
		2. This includes any components installed by the manufacturer or any subcontractor or the successful bidder.
		3. Information will include at a minimum, when available, make, model serial number on items such as engines, transmissions, axles, tires, bodies, etc. The listings will be specific to each piece of equipment and will be provided on an individual CD for each unit delivered.
		4. A minimum of two (2) CD’s per unit are to be provided and marked with the make, model, and last main numbers of the units serial number or State PO number.
	8. **Service Bulletins, Etc.:** The successful bidder must provide appropriate service bulletins, technical support bulletins, service letters, product support bulletins, and/or any other information type notifications that are sent out to the vendor or used by the manufacturer in the maintenance and report of the vehicle, equipment or attachments being provided. The intent of this clause is that the State of Alaska be provided notification of any and all changes or improvement7s that may affect the maintenance, reliability, longevity, and safety of our equipment. This information will be provided as soon as possible to person(s) as noted on the Purchase Order.
3. **STATEMENT OF ORIGIN:** The bidder/contractor will be required to furnish a Manufacturer's Statement of Origin for Automotive or Non-Automotive rolling stock for each unit. All such documents shall be forwarded to:

DOT&PF, HQ State Equipment Fleet

2200 E. 42nd Avenue Room #311

Anchorage, Alaska 99508

1. **WEIGHT VERIFICATION SLIPS:** If required in the Section IV - Bid Price Schedule, a weight scale ticket of the completed unit will be included with the Statement of Origin.
2. **INSPECTIONS:**
	1. The State's inspection of all materials and equipment upon delivery is for the sole purpose of identification. Such inspection shall not be construed as final or as acceptance of the materials or equipment if materials or equipment do not conform to Contract requirements. If there are any apparent defects in the materials or equipment at the time of delivery, the State will promptly notify the Contractor thereof. Without limiting any other rights of the State, The State at its option, may require the Contractor to:
		1. repair or replace at contractor's expense, any or all of the damaged goods,
		2. refund the price of any or all of the damaged goods, or
		3. accept the return of any or all of the damaged goods.
	2. Costs of remedying all defects, indirect and consequential costs of correcting same, and/or removing or replacing any or all of the defective materials or equipment will be charged against the bidder.
3. **PRICE:**
	1. **Price Guarantee:** The contractor is responsible to maintain prices under the contract firm for 180 days after bid opening. All price increases or decreases must remain firm for the following 180 days.
	2. **NO RETROACTIVE PRICE INCREASES WILL BE ACCEPTED**.
	3. Price adjustments, increases or decreases, for subsequent orders, may be made by providing the Contracting Officer satisfactory evidence that all of the following conditions exist:
		1. The increase is a result of the increased cost at the manufacturer’s level and not costs under the contractor’s control, and that;
			1. The increase will not produce a higher profit margin for the contractor than that on the original contract, and that;
			2. The increase affects only the item(s) that are clearly identified by the contractor.
			3. Satisfactory forms of the evidence of the above facts may include a certified invoice from the manufacturer, or an affidavit from an independent professional price-tracking firm that is recognized by the industry as reputable and knowledgeable. The contractor must be able to show the difference between the prior year’s price and the current difference in the price being requested.
	4. **Price Decreases:** During the period of the contract, the Contractor must pass on to the state all price decreases, such as fleet rebates. A Contractor’s failure to adhere strictly and faithfully to this clause will be considered a material breach of contract. The state reserves the right to cancel the contract if the contractor fails to properly perform the duties set out herein.
4. **MANUFACTURER'S REBATE (INCENTIVES):** In any circumstance during or prior to completion of the contract, whereupon the State of Alaska becomes eligible to receive a rebate for any vehicle purchased under this contract, it shall be the BIDDER'S responsibility to inform the Contracting Officer in writing and to advise the procedures for obtaining such rebates.
5. **REPLACEMENT PARTS:**
	1. The State of Alaska shall expect the dealer or manufacturer to provide replacement wear parts at their authorized warranty facilities for the entire warranty period within seven (7) days of order. All other parts must be available within ten (10) working days.
	2. Back order procedures: Back orders are acceptable; however, the ordering shop shall be appraised at time of original orders as to the expected delay in delivery.
	3. Warranty: All products supplied by the contractor shall be warranted against defects in materials and workmanship for a minimum of 90 days, commencing at the time of installation as long as the installation is within 12 months of purchase. The cost of any defective product and the labor required to replace the defective product shall be the obligation of the contractor.
		1. If the manufacturer’s warranty exceeds the stated warranty then manufacturer’s warranty supersedes.
		2. Parts Return: Within 12 months of purchase, the State is to be allowed to return new, parts with full refund, less shipping charges.
		3. Invoicing: Full description of item is required on all invoices, packing lists and billings.
6. **EQUIPMENT RELIABILITY:**
	1. Reliability of equipment is of paramount importance to the State. It is the policy of SEF to require minimum levels of reliability from owned or leased equipment for it to be considered acceptable. Equipment offered for this bid must be capable of meeting the acceptable reliability standard stated below.
	2. Acceptable Reliability: The State will monitor equipment reliability. Acceptable reliability for this contract is achieved when a machine achieves or maintains a Reliability Ratio (RR) equal to or exceeding the following:
		1. .90 (90 percent) PR during any consecutive 12-months (365 days) during the warranty period.
		2. .75 (75 percent) PR per operational month (recognizing operational as subject to weather and being defined by calendar days) during the consecutive 12-month period.
		3. PR below the state percentages do not meet minimum reliability requirements for state owned equipment.
	3. **Machine Failure and Downtime:**
		1. **Machine Failure** is any and all loss of capability to perform fully, as specified, which is not attributed to **Conditioned Failure**. Machine Failure resulting in the unit being out of service is defined as **Downtime**.
		2. **Conditioned Failure** is any Machine Failure attributable to accident, operator abuse or other external cause not attributable to a defect in the machine itself.
		3. **Downtime** is the actual number of days or fractions of days that the equipment is in a state of Machine Failure. Downtime does not count time used for scheduled maintenance (including preventative maintenance and scheduled major overhauls), time lost for repair maintenance and scheduled major overhauls, time lost for repair of damage as a result of operator abuse or machine misapplication; or time lost as a result of accident or an act of God. Downtime includes:
			1. Actual shop hours (and/or field repair hours) required to return unit to full operational status following machine failure, including trouble-shooting, repair, necessary replacement of parts, and necessary adjustments, plus
			2. Time lost waiting for parts and/or vendor assistance. “Waiting downtime” also applies if need for parts/assistance is discovered during routine maintenance and return to service is deemed counterproductive. In this case, “waiting time” clock begins with notice of need to vendor. Allowance may be considered in “waiting time” calculations if arrival of parts/assistance is delayed by transportation shutdown, to include verifiable transportation scheduling difficulties such as infrequent flights as long as all reasonable alternatives have been exhausted. Parts and assistance are to be provided by the quickest means reasonably possible to avoid unnecessary delays and downtime.
		4. **Out of Service Report (OSR):** Downtime resulting from machine failure is the actual number of hours a machine is out of service as recorded on the OSR or in the Equipment Maintenance Management System (EMS).
			1. TheState will record all downtime on an OSR or EMS work order, which will be originated for each occurrence of downtime. The document will show the date and time a unit went down, the location where the machine was based, the reason the machine is down, date and time the vendor was notified (if applicable), the date and time the machine was returned to service, and the total hours of downtime.
				1. The Contract Manager will finalize and approve the OSR or EMS work order. Both are available for contractor review.
		5. **Reporting Downtime**: The Contracting Officer will maintain documentation of all Downtime, and shall send copies of such documentation to the contractor.
		6. **Calculation of Reliability Ratio**: RR is the mathematical ration of operated time (uptime) to out of service time (downtime). The RR will be calculated according to the following formula:

**RR = Days in a Month – Days Out of Service\* = DM - DO**

 **Days in a Month \*\* DM**

 **Note \* :** Fractional Days apply, i.e., a unit is out of service 8 hours in a 24 hour period equals 1/3 or .33% of a day.

 **Note \*\*:** A day is allocated as 24 consecutive hours from 12:00 AM to 12:00 PM.

 **Example:** 30 days DM with 2 days and 8 hours DT would result in:

 RR = 30 **-** 2.33 = .92

 30

* + 1. **Unacceptable Reliability**: If an item of equipment fails to perform at an acceptable level of reliability during the warranty period, the Contracting Officer will notify the contractor and request immediate remedy. Failure to remedy the piece of equipment within 30 days for failure will result in a breach of contract and the immediate return of the equipment and reimbursement of the **Guaranteed Value** (V) of the unit:

Original Cost of the unit less (-) Freight = $\_\_\_\_\_\_\_\_\_\_ (V)

Guaranteed Value (V) less (-) the **Cost of Operation** as listed in the Equipment Rental Rate Blue Book \_\_\_\_\_\_\_\_\_or comparable equipment or the current Federal Fixed Usage Rate for the Class for the State of Alaska (a, b or c per hour) times (X) the number of hours used = \_\_\_\_\_\_\_\_\_\_\_(DV).

1. Example: Cost of a single unit, less freight = $150,000. The hourly cost is $150.00 per hour. The unit was used 150 hours prior to failing the acceptable reliability. The contractor guarantees the unit’s worth at $127,500.00.
	* 1. Prior to return, the State will correct all reasonable cosmetic deficiencies (such as excessive rust) and those deficiencies that are directly related to damage due to accidents, misuse of equipment or failure to operate or maintain equipment as prescribed by the vendor/manufacturer, prior to public auction.
		2. The tires will be serviceable with at least 50% remaining thread.
		3. Oil samples, as per manufacturer’s service manual recommendations, will be taken by State of Alaska maintenance personnel on the engine, transmission, differentials and hydraulics.
		4. In the case of dispute, at the expense of the State, a qualified agent from Northern Adjusters, Inc. or another professionally recognized appraiser may be commissioned for an independent claim appraisal. Such appraisal shall be binding upon the State and the contractor.
2. **PERFORMANCE BOND FOR WARRANTY & PERFORMANCE:**
	1. A Performance Bond is due within 30 days of the first purchase order.
		1. The State does not have backup equipment in many of its locations. Consequently, new-unit reliability and warranty performance is of vital importance. To insure the possible reliability and warranty service the State requires the contractor to post performance bond in one of the forms listed below.The purpose of the posted performance bond is to secure performance over the entire term of the contract. The performance bond must cover any remaining warranty in the event that the contractor is unable to or otherwise fails to complete the 12 month warranty period. The amount of the performance bond will be $50,000.00. Release of the performance security will be contingent solely upon the acceptable completion of the terms of the original contract.
		2. The Performance Bondmust be posted in one year terms for the life of the contract by a surety company agreed to by the parties to this contract. Failure to post the successive bond, or to provide an alternative security as listed below, will be cause for breach of contract and immediate cancellation of any future orders.
		3. The Performance Bond must be written in a form satisfactory to the State by a company authorized to do surety business in Alaska. The performance bond must provide a statement that it is payable to the State of Alaska as security for the contractor’s full and faithful performance of the contract.
	2. **Alternate Security**: In lieu of a performance bond, a contractor may post security in the form of a certified or cashier’s check, or a certificate of deposit, to be returned to the contractor provided that the contractor fully and faithfully performs the contract, including all warranty obligations.
		1. A certified or cashier’s check, made payable to the State of Alaska.
		2. A Certificate of Deposit (CD) made payable to the State of Alaska. Inclusion of other verbiage on the “payee” or pay to” line will render the security unacceptable.
3. **TRADE RESTRICTION CLAUSE (9 CFR Part 30.13FAA Order 5100.38):**
	1. The contractor or subcontractor, by submission of an offer and/or execution of a contract, certifies that it:
		1. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR);
		2. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list;
		3. has not procured any product nor subcontracted for the supply of any product for use on the project that is produced in a foreign country on said list.
	2. Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR 30.17, no contract shall be awarded to a contractor or subcontractor who is unable to certify to the above. If the contractor knowingly procures or subcontracts for the supply of any product or service of a foreign country on said list for use on the project, the Federal Aviation Administration may direct through the Sponsor cancellation of the contract at no cost to the Government.
	3. Further, the contractor agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in each contract and in all lower tier subcontracts. The contractor may rely on the certification of a prospective subcontractor unless it has knowledge that the certification is erroneous.
	4. The contractor shall provide immediate written notice to the sponsor if the contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The subcontractor agrees to provide written notice to the contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.
	5. This certification is a material representation of fact upon which reliance was placed when making the award. If it is later determined that the contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration may direct through the Sponsor cancellation of the contract or subcontract for default at no cost to the Government.
	6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
	7. This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.
4. **CIVIL RIGHTS ACT OF 1964, TITLE VI – CONTRACTOR CONTRACTUAL REQUIREMENTS (49 CFR Part 21 AC 150/5100-15)**
	1. During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:
		1. **Compliance with Regulations.** The contractor shall comply with the Regulations relative to nondiscrimination in federally assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.
		2. **Nondiscrimination.** The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.
		3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment.** In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.
		4. **Information and Reports.** The contractor shall provide all information and reports required by the regulations or directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Sponsor or the Federal Aviation Administration (FAA) to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the sponsor or the FAA, as appropriate, and shall set forth what efforts it has made to obtain the information.
		5. **Sanctions for Noncompliance.** In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the sponsor shall impose such contract sanctions as it or the FAA may determine to be appropriate, including, but not limited to:
			1. Withholding of payments to the contractor under the contract until the contractor complies, and/or
			2. Cancellation, termination, or suspension of the contract, in whole or in part.
		6. **Incorporation of Provisions.** The contractor shall include the provisions of paragraphs 1 through 5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the sponsor or the FAA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Sponsor to enter into such litigation to protect the interests of the sponsor and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.
5. **AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, SECTION 520 - GENERAL CIVIL RIGHTS PROVISIONS (Airport and Airway Improvement Act of 1982, Section 520, Title 49 47123, AC 150/5100-15, Para. 10.c):**
	1. The contractor assures that it will comply with pertinent statutes, Executive orders and such rules as are promulgated to assure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or handicap be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision obligates the tenant/concessionaire/lessee or its transferee for the period during which Federal assistance is extended to the airport a program, except where Federal assistance is to provide, or is in the form of personal property or real property or interest therein or structures or improvements thereon. In these cases the provision obligates the party or any transferee for the longer of the following periods: (a) the period during which the property is used by the airport sponsor or any transferee for a purpose for which Federal assistance is extended, or for another purpose involving the provision of similar services or benefits or (b) the period during which the airport sponsor or any transferee retains ownership or possession of the property. In the case of contractors, this provision binds the contractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required of Title VI of the Civil Rights Act of 1964.
6. **DISADVANTAGED BUSINESS ENTERPRISES (49 CFR Part 26):**
	1. **Contract Assurance (§26.13):** The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the recipient deems appropriate.
	2. **Prompt Payment (§26.29):**  The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than ***30*** days from the receipt of each payment the prime contractor receives from the ***State of Alaska.*** The prime contractor agrees further to return retainage payments to each subcontractor within [specify the same number as above] days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the ***Contracting Officer***. This clause applies to both DBE and non-DBE subcontractors.
7. **LOBBYING AND INFLUENCING FEDERAL EMPLOYEES (49 CFR Part 20, Appendix A):**
	1. No Federal appropriated funds shall be paid, by or on behalf of the contractor, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the making of any Federal grant and the amendment or modification of any Federal grant.
	2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any Federal grant, the contractor shall complete and submit Standard Form-LLL, “Disclosure of Lobby Activities,” in accordance with its instructions.
8. **ACCESS TO RECORDS AND REPORTS (49 CFR Part 18.36(i), FAA Order 5100.38):**
	1. The Contractor shall maintain an acceptable cost accounting system. The Contractor agrees to provide the Sponsor, the Federal Aviation Administration and the Comptroller General of the United States or any of their duly authorized representative’s access to any books, documents, papers, and records of the contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.
9. **ENERGY CONSERVATION REQUIREMENTS (49 CFR Part 18.36 & Public Law 94-163):**
	1. The contractor agrees to comply with mandatory standards and policies relating to energy efficiency that are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.
10. **BREACH OF CONTRACT TERMS (49 CFR Part 18.36):**
	1. Any violation or breach of terms of this contract on the part of the contractor or their subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement. The duties and obligations imposed by the Contract Documents and the rights and remedies available there under shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.
11. **RIGHTS TO INVENTIONS (49 CFR Part 18.36(i)(8) & FAA Order 5100.38):**
	1. All rights to inventions and materials generated under this contract are subject to regulations issued by the FAA and the Sponsor of the Federal grant under which this contract is executed.
12. **TERMINATION OF CONTRACT (49 CFR Part 18.36(i)(2) & FAA Order 5100.38):**
	1. The Sponsor may, by written notice, terminate this contract in whole or in part at any time, either for the Sponsor's convenience or because of failure to fulfill the contract obligations. Upon receipt of such notice services shall be immediately discontinued (unless the notice directs otherwise) and all materials as may have been accumulated in performing this contract, whether completed or in progress, delivered to the Sponsor.
	2. If the termination is for the convenience of the Sponsor, an equitable adjustment in the contract price shall be made, but no amount shall be allowed for anticipated profit on unperformed services.
	3. If the termination is due to failure to fulfill the contractor's obligations, the Sponsor may take over the work and prosecute the same to completion by contract or otherwise. In such case, the contractor shall be liable to the Sponsor for any additional cost occasioned to the Sponsor thereby.
	4. If, after notice of termination for failure to fulfill contract obligations, it is determined that the contractor had not so failed, the termination shall be deemed to have been effected for the convenience of the Sponsor. In such event, adjustment in the contract price shall be made as provided in paragraph 2 of this clause.
	5. The rights and remedies of the sponsor provided in this clause are in addition to any other rights and remedies provided by law or under this contract.
13. **CERTIFICATION REGARDING DEBAREMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION (49 CFR Part 29 & FAA Order 5100.38):**
	1. The bidder/offeror certifies, by submission of this proposal or acceptance of this contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this proposal that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the bidder/offeror/contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this solicitation/proposal.
14. **CLEAN AIR AND WATER POLLUTION CONTROL (49 CFR Part 18.36(i)(12) & Section 306 of the Clean Air Act & Section 508 of the Clean Water Act):**
	1. Contractors and subcontractors agree:
		1. That any facility to be used in the performance of the contract or subcontract or to benefit from the contract is not listed on the Environmental Protection Agency (EPA) List of Violating Facilities;
		2. To comply with all the requirements of Section 114 of the Clean Air Act, as amended, 42 U.S.C. 1857 et seq. and Section 308 of the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 and Section 308 of the Acts, respectively, and all other regulations and guidelines issued there under;
		3. That, as a condition for the award of this contract, the contractor or subcontractor will notify the awarding official of the receipt of any communication from the EPA indicating that a facility to be used for the performance of or benefit from the contract is under consideration to be listed on the EPA List of Violating Facilities;
		4. To include or cause to be included in any construction contract or subcontract which exceeds $100,000 the aforementioned criteria and requirements.
15. **BUY AMERICAN PREFERENCES (Section 9129 of the Aviation Safety and Capacity Expansion Act of 1990 & Title 49 U.S.C. Chapter 501, AIP Program Guidance Letter 91-3**)**:**
	1. The Aviation Safety and Capacity Expansion Act of 1990 provides that preference be given to steel and manufactured products produced in the United States when funds are expended pursuant to a grant issued under the Airport Improvement Program. The following terms apply:
		1. Steel and manufactured products. As used in this clause, steel and manufactured products include (1) steel produced in the United States or (2) a manufactured product produced in the United States, if the cost of its components mined, produced or manufactured in the United States exceeds 60 percent of the cost of all its components and final assembly has taken place in the United States. Components of foreign origin of the same class or kind as the products referred to in subparagraphs b. (1) or (2) shall be treated as domestic.
		2. Components. As used in this clause, components mean those articles, materials, and supplies incorporated directly into steel and manufactured products.
		3. Cost of Components. This means the costs for production of the components, exclusive of final assembly labor costs.

1. **ACCESSORIES:** When accessories are supplied, they must be certified to be compatible with the rest of the equipment. Certification will be written evidence satisfactory to the State that the accessories are compatible. The bidder’s failure to supply this evidence within the time required by the State will cause the State to consider the bid non-responsive and reject the bid.
2. **ADDITIONS OR DELETIONS:** The State reserves the right to add or delete items, agencies or locations as determined to be in the best interest of the State. Added items, agencies or locations will be related to those on contract and will not represent a significant increase or decrease in size or scope of the contract. Such additions or deletions will be documented via mutual agreement, will be at prices consistent with the original bid price margins, and will be evidenced by issuance of a written contract change notice from the Contracting officer.
3. **ALASKA BUSINESS LICENSE AND OTHER REQUIRED LICENSES:** At the time the bids are opened, all bidders must hold a valid Alaska business license and any necessary applicable professional licenses required by Alaska Statute. Bids must be submitted under the name as appearing on the person’s current Alaska business license in order to be considered responsive. Bidders should contact the Department of Commerce, Community and Economic Development, Division of Corporations, Business, and Professional Licensing, P. O. Box 110806, Juneau, Alaska 99811-0806, for information on these licenses. Bidders must submit evidence of a valid Alaska business license with the bid.
	1. You are not required to hold a valid Alaska business license at the time bids are opened if you possess one of the following licenses and are offering services or supplies under that specific line of business:
* fisheries business licenses issued by Alaska Department of Revenue or Alaska Department of Fish and Game,
* liquor licenses issued by Alaska Department of Revenue for alcohol sales only,
* insurance licenses issued by Alaska Department of Commerce, Community and Economic Development, Division of Insurance, or
* Mining licenses issued by Alaska Department of Revenue
1. **ALTERATIONS:** The contractor must obtain the written approval from the contracting officer prior to making any alterations to the specifications contained in this ITB. The State will not pay for alterations that are not approved in advance and in writing by the contracting officer.
2. **AMENDMENTS:** Contract terms shall not be waived, altered, modified, supplemented or amended without prior written approval of the Contracting officer.
3. **ASSIGNMENT(S):** Assignment of rights, duties, or payments under a contract resulting from this ITB is not permitted unless authorized in writing by the State of Alaska, Department of Administration, Division of General Services. Bids that are conditioned upon the State’s approval of an assignment will be rejected as nonresponsive.
4. **AUTHORITY:** This solicitation is written in accordance with Alaska statutes AS 36.30 and 2 AAC 12.
5. **BILLING INSTRUCTIONS:** Invoices must be billed to the ordering agency's address shown on the individual Purchase Order, Contract Award or Delivery Order, not to the Division of General Services. The ordering agency will make payment after it receives the merchandise or service and the invoice. Questions concerning payment must be addressed to the ordering agency.
6. **BRAND AND MODEL OFFERED:** Unless otherwise specified, when brand names and model numbers are used to specify the type and quality of the goods desired, bidders must clearly indicate the brand names and model numbers they intend to provide. The bidder’s failure to identify the brand and model offered will cause the State to consider the offer non-responsive and reject the bid.
7. **CERTIFICATION OF COMPLIANCE WITH AMERICAN'S WITH DISABILITIES ACT OF 1990:**
	1. By signature of their bid/proposal the bidder/proposer certifies that they comply with the American's with Disabilities Act of 1990 and the regulations issued there under by the federal government.
	2. Services or activities furnished to the general public on behalf of the State must be fully accessible. This is intended to ensure that agencies are in accordance with 28 CFR Part 35 Section 35.130 and that services, programs or activities furnished to the public through a contract do not subject qualified individuals with a disability to discrimination based on the disability.
8. **COMPLIANCE WITH ALL GOVERNMENT REGULATIONS:** The bidder must comply with all applicable federal, state, and borough regulations, codes, and laws, and pay all applicable federal, state, and borough taxes, and is liable for all required insurance, licenses, permits, and bonds. Failure to comply with such requirements shall constitute a breach of contract and shall be grounds for contract cancellation. Damages or costs resulting from noncompliance shall be the sole responsibility of the bidder.
9. **CONFLICT OF INTEREST:** An officer or employee of the State of Alaska may not seek to acquire, be a party to, or possess a financial interest in, this contract if (1) the officer or employee is an employee of the administrative unit that supervises the award of this contract; or (2) the officer or employee has the power to take or withhold official action so as to affect the award or execution of the contract.
10. **CONSUMER ELECTRICAL PRODUCT:** AS 45.45.910 requires that "...a person may not sell, offer to sell, or otherwise transfer in the course of the person's business a consumer electrical product that is manufactured after August 14, 1990, unless the product is clearly marked as being listed by an approved third party certification program." Electrical consumer products manufactured before August 14, 1990, must either be clearly marked as being third party certified or be marked with a warning label that complies with AS 45.45.910(e). Even exempted electrical products must be marked with the warning label. By signature on this bid the bidder certifies that the product offered is in compliance with the law. A list of approved third party certifiers, warning labels and additional information is available from: Department of Labor and Workforce Development, Labor Standards & Safety Division, Mechanical Inspection Section, P.O. Box 107020, Anchorage, Alaska 99510-7020, (907)269-4925.
11. **CONTINUING OBLIGATION OF CONTRACTOR:** Notwithstanding the expiration date of a contract resulting from this ITB, the contractor is obligated to fulfill its responsibilities until warranty, guarantee, maintenance and parts availability requirements have completely expired.
12. **CONTRACT ADMINISTRATION:** The administration of this contract, including any/all changes, is the responsibility of the Contracting Officer, HQ State Equipment Fleet.
13. **CONTRACT EXTENSION:** Unless otherwise provided in this ITB, the State and the successful bidder/contractor agree: (1) that any holding over of the contract excluding any exercised renewal options, will be considered as a month-to-month extension, and all other terms and conditions shall remain in full force and effect and (2) to provide written notice to the other party of the intent to cancel such month-to-month extension at least thirty (30) days before the desired date of cancellation.
14. **CONTRACT FUNDING:** Bidders are advised that funds are available for the initial purchase and/or the first term of the contract. Payment and performance obligations for succeeding purchases and/or additional terms of the contract are subject to the availability and appropriation of funds.
15. **DEFAULT:** In case of bidder default, the State may procure the goods or services from another source and hold the bidder responsible for any resulting excess costs and may seek other remedies under law or equity. Alaska Statutes and Regulations provide for suspension and disbarment of non-responsible bidders.
16. **DELIVERY:** All deliveries shall be F.O.B. final destination point with all transportation and handling charges paid by bidder. Responsibility and liability for loss or damage shall remain with bidder until final inspection and acceptance when responsibility shall pass to the State except as to latent defects, fraud and bidder's warranty obligations.
17. **DISCONTINUED ITEMS:** In the event an item is discontinued by the manufacturer during the life of the contract, another item may be substituted, provided that the contracting officer makes a written determination that it is equal or better than the discontinued item and provided that it is sold at the same price or less than the discontinued item.
18. **DISPUTES:** Any dispute arising out of this agreement shall be resolved under the laws of Alaska. Any appeal of an administrative order or any original action to enforce any provision of this agreement or to obtain any relief from or remedy in connection with this agreement may be brought only in the superior court for the State of Alaska.
19. **EXTENSION OF PRICES:** In case of error in the extension of prices in the bid, the unit prices will govern; in a lot bid, the lot prices will govern.
20. **FILING A PROTEST:** A bidder may protest the award of a contract or the proposed award of a contract for supplies, services, or professional services. The protest must be filed in writing and include the following information: (1) the name, address, and telephone number of the protester; (2) the signature of the protester or the protester's representative; (3) identification of the contracting agency and the solicitation or contract at issue; (4) a detailed statement of the legal and factual grounds of the protest, including copies of relevant documents; and (5) the form of relief requested. Protests will be treated in accordance with Alaska Statutes (AS) 36.30.560-36.30.610.
21. **FIRM OFFER:** For the purpose of award, offers made in accordance with this ITB must be good and firm for a period of ninety (90) days from the date of bid opening.
22. **FIRM, UNQUALIFIED AND UNCONDITIONAL OFFER:** Bidders must provide enough information with their bid to constitute a definite, firm, unqualified and unconditional offer. To be responsive a bid must constitute a definite, firm, unqualified and unconditional offer to meet all of the material terms of the ITB. Material terms are those, which could affect price, quantity, quality, or delivery. Also included, as material terms are those, which are clearly identified in the ITB and which, for reasons of policy, must be complied with at risk of bid rejection for non-responsiveness.
23. **FORCE MAJEURE (Impossibility to perform):** Neither party to this contract shall be held responsible for delay or default caused by acts of God and/or war, which is beyond that party's reasonable control. The State may terminate this contract upon written notice after determining such delay or default will reasonably prevent successful performance of the contract.
24. **HUMAN TRAFFICKING:**
	1. By signature on this contract, the offeror certifies that:
		1. the offeror is not established and headquartered or incorporated and headquartered, in a country recognized as Tier 3 in the most recent United States Department of State’s Trafficking in Persons Report; or
	2. The most recent United States Department of State’s Trafficking in Persons Report can be found at the following website: [www.state.gov/g/tip/](http://www.state.gov/g/tip/)
	3. Failure to comply with this requirement will cause the state to reject the bid or proposal as non-responsive, or cancel the contract.
	4. This pertains to goods and services above $50,000.00.
25. **INDEMNIFICATION:** The Contractor shall indemnify, hold harmless, and defend the contracting agency from and against any claim of, or liability for error, omission or negligent act of the Contractor under this agreement. The Contractor shall not be required to indemnify the contracting agency for a claim of, or liability for, the independent negligence of the contracting agency. If there is a claim of, or liability for, the joint negligent error or omission of the Contractor and the independent negligence of the Contracting agency, the indemnification and hold harmless obligation shall be apportioned on a comparative fault basis. “Contractor” and “Contracting agency”, as used within this and the following article, include the employees, agents and other contractors who are directly responsible, respectively, to each. The term “independent negligence” is negligence other than in the Contracting agency’s selection, administration, monitoring, or controlling of the Contractor and in approving or accepting the Contractor’s work.
26. **INSPECTIONS:** Goods furnished under this contract are subject to inspection and test by the State at times and places determined by the State. If the State finds goods furnished to be incomplete or not in compliance with bid specifications, the State may reject the goods and require bidder to either correct them without charge or deliver them at a reduced price, which is equitable under the circumstances. If bidder is unable or refuses to correct such goods within a time deemed reasonable by the State, the State may cancel the order in whole or in part. Nothing in this paragraph shall adversely affect the State's rights as buyer, including all remedies and rights granted by Alaska statutes.
27. **INSURANCE:**
	1. Without limiting Contractor's indemnification, it is agreed that Contractor shall purchase at its own expense and maintain in force at all times during the performance of services under this agreement the following policies of insurance. Where specific limits are shown, it is understood that they shall be the minimum acceptable limits. If the Contractor's policy contains higher limits, the state shall be entitled to coverage to the extent of such higher limits. Certificates of Insurance must be furnished to the contracting officer prior to beginning work and must provide for a notice of cancellation, non-renewal, or material change of conditions in accordance with policy provisions. Failure to furnish satisfactory evidence of insurance or lapse of the policy is a material breach of this contract and shall be grounds for termination of the Contractor's services. All insurance policies shall comply with, and be issued by insurers licensed to transact the business of insurance under AS 21.
	2. Proof of insurance is required for the following:
		1. Workers' Compensation Insurance: The Contractor shall provide and maintain, for all employees engaged in work under this contract, coverage as required by AS 23.30.045, and; where applicable, any other statutory obligations including but not limited to Federal U.S.L. & H. and Jones Act requirements. The policy must waive subrogation against the State.
		2. Commercial General Liability Insurance: covering all business premises and operations used by the Contractor in the performance of services under this agreement with minimum coverage limits of $300,000 combined single limit per occurrence.
		3. Commercial Automobile Liability Insurance: covering all vehicles used by the Contractor in the performance of services under this agreement with minimum coverage limits of $300,000 combined single limit per occurrence.
	3. Failure to supply satisfactory proof of insurance within the time required will cause the State to declare the bidder nonresponsive and to reject the bid.
28. **ITEM UPGRADES:** The State reserves the right to accept upgrades to models on the basic contract when the upgrades improve the way the equipment operates or improve the accuracy of the equipment. Such upgraded items must be at the same price as the items in the basic contract.
29. **NEW EQUIPMENT:** Equipment offered in response to this ITB must be new equipment. New equipment means equipment that is currently in production by the manufacturer and is still the latest model, edition or version generally offered. The equipment must be warranted as new by the manufacturer and may not have been used for any purpose, other than display (not demonstration), prior to its sale to the State. The State will not accept remanufactured, used or reconditioned equipment, including used or reconditioned components or parts of. It is the contractor’s responsibility to ensure that each piece of equipment delivered to the State complies with this requirement. A contract’s failure to comply with this requirement will cause the State to seek remedies under breach of contract.
30. **ORDER DOCUMENTS:** Except as specifically allowed under this ITB, an ordering agency will not sign any vendor contract. The State is not bound by a vendor contract signed by a person who is not specifically authorized to sign for the State under this ITB. The State of Alaska Purchase Order, Contract Award and Delivery Order are the only order documents that may be used to place orders against the contract(s) resulting from this ITB.
31. **PAYMENT:** Payment for agreements under $500,000 for the undisputed purchase of goods or services provided to a State agency will be made within 30 days of the receipt of a proper billing or the delivery of the goods or services to the location(s) specified in the agreement, whichever is later. A late payment is subject to 1.5% interest per month on the unpaid balance. Interest will not be paid if there is a dispute or if there is an agreement, which establishes a lower interest rate or precludes the charging of interest.
32. **PRICES:** The bidder shall state prices according to the requirements of this ITB. Prices quoted for commodities or services must be in U.S. funds and include applicable federal duty, brokerage fees, packaging, and transportation cost to the FOB point so that upon transfer of title the commodity or service can be utilized without further cost.
33. **PROPRIETARY INFORMATION AND STATEMENTS OF CONFIDENTIALITY:**
	1. Except as set forth in this provision, all information in all bids will be made public under AS 36.30.530 not later than the time of issuance of a notice of intent to award.
	2. If the offeror submits information considered by it to constitute a trade secret or proprietary data, such information may be expressly designated as such, and must be accompanied by the offeror's certification that (1) the information has consistently been maintained by its owner as a trade secret or as proprietary information, (2) the owner of the information has taken due care to protect it from release to non-privileged persons, and (3) to the best knowledge of the offeror, the information has not lost its status as trade secret or proprietary information, whether by lack of diligent protection, release to any non-privileged person or otherwise.
	3. **Absence of such certification, any claim of confidentiality will be ignored, and the bidder may not hold any reasonable expectation of confidentiality.**
	4. Any information so certified will be held confidential so long as the contracting officer concurs that it constitutes a trade secret or proprietary data, and deems it not critical to determination of the price, quantity, or delivery terms bid, or the responsiveness of the bid.
	5. By submission of a bid, the offeror consents to the contracting officer’s exercise of reasonable judgment as to concurrence with any assertion of confidentiality, and waives any and all claims for release of information that the contracting officer reasonably deems not confidential notwithstanding a certified assertion of confidentiality.
	6. A certified assertion of confidentiality in which the contracting officer concurs, with respect to information the contracting officer deems critical to determination of the price, quantity, or delivery terms bid, or the responsiveness of the bid, will cause the bid to be rejected as a non-responsive bid.
34. **QUANTITIES:** The State reserves the right to reduce or increase the quantity of items ordered under any contract resulting from this Invitation to Bid.
35. **SEVERABILITY:** If any provision of the contract is declared by a court to be illegal or in conflict with any law, the validity of the remaining terms and provisions will not be affected; and, the rights and obligations of the parties will be construed and enforced as if the contract did not contain the particular provision held to be invalid.
36. **SHIPPING DAMAGE:** The State will not accept or pay for damaged goods. The contractor must file all claims against the carrier(s) for damages incurred to items in transit from the point of origin to the ultimate destination. The State will provide the contractor with written notice when damaged goods are received.
37. **STANDARD AND SPECIAL TERMS AND CONDITIONS:** The terms and conditions of this section are standard to State of Alaska, Department of Transportation and Public Facilities, Statewide Equipment Fleet contracts for the purchase of goods. There may also be other special terms and conditions in an Invitation to Bid or Request for Proposal which apply only to this contract. In the event of a conflict between the standard and special terms and conditions, the Special Terms and Conditions take precedence.
38. **SUCCESSORS IN INTEREST:** This contract shall be binding upon successors and assigns.
39. **SUITABLE MATERIALS:** All materials, supplies or equipment offered by a bidder shall be new, unused, of recent manufacture, and suitable for the manufacturer's intended purpose unless the specifications allow for used, rebuilt or remanufactured equipment.
40. **TAXES:** Prices quoted in bids must be exclusive of federal, state, and local taxes. If the bidder believes that certain taxes are payable by the State, the bidder may list such taxes separately, directly below the bid price for the affected item. The State is exempt from Federal Excise Tax because articles purchased are for the exclusive use of the State of Alaska.
41. **WARRANTY:** Unless otherwise stated, all equipment shall be new and current model and shall carry full factory warranties. Bidder warrants all goods delivered to be free from defects in labor, material and manufacture and to be in compliance with bid specifications. All implied or expressed warranty provisions of the Uniform Commercial Code apply. All warranties shall be for and benefit the State

SPECIFICATION #285

4x4 Carrier Tractor with Detachable

Airport Plow, Fifth Wheel Hitch, 12’ Belly Scraper,

 And Towed Broom with Blower

August 22, 2017

**GENERAL SPECIFICATION:**

It is the purpose of this specification to describe a new Multi-Function Hi-Speed, 4-wheel-drive, all-wheel-steer, carrier tractor, airport plow and fifth wheel towing hitch, under body scraper, and cradling runway broom. The unit will be of cab-forward design. This vehicle must be designed and manufactured for the specific purpose of airport snow removal. The total GVW of all axles combined shall be 81,000 pounds minimum. For maximum tractive efforts for all equipment configurations, static axle loading with all fluids filled and equipment operating shall be optimized. This vehicle shall also comply with all applicable FMCSR and FMVSS quality/safety standards, requirements of the FAA Advisory Circular 150/5220-20, and SAE ARP 5548

The unit will be provided with a 24 foot wide reversible snow plow, 12 foot underbody scraper (optional), and 20 foot high performance tracking towed runway broom. The truck is to include a hands-free quick attach system for mounting plow to the 4x4 tractor carrier. The plow will utilize tungsten carbide insert cutting edges. Unit is to include all factory standard equipment, unless specified otherwise.

All parts and components of this unit shall be engineered to sustain the maximum load limits and severe operating conditions encountered in snow removal, while resulting in minimum wear and failure.

These specifications require the doing of all things necessary, proper for, or incidental to the furnishing of said unit. All items of design and equipment not listed in these specifications, but involved in carrying out their intent, are required to be furnished by the bidder, the same as if these items were specifically mentioned and described in these specifications. The unit must be fully assembled and tested prior to delivery by a qualified factory or local dealer representative.

**APPLICATION:**

The multi-function vehicle shall be designed for one man operation and used up to 40 MPH during snow removal operations on ramps, taxiways and runways. The design of this unit shall ensure positive tire-to-ground tractive effort while brooming. The unit shall have a net clean width of 18.0 feet after the broom. The chassis shall be all wheel drive and all wheel steering with approximate wheel base of 158 inches standard and approximately170 inches with the belly scraper option. The configuration shall be front mounted attachments, belly scraper, forward mounted cab design, and bare frame for fifth wheel and ballast at rear. Unit shall be a Modular Cab Forward Mid-Engine Power Unit with 5tH Wheel type Tow Broom or Modular MTE Cabover Engine Power Unit with 5tH Wheel type Tow Broom.

Unit will be subject to varying terrain and weather conditions to -40 ℉.

1. **POWER TRAIN:**
	1. Chassis Engine: Diesel, water-cooled, four (4) cycle, Minimum 11.9 liter nominal displacement, electronically controlled, minimum 475HP. Chassis engine must be Tier 4F or On Highway Emissions, No Exceptions.
	2. Engine, General:
		1. Engine to be located behind or underneath cab. If engine is mounted under cab, Cab must fully tilt forward to allow access to the engine. No tilting Cabs are NOT acceptable.
		2. Engine shall be equipped with the latest diesel electronic control and engine management system. The engine shall be provided with full flow, replaceable oil filters, heated fuel water separator, high idle and cruise control, engine manufacturer’s standard fuel filtration system, and emergency (power derate) system with indicator and buzzer, in event of high water temperature and/or low oil pressure.
		3. Governor will be of the correct type to control and limit engine speeds as recommended by the engine, driveline, and power train component manufacturers, for its intended use in this vehicle.
		4. Provisions shall be provided for draining engine fluids from convenient locations. No component shall drain on another.
		5. The carrier engine access cover shall be a right side fiberglass enclosure with a hand pump that requires less than 20 strokes to fully open the cover or tilt cab.
		6. Engine covers that utilize a hydraulic pump for access shall incorporate an orifice release to provide a slow and safe lowering of the hood.
		7. Cooling system, hydraulics and other required elements of the power pack shall be protected by a fiberglass hood.
		8. Daily maintenance points shall be easily accessed.
		9. The opened cover or tilt cab access shall be of adequate size to allow convenient access to the daily maintenance items.
	3. Engine Cooling System:
		1. Coolant to be extended life type antifreeze, affording protection to- 40 ℉.
		2. The cooling system shall consist of a heavy duty charge air cooler, engine coolant radiator, transmission oil cooler and hydraulic system cooler.
		3. The tanks and the core shall be constructed of aluminum or steel tanks with copper and brass core. The radiator and cooler assembly shall be mounted with vibration isolators.
		4. The transmission cooler shall have a low temperature bypass to allow rapid warm up of the transmission.
		5. Certification and proof of carrier engine cooling tests is required with the delivery of the unit.
		6. Drain cocks will be provided at the low point of radiator cooling system.
		7. Safe and easy access to radiator fill shall be provided.
		8. Engine coolant level sight gauge, easily seen by maintenance personnel when checking engine oil, etc.
	4. Hose Clamps: Utilized on engine coolant lines one (1) inch inside diameter or larger are to be *CONSTANT-TORQUE* or equivalent, stainless steel.
	5. Engine Air Intake System:
		1. Must have two (2) stage airs cleaner.
		2. Air filter restriction indicator.
	6. Engine Exhaust System:
		1. Exhaust system to be designed to prevent rain, snow, or slush from entering exhaust system.
		2. Exhaust piping to be located away from cab providing maximum visibility and be heat shielded if vulnerable to maintenance personnel.
		3. Horizontal exhaust piping shall be shielded to prevent spilled flammable fluids from contacting surface, where applicable.
		4. Muffler and tailpipe will be designed to minimize noise without causing excessive backpressure.
		5. Engine Fuel System for Carrier Chassis: Capacity: 150 gallons
		6. When more than one (1) tank is furnished, means shall be provided to assure equalized fuel level in all tanks. The tanks shall be constructed of heavy gauge steel and be properly fastened to the frame.
		7. A four inch diameter filler neck with chain connected cap and brass tank drain plugs shall be provided. If twin fuel tanks are utilized, they shall be interconnected, single side fuel fill, 30 GPM fill rate with shut-off valves at each end of the crossover. The fuel filler cap shall be painted a color appropriate for the type of fuel, and a permanent label shall be affixed as close as practical to the fill neck(s), in an area visible to the person refueling the vehicle, stating the appropriate fuel and capacity of the tank(s).
		8. Fuel tank(s) to be mounted so as not to affect the balance of the unit (full or empty).
		9. Filters:
			1. To be spin-on or cartridge type.
			2. Excessive leakage when changing fuel filter(s):
				1. Filter(s) shall include ¼-turn valve(s) to isolate the filter(s) or location of filters (above tank and engine) or anti-siphon plumbing may be substituted for the shut-off valves. The main intent is to minimize onsite spills during service.
			3. Fuel filter(s) easily accessed.
		10. Fuel system to include heated fuel and water separator.
	7. Engine Oil Filtration: Oil filters to be spin-on or cartridge type.
	8. Engine Oil Drain (If engine is behind the cab):
		1. To be equipped with a ¼ (one-quarter) turn ball shut-off valve.
		2. An extension hose, or piping, may be required to allow draining of oil into a bucket or pan that would be positioned at ground level.
		3. The ball valve, end of the hose, or piping would require a threaded cap or plug.
	9. Engine Cold Starting Aids**:**
		1. Automatic electronic ether injection system, or engine manufacturer supplied standard fuel pre-heater.
		2. To be wired through the ignition system.
		3. To include an engine sensor switch.
		4. System to be installed in engine compartment and to have maximum protection from the elements.
		5. Engine Block Heater: Immersion type, highest wattage available, 110 volt AC (OEM if available).
		6. To include an onboard 12V trickle charger/battery maintainer.
			1. Cord for block heater and trickle charger to be joined and routed to a single connection point.
2. **DRIVE TRAIN:**
	1. Design: To be two (2) axles, single tire, 4x4.
	2. Work Speed: Shall be capable of maintaining a continuous forward speed, in working mode, of not less than 40 MPH on level pavement.
	3. Transmission:
		1. The transmission shall be Allison RDS 4000 or Allison Rugged Duty. When coupled with transfer case and axle ratios will provide sufficient power for heavy duty snow removal operations. The vehicle shall provide sufficient torque in all gear ranges to support ground speeds during snow removal from 1-45 MPH. Shifting shall be accomplished via a touch pad shift control within easy reach of the operator.
		2. Transmission is to be locked out if an attempt is made to shift the transmission into gear with the parking brake still engaged.
		3. To include an oil level sensor option.
	4. Transfer Case:
		1. Transfer case assemblies shall be installed provide positive drive to the traction drive axle(s) and may be of single or multispeed design if required.
	5. Axles:
		1. Front: The front axle shall be a full floating, torsion flow drive/steer type, with a single reduction gear design, minimum 29,000 pound GVW rating at the ground, minimum 10" ground clearance, capable of withstanding the loads of the unit being bid. To ensure good maneuverability, the cramp angle of the wheels shall be a minimum of 35 degrees. A driver controlled traction differential unit is required in the front axle.
		2. Rear: The rear axle shall be a full floating, torsion flow drive type with a single reduction gear design, minimum 26,000 pound GVW rating at the ground, minimum 10" ground clearance, capable of withstanding the loads of the unit being bid. A driver controlled traction differential unit is required in the rear axle.
		3. Front and rear tread widths not to vary more than two (2) inches. Wheel spacers shall not be used to obtain correct tread widths.
		4. For extended life, the steering-drive wheel ends shall be bolted to and removable from the center section of the axle housing. The permanently lubricated cardan drive type joints shall be enclosed in a ball and socket. The trunnion pins shall be supported by high capacity low friction sealed spherical bushings to insure long life and smooth steering at all cramp angles.
	6. Drive Lines: Shall include shielding or guards to prevent damage to specialized components, such as hydraulic components, in case of driveline failure.
3. **CHASSIS:**
	1. The operator shall be positioned near cab center for visibility in high speed snow removal operations. Minimum cab height shall be 132" as measured from the ground to the top of the cab.
	2. The front attachment to front axle dimension shall be kept as close as possible. This cab location and the axle to attachment dimension are necessary in order to have the operator as far forward as good engineering practices will permit, allowing greater visibility and maneuverability while clearing runways and taxiways.
	3. The chassis shall be designed to permit easy and safe mounting and dismounting of the unit for operators and service personnel.
	4. All sheet metal, cowling, steps and fenders shall be free of sharp edges and protrusions, and include ample supports and bracing to prevent distortion and cracking.
	5. All steps or walkways shall be raised lug or expanded metal type construction.
	6. Grab bars shall be installed as required for safe mounting and dismounting by personnel following OSHA standards of 3-point contact during all mount and dismount activities. This shall include a minimum 1-inch diameter vertical grab bar behind each door. The inside of each door shall include a minimum 1-foot grab handle positioned under the window. It shall be made of minimum 1-inch diameter material, round only (no sharp edges or corners) for safety.
	7. GVWR: 55,000 pound
	8. Wheelbase: 158 inches for unit without Underbody. Wheelbase of 170” with Underbody Option.
	9. Ground Clearance: Eight (8) inches all attachments in the raised position.
	10. Frame:
		1. Straight steel frame.
		2. To be reinforced as required preventing distortion under maximum loads experienced during operation of this vehicle.
		3. Overall frame width must be 34 inches nominal to minimize wracking and torsional stress during operation.
		4. Frame assembly to include cross members in addition to engine and drive train components to provide lateral frame stability.
		5. Frame liners, wrappers, fish plating, and bolt-on extensions are not acceptable.
		6. All fasteners to be grade eight (8) per SAE J429.
	11. Steering:
		1. Front axle steering shall be integral hydraulic power assist gear type. The steering gear shall be rated for heavy duty service. For safety, a mechanical linkage shall be maintained between the operator’s steering wheel and front axle, allowing manual steering in the event of a hydraulic or electrical system failure. To be capable of easily maintaining directional control during operation.
		2. All-Wheel steering is required. Four Wheel Steering System. The Four Wheel Steering system shall allow the vehicle with plow attached to accomplish a complete wall to wall turning circle of 75 feet or less to assure it can complete a U-turn within the confines of a taxiway without damage to lighting or infield surfaces with Tow Broom Attached.
		3. The electronic over hydraulically controlled rear axle steering system shall operate in conjunction with the mechanically controlled front wheel steering system. This system must consist of the following components and operating features:
			1. A mechanical front steering system with hydraulic assist.
			2. Front and rear driving, steerable axles.
			3. Various hydraulic control valves, wheel position sensors, speed sensor and a steering cylinder located on the rear axle.
			4. ECU (electronic control unit) is integral to the vehicle ECU.
		4. Four wheel steering shall be electronically coordinated through the standard steering wheel. The operator shall have the ability to select the desired mode of operation “on the go” with provisions made for safe transition from one mode to the other. A selector switch within easy reach of the operator shall provide the option of front steer only, crab steer, or coordinated front/rear steer. Additionally, a thumb switch control on the joystick shall be provided for controlling rear steer only.
		5. The system shall include safety provisions for dampening of all wheel steer effects at higher speeds, but it shall also allow full operation while the vehicle is moving at lower speeds. An indicator shall be provided in the cab to display mode selected and rear wheel position. Safety dampening of all wheel steer effects shall be related to vehicle speed.
		6. Front Steer:
			1. When in the front mode the vehicle behaves like a conventionally steered vehicle. In this mode, the rear axle is locked and does not steer.
		7. Coordinated Steer:
			1. This mode gives the operator the tightest turning radius of any of the available modes. When the front axle is steered, the rear axle turns in the opposite direction of the front, which reduces the turning radius and enhances maneuverability. This mode also has a dead band feature. Dead band allows the vehicle front axle to be turned a predetermined number of degrees in either direction before the rear axle steers. The dead band varies according to the speed of the vehicle.
		8. Crab Steer:
			1. When the front axle is steered, the rear axle steers in the same direction as the front axle. This makes the vehicle travel in a diagonal motion, sometimes called “crab walking”. This mode can be useful for parallel parking or for counteracting side forces applied to a vehicle, such as during low speed snow plowing or brooming operations. This mode also has a speed controlled variable dead band.
		9. Operator Controlled Rear Steer:
			1. When in this mode, the rear axle shall be controlled only by a dedicated control in the cab, independent of the front wheel position. This mode is required for backing the vehicle or when the vehicle is moving large amounts of snow and more implement angle is desired. The hydraulic locks shall remain operational; however, the mechanical lock is disengaged (unlocked) at all times when in this mode.
		10. Auto-center feature:
			1. Assists in relocating the rear axle to the straight ahead position after use of the operator controlled rear steer mode.
		11. Switching Between Modes:
			1. The mode switch shall be active at all times. However, the ECU shall not switch modes unless the front axle crosses center for operator safety. If the front axle does not cross center the system shall remain in the previous mode until the front axle crosses center. The rear wheels must also be in the straight ahead position before the mode change occurs.
		12. Wheel Position Indicator:
			1. The system must include a wheel position indicator which shows the rear axle positions at all times and shall be in easy view of the operator.
		13. Mode Indicator:
			1. The mode indicator feature shall consist of one of four icons on the operator display indicating which mode is selected and whether rear axle is locked.
		14. Managers Password or key switch:
			1. A password or key switch shall be provided which will allow supervisory personnel to “lockout” or “enable” operation of the all-wheel steer system. This password or key switch is included to insure that only those operators who are qualified to operate the vehicle all wheel steering system are permitted to do so.
		15. Safety lockout:
			1. The system shall include safety provisions for gradually decreasing the AWS effects at speeds above 15 to 20 MPH and shall automatically lock out the rear steering axle at 30 MPH. The system shall restore to full operation as the vehicle slows down.
		16. Mechanical or hydraulic locking system shall immobilize rear axle in the event of failure or deactivation.
		17. If required, steering axle ball ends shall be completely enclosed at all cramp angles to help prevent ice, slush, mud, etc. from contacting the driveline joints. The entire moving drive-steer axle shaft should be enclosed within the steel ball end that functions as a grease reservoir.
	12. Brakes:
		1. The service brakes shall be fully air actuated S-cam drum and shoe system with a minimum 15.7 CFM air compressor and documented to conform to FMVSS 121.
		2. Service Brakes:
			1. To include ABS system.
			2. Foot operated control, suspended or treadle type.
		3. Parking Brakes:
			1. The parking brakes shall be spring actuated, air released at the rear service brake air chambers with the air switch mounted within the cab and in easy reach of the operator.
			2. Warning Light: Red or yellow in color is to be “ON” when parking brake is actuated. This light is to be dash mounted in clear view of the operator.
			3. Audible alarm if the parking brake is not released.
		4. Brakes, shall be enclosed and shielded to help protect against moisture and sand. Enclosed refers to drum brake systems only. Protection devices are to be metal, not plastic/poly.
		5. Pneumatic System:
			1. The unit shall be fitted with a pneumatic system to provide the necessary compressed air supply for the vehicle brakes and all other components requiring a source of compressed air. The system shall be a standard, transportation grade design as used in Class-8 highway applications. The system shall include a direct (engine) driven air compressor, air tanks, valves, air dryer, actuators and any other components required to make a reliable operating system. At a minimum, compressed air shall be required for the carrier vehicle brakes and tow behind broom brakes (if applicable) as per the latest published FMVSS 121 regulations.
	13. Towing Provisions:
		1. A fifth wheel receptacle shall be supplied and installed over the rear axle of the towing chassis.
		2. Trailer connections shall be provided integral to the chassis system with air supply valve in the cab.
		3. Air brake glad hands and an SAE 7 pin trailer connector shall be supplied and installed by the bidder just in front of the fifth wheel.
		4. A pogo stick shall be provided between the fifth wheel and the trailer connection points to support the hoses and cable. A solid mounting plate shall be supplied for the SAE 7 pin trailer connector and air brake glad hands.
		5. The chassis shall be properly ballasted for best traction during operation, approximately 9,000 pounds of steel near and above the rear axle. Such ballast shall not put the unit over its component ratings in plow up or plow down configuration.
		6. Unit must be able to have enough ballast to plow with the broom removed. The chassis must be able to be used independently with or without the plow and / or broom.
	14. Tires and Wheels:
		1. Rim and tire ratings shall conform to the current recommendations as published by The Tire and Rim Association. The preferred rim type for this application is Steel or Aluminum Disk with a minimum of ten bolt holes, hub piloted design with flanged or captured washer type lug nuts.
		2. Tires should be identical.
	15. Suspension:
		1. To be manufacturer’s standard spring type.
		2. Suspension will be designed to allow for proper operation of specified attachments.
		3. The spring hangers, pins and supports shall be heavy-duty to give long life.
		4. The pins shall be of the grease type with substantial bronze bushings.
	16. Tow Hooks: Two (2) each, frame mounted, rear.
4. **ELECTRICAL:**
	1. The electrical system shall be negatively grounded and installed in accordance with current state-of-the-art practices and appropriate Federal requirements. All parts of the electrical system shall be water resistant, easily accessible, securely mounted, and protected against extreme temperatures, physical damage, snow, oil, and corrosion. All electrical circuit wiring shall be made of stranded conductors with a capacity exceeding the anticipated maximum circuit loading. Insulation of electrical wiring shall be equal to the recommended standards established for insulation materials by SAE. Manufacturers may employ at their discretion, multiplex technology/inpuV output microprocessor type controls for efficiency and maximization of control parameters for applicable electrical systems and/or devices. Acceptable electrical configurations are as follows:
		1. 12 V electrical and starting
		2. 24 V electrical and starting, with 12 V lighting
	2. Master Electrical Switch:
		1. Single high ampere master electric switch to cut off power source from battery to the ground (ground side if possible, positive side if not) and remainder of electrical system,
		2. Located driver’s side, in cab or near battery location, easily accessed, but not ordinarily visible to persons unfamiliar with vehicle.
	3. Batteries:
		1. Batteries shall be securely mounted and adequately protected against physical injury, water, chemicals and exhaust heat. Battery mounting hardware shall be constructed from corrosion resistant material. It is recommended that batteries be located as close as feasibly possible to its respective engine starter so as to minimize voltage drop and to provide ready access for change out and maintenance. Enclosed battery compartments shall have adequate ventilation. Battery size and quantity shall be calculated based on the specific diesel engine cold cranking specifications (with the recommended oil viscosity) and reserve capacity as per SAE J537.
	4. Charging System:
		1. Alternator: Minimum 240 AMPS (12V System) or 100 AMP (24V System), carrier engine driven.
		2. All electrical control switches to be direct current rated.
		3. Circuit Breakers: To be located in an easily accessed weatherproof electrical panel.
	5. Lighting System: All lighting on this vehicle shall conform to FMVSS.
		1. Headlights: Halogen, with High/Low beam.
		2. Stop turn, tail, and marker lights to be LED. Factory non-LED lighting may be used for front turn signal lighting.
		3. Turn Signals: Self-canceling with 4-way flashers.
		4. One LED Cab interior dome light. Light to come on when opening door(s) and also be operated by a separately driver controlled switch on the light.
		5. Work Lights:
			1. Two (2) each, HID (High Intensity Discharge (*J.W. SPEAKER* or equal) flood, adjustable and mounted left and right, front upper outside cab light bar. Facing forward.
			2. Two (2) each 50 watt halogen flood, mounted left and right, rear of unit. Facing rearward.
			3. Lighted engine compartment(s), switched at compartment. Lights are to give more than adequate lighting.
			4. To include two (2) each remote mounted spotlights, wireless remote controlled.
				1. To be located at the upper left and right corners of cab, visible from the driver’s position.
		6. Strobe Lights:
			1. Two (2) each, Beacons mounted on cab roof, visible from all directions.
			2. Two (2) each, LED Beacons mounted on top rear of unit, shielded to prevent flashing of light into operator’s cab.
			3. Left lenses color to be amber, right lenses to be blue.
			4. Switch control center with “HIGH/OFF/LOW” to be within easy reach of operator.
			5. To be spaced approximately 11 inches apart.
		7. All other lighting to conform to FMVSS regulations.
	6. Backup Alarm: Electronic, self-adjusting sound level, located on rear of unit per manufacturer’s recommendations.
	7. Trailer Wiring and Location:
		1. Electrical wiring used is to be flexible to -40 ℉.
		2. Wires to be a continuous run from source block to plug.
			1. Wire position #1, white, and 10-gauge, for ground.
			2. Wire position #2, black, 12-gauge for clearance, side marker, and identification lamps.
			3. Wire position #3, yellow, 12-gauge, for left turn.
			4. Wire position #4, red, - 12-gauge, for stop lights.
			5. Wire position #5, green, 12-gauge, for right turn.
			6. Wire position #6, brown, 12-gauge, for tail and license plate.
			7. Wire position #7, blue, 12-gauge, for ABS power.
			8. This plug must be clearly marked “ABS” with a permanent engraved or welded label.
		3. Location to be on same pole as the air glad hands.
	8. Wiring:
		1. Located for maximum protection from snow and ice build-up, grease, oil, fuel, and heat from engine and components.
			1. All wiring not in protected areas shall be covered with split-loom or canvas loom and heat-shrink ends.
		2. Routing through structural members to be protected by grommets.
		3. To be secured by clips at intervals to prevent rubbing or chafing due to movement.
		4. All applicable junction boxes, light housings, etc. to be constructed of corrosion proof material.
		5. Spade and bullet connectors are not acceptable.
		6. Outside of the cab wiring:
			1. All connectors to be corrosion resistant and waterproof.
			2. *THERMOSEAL* and *WEATHER-PACK* type connectors are acceptable.
		7. Non-Factory Wiring:
			1. All dealer/vendor installed items, which require connecting into the vehicle’s electrical system shall be done using an OEM factory modified wiring kit whenever possible. All non-factory wire connections (splices, connectors, etc.” shall be soldered and shrink tube insulated with adhesive/metable sealant, thick wall polyolefin shrink tubing (3M EPS-300 or equal). No non-factory crimp connections allowed. No cutting or splicing into the factory wiring harnesses allowed. All electrical connectors shall have dielectric grease applied to terminals to help reduce corrosion.
			2. All non-factory wiring shall be encased in a totally sealed wiring harness to help prevent corrosion from magnesium chloride or urea. The wiring harness shall be well secured to the truck with neoprene aircraft stainless steel tubing clamps. Rubber grommets shall be used at all areas where the wiring passes through areas that could damage the wiring.
		8. All wiring connections to include dielectric grease.
		9. All positive studs at locations such as but not limited to junction blocks, thru-hulls and batteries shall be have dielectric grease and insulated boots or electronics compatible silicone protection from accidental grounding.
5. **AIR RIDE CAB:**
	1. Cab Shoulder Width: 70 inches, wide enough for a two (2) man cab, but narrow enough for adequate visibility to the left and right for the operator.
	2. Noise Suppression/Insulation:
		1. This unit shall have a fully enclosed, thermally and acoustically insulated (85 dB maximum as measured 6" from the drivers ear at full engine RPM), fiberglass, aluminum, and glass cab. The operator shall be positioned slightly right of center. Adequate space for the convenient installation of two communication radios shall be provided. Minimum cab height shall be 132" as measured from the ground to the top of the cab. The interior of cab shall be fully insulated. The floor of the cab shall be insulated with thermal-acoustical sound barrier floor mat.
		2. Rubber matting on floor will be slip resistant.
		3. Interior lower panels of doors shall include a nonmetallic liner to assist in sound absorption.
	3. Heater and Defroster with Air Conditioning:
		1. High output, fresh air type heater/defroster with multispeed fan motor, mounted behind the operator to minimize visibility obstructions to the front. Cab heater with defroster shall be capable of maintaining a 50 degree F inside temperature at sea level when the ambient temperature is -40 degrees F.
		2. The Heater/Ventilation shall include a screened vent near cab rear for fresh air intake into the heating/ventilation unit. Air flow of 380 CFM minimum required. Vent controls shall be provided from panel selection including inside or outside air intake.
		3. Caged Defroster Fans: Two (2) each, dash or upper windshield mounted, two (2) speeds, independently controlled.
	4. Glass/Windows:
		1. All glass to be tinted safety glass DOT approved and stamped (stick-on type tint is not acceptable).
		2. Front windshield to have a minimum 3000 square inches.
		3. Windshield to be heated.
		4. Front windshield and side windows to include driver’s area sun visor, fold-up style, green or gray tinted visor.
		5. Side windows shall be power roll down type, one on each side of cab in each door, 6 square feet each. Sliding window are unacceptable.
		6. Rear window shall be minimum 3 sq. ft., stationary type.
		7. Rear corners of cab shall include sight windows for visibility of processed runway surface, approximately 250 square inches each.
		8. A minimum of two peep windows, 500 square inches total, are required in the cab front fascia below the windshield to assist operator in monitoring plow and casters.
		9. Side sight peep windows required in lower portion of each door 70 square inches each. Glass pane in each skin of door required.
	5. Wipers:
		1. Electric variable speed heated wipers, providing a minimum of 77% swept surface of the windshield.
		2. Electric powered multiple speed wipers with intermittent feature and include wet arm washer(s) on front windshield(s).
		3. Side window wipers (on both left and right) are required. Side window wipers may be air or electrically operated. Heated wipers on the side windows are not required.
			1. To include a feature that if the window is open a ¼ (one-quarter) of an inch or more that the wiper for that window will not operate.
	6. Deluge System:
		1. Minimum 15 gallon capacity system is required with dedicated pump for visibility enhancement. The washer solvent shall be directed at each side window, each outside mirror, and the front cab glass by means of a minimum five (5) each dedicated nozzles. This is in addition to normal wet arm wiper systems.
	7. Seats:
		1. The operator seat shall be air ride, high back, fully adjustable in the horizontal and vertical positions, left side arm rest, adjustable lumbar support, cloth covered, and load adjustable and furnished with 3 point type safety belts.
		2. Custom right side adjustable arm rest shall contain joystick for implement and all wheel steer control.
			1. Arm rest control shall include a vertical stow feature to facilitate easy egress/ingress of operator. A detent shall hold arm rest in the stowed position, with release control provided for operator.
		3. An air ride, high back, fully adjustable in the horizontal and vertical positions, adjustable lumbar support passenger seat shall be provided to the left of the driver. It shall also be equipped with three point type safety belts; arm rests are not required.
	8. Entry:
		1. To have raised lug or expanded metal construction steps.
		2. Grab handles to be provided to assist in entering or leaving cab, or gaining access to catwalk(s) around engine compartment (if so equipped).
		3. For future reparability, door hinges shall not be welded to the cab frame and the door.
		4. For extended door life, door hinges shall stainless steel piano type hinges
		5. Door stop webbing, minimum two (2) each 2 inch, on each door, or a single 4 inch on each door to prevent strong winds from “over opening” of doors.
	9. Rear View Mirrors:
		1. Dual, heated, motorized West Coast type mirrors operated from the operator position in the cab.
		2. Electrical for heat to mirrors to include a dash mounted independent switch.
	10. Gauges/Indicators and Controls:
		1. All gauges, indictors and controls mounted in the cab are to be within easy reach and view of the operator.
		2. Any and all gauges that show pressure, temperature, etc., are to be in U.S.A. measurements such as PSI, Fahrenheit, etc.
		3. All digitally controlled electrical circuits shall be protected by solid state circuitry and logic.
		4. Power supplies to control modules shall be protected by manual and automatic reset circuit breakers.
		5. Master wiring circuitry boxes shall be mounted behind operator.
		6. Circuit breakers controlling all analog circuits shall be easily accessible.
		7. Master connection point for radios shall be in the cab within reach of operator and passenger.
		8. Access panels shall be supplied in the upper console to allow easy access to switch and wiring connections.
		9. A warning device to indicate open door, transmission in gear is required.
		10. Instrumentation shall be centered on a color liquid crystal display mounted to the tilt/telescoping steering wheel. Available information shall include:
			1. Audible and visual (red or yellow in color) warning system for low engine oil pressure and high engine coolant temperature.
			2. Voltmeter or ammeter gauge (for each alternator, if applicable).
			3. Air pressure with visual (red or yellow in color) and audible low air pressure warning (if air system is utilized).
			4. Engine oil pressure warning light (red or yellow in color).
			5. Fuel gauge.
			6. Engine coolant overheat warning.
			7. Tachometer.
			8. Speedometer and odometer.
			9. Transmission temperature warning light (red or yellow in color).
			10. Hydrostatic fluid low-level warning light (if applicable, red or yellow in color).
			11. Parking brake audible alarm and warning light (red or yellow in color).
			12. DCDL (Driver Controlled Differential Lock) ON/OFF switch with ENGAGED (Orange) indicator light for forward and rear drive axle.
			13. Indicator light, green in color, lit when runway plow hitch pin lock is engaged.
		11. All gauges to be lighted from behind.
		12. All switch identifications are to be lighted.
		13. All switches, gauges and controls to be properly identified.
			1. *DYMO* type tape labels are not acceptable.
			2. All OEM labels shall have part numbers, and to be listed in parts manual.
		14. Toggle switches controlling electrical components to be metal (plastic is not acceptable). Rocker type switches may be plastic or metal.
		15. Self-canceling turn signals with hazard switch.
		16. To include a RED in color Emergency Engine Shut-Down Switch located in a reachable location for the driver.
	11. Horn: To provide a minimum of 113 decibel rating. If roof mounted air, to include snow shield. Dual electric are acceptable.
	12. Hydraulic hoses are not to enter the operator’s cab.
6. **BODY:**
	1. Engine Compartment:
		1. Shall provide adequate access to the top, left, and right sides, for maintenance.
		2. Walkways to be of raised lug or expanded metal construction.
		3. Walkways shall include minimum one (1) inch tubular, 42 inches in height, handrails or guardrails and be included for steps that access walkway.
	2. Anti-Sail mud flaps, front and rear of both axles (if lower edge of fender is more than 23 inches from ground).
	3. Fenders of front and rear wheels, if steel, to be undercoated.
	4. Self-tapping bolts used in sheet metal construction are not acceptable.
7. **HYDRAULIC SYSTEM FOR PLOWS:**
	1. Hydraulics will be provided to power the plow and scraper.
		1. The 24 foot runway plow will require hydraulics for quick attach, plow lift, right and left reverse. The plow, itself, doesn’t have any hydraulic functions. All hydraulics are on the truck side of hitch system.
		2. The 12 foot scraper will require hydraulics for pitch, swing, and lift. (Scraper is optional)
	2. Pump: Direct driven, variable displacement piston. Engine driven auxiliary is acceptable with. Sufficient flow and pressure capacity for all systems. Belt or chain driven is not acceptable.
	3. Hydraulic Reservoir:
		1. Designed for adequate cooling and shall be properly baffled.
		2. The hydraulic fluid reservoir or tank shall have a filler neck consisting of a strainer, drain plug, shutoff valve, air vent and baffles. A sight glass or other device shall be provided to allow the operator to verify that fluid level is sufficient for safe operation without the necessity of opening the system. An oil level warning device shall be provided at the Operator Control Station for all hydraulic systems. A label shall be installed as close as practical to the filler neck indicating the proper fluid for servicing the hydraulic system, and the capacity of the tank. Separate hydraulic reservoirs may be utilized for different attachment systems so as to minimize cross contamination and potential progressive wear.
		3. Suction strainer, 100 mesh minimum, with sump area and provisions made for easy cleaning.
		4. Sight gauge located above pump level.
		5. Temperature gauge.
		6. Equipped with a filler neck with 40 micron strainer and air vent.
		7. Drain to be equipped with a ¼ (one-quarter) turn ball shut-off valve (easily accessed). An extension hose, or piping, may be required to allow draining of oil into a bucket or pan that would be positioned at ground level. The ball valve, end of the hose, or piping would require a threaded cap or plug.
	4. Hydraulic Filtration:
		1. Spin-on filter(s), element having a 10 micron filtration capacity, with properly rated no flow restriction check valves installed to isolate filter(s) for servicing or filters to be located above the hydraulic tank to reduce oil loss during servicing.
		2. Filtration to be in compliance with SAE J931.
	5. Hydraulic Control Valve:
		1. The hydraulic system(s) shall consist of rams, pumps, motors, piping, fittings, valves, controls, microprocessors, transducers, fluid reservoirs, filters, necessary and all other parts essential to efficient operation. The system(s) shall be capable of positioning the hydraulic actuated equipment in any chosen position within the design limits of travel, and will be of such capacity that all controls can be operated simultaneously without noticeable reduction in response. Hydraulic system(s) shall be constructed to withstand all loads imposed in snow removal operations without the use of mechanical locks. The entire hydraulic system shall conform to SAE J514, J516, J517, and J524. All hydraulic controls shall be located in the vehicle cab. The equipment manufacturer shall not be permitted to install any high-pressure hydraulic lines or other hydraulic transmission devices in the operators cab. Control of all snow removal attachments shall be by means of remote control CAN BUS, electric over hydraulic controls whenever possible. Adequate cooling shall be included to maintain acceptable hydraulic oil temperatures throughout expected vehicle operational ranges.
	6. Controls:
		1. The operator’s control shall be integrated with the chassis, fifth wheel, scraper, and plow. All switches shall be lighted rocker style or push button. It shall have all necessary functions to operate the plow and shall have the following:
			1. Joystick for raise, lower, swing left/right.
			2. Switch for plow float, ON/OFF, to be located on the joystick or arm rest switch panel.
			3. Low hydraulic oil level warning light.
			4. Switch for hitch, LOCK/UNLOCK.
	7. Plumbing:
		1. Only commercial quality hydraulic lines, hoses, and fittings that are capable of withstanding system working pressures under load are acceptable. Hydraulic hoses shall have a bursting pressure of three times their rated working pressure. The use of fittings, joints, and connections shall be kept to a minimum. Where local climatic conditions require, the airport operator should consider requiring arctic type hoses with temperature ratings appropriate for the location. Test gauge connection fittings or pressure transducers shall be provided at suitable points throughout system for maintenance and trouble-shooting. All hydraulic system components are to be shielded from engine exhaust heat, and heat shields shall be installed on the engine exhaust system to divert any possible leakage from the hydraulic system. Hoses shall be installed inside steel tubing wherever necessary to deflect the flow of fluid from exhaust and electrical system components in the event of hose rupture or leakage. An airport operator may request that all hydraulic hoses exposed to sunlight be encased in cloth sheathing for UV protection. Any quick disconnect fittings utilized in the system should be of the latest ISO spec low/no drip design
8. **CHASSIS MOUNTED PLOW HITCH:**
	1. Capable of handling the 24 foot plow.
	2. The front attachment plow hitch to the chassis shall be a “Hands Free” type. It shall allow hands free interchange of the plow and other attachments from the operator position in the cab. It shall be hydraulically operated (plow lift, swing, and lock) and designed for power reversible runway plows.
	3. The plow moldboard and push frame must be capable of being completely removed or attached from the vehicle’s cab without leaving the operator’s seat and without the need to disconnect or reconnect hydraulic lines and connections by the operator.
	4. It shall be automated and fully repeatable. The entire process of hitching or unhitching shall be possible by one man in not more than 2 minutes and shall be positive connected with hydraulically operated lock pins.
	5. There shall be three sections of the hitch: 1) Chassis side 2) module 3) moldboard side.
		1. All hydraulics and structure for plow lift, swing, oscillation, and lock shall be on the module section, which shall be located between the chassis and the moldboard sections of the hitch.
		2. The moldboard section shall be a J-Hook style coupling.
		3. Provisions shall be made to allow the module portion to be readily removable from the chassis.
		4. Attachment to the front driving axle housing will not be acceptable.
		5. The lock pins are to be activated from the operator’s position in the cab.
	6. Plow Hitch – Chassis Side:
		1. On the front chassis frame rails shall be a DIN plate style coupler for connection of the module. It shall consist of two side (cheek) plates of adequate size bolted to the chassis frame rails with a welded 0.63 inch thick push plate.
		2. This flat mounting push plate shall have two top mounting pockets and slots for four 1 inch diameter swing bolts to accept the mating portion of the module or other possible front attachments that are equipped with a standard DIN type hitch.
		3. Plow Hitch: Lift, Swing, Oscillation Lock Module
		4. The module (hydraulics and structure for the plow lift, swing, oscillation, and lock) shall be mounted and un-mounted from the chassis by means of a chassis mating DIN plate hitch of a size sufficient to support the weight and operation of the plow.
		5. Two steel claws and four 1 inch diameter swing bolts with nuts that are part of the module will lock the connection between the module and chassis. The entire process of removing or installing the module shall be possible by one man in not more than 10 minutes.
		6. All hardware shall be grade 8. Bolts shall have sufficient shank length so that no thread is in the bearing areas.
		7. Lift:
			1. The plow lift system of the module shall be a parallel lifting type consisting of two parallel tubular lift arms of 3 inch x 3 inch x 0.31 inch wall steel tubing.
			2. The design shall incorporate a dual acting plow lift cylinder.
			3. The hydraulic double acting plow lifting cylinder shall be 4 inch bore stroke with a 2 inch diameter rod.
			4. This lift cylinder will also serve to “hands free” remove and attach the plow moldboard.
			5. The plow lift hydraulic system will be furnished with a relief valve to prevent no more than 200 PSI down pressure.
			6. The lifting cylinder arrangement shall incorporate a mechanical transport lock that shall take the weight of the plow off the hydraulic cylinder during plow transport, and shall act as a safety in the event of a hose failure during transport.
		8. Swing:
			1. The plow swing system of the module shall be equipped with two telescoping type hydraulic cylinders enabling the plow to be angled left, right or straight ahead.
			2. Maximum angle to the left or right shall be 32 degrees.
			3. The telescopic hydraulic cylinders shall be of the two stage type with an outside diameter of 4.50 inch and a rod diameter of 2.50 inch.
			4. For corrosion protection, the tubular stage shall be chrome plated and the rods shall be nitride.
			5. The cylinders shall be heavy duty to allow for heavy snow plowing under severe conditions and shall be equipped with a double acting hydraulic cushion valve mounted on the plow to protect the cylinders from damage.
			6. The hoses used shall be standard 0.50 inch SAE 100R2 rated.
			7. There shall be a DX type bushing installed in the center of each yoke assemblies for low friction movement of the swing pin.
			8. The two (2) parallel tubular lift arms shall be attached to the top and bottom yoke. The yokes/lifting arms connections shall have a hardened steel sleeve bushing.
		9. Oscillation:
			1. The plow oscillation system of the module shall incorporate a drive frame that allows oscillation of the plow with respect to the chassis in order to follow the pavement contour.
			2. The plow shall oscillate a minimum of 2 degrees overall. The oscillation mechanism shall consist of two front facing vertical plates which can pivot and slide.
			3. When the plow is carried in the raised position and angled right or left the plow shall remain approximately level to the pavement and remain no more than 2 degrees to the pavement.
			4. A poly plate shall be sandwiched between the two oscillation plates to reduce friction and wear. No metal on metal.
			5. There shall also be two (2) rubber cushions bolted to the plow push frame to limit and cushion the end of oscillation travel.
		10. Lock:
			1. The plow lock system of the module shall aid in the hands free attachment of the plow moldboard and to positively secure the plow moldboard to the hitch module. The lock switch must have a locking switch to prevent locking the plow blade from the machine. Unlocking and locking from a display function in the cab is acceptable.
			2. The top of the front oscillation plate shall have a steel receptacle with a tapered sideways lead in to accept the J-hooks of the moldboard.
			3. The bottom of the front oscillation plate shall incorporate an outward acting, horizontal, double acting hydraulic lock cylinder operated from cab with a switch.
			4. At the ends of the cylinder shall be 2.5 inch diameter lock pins. When activated, the lock pin translates into the mating holes in the plow moldboard push frame.
			5. The lock pins shall be tapered to pull the moldboard and the module together to form a positive lock.
			6. The lock pins will be capable of being installed without the need of an additional hydraulic cylinder to push the moldboard away.
			7. A proximity sensor with confirmation light in the cab shall also be provided to confirm the pins are locked on the holes.
		11. Plow Hitch: Moldboard Side:
			1. The plow push frame will have two J-hooks each 1.50 inches thick that will allow the operator to lower the plow hitch, drive forward into the hooks, and then pick up the moldboard. At the bottom of the push frame shall be the mating holes for the lock pins to secure the moldboard to the plow hitch.
			2. The moldboard and push frame, once detached, will rest on the ground on the caster tires and the cutting edge only. No blocking shall be needed.
			3. Lead in on the J-hooks shall be great enough to compensate for forward moldboard roll.
		12. Plow Push Frame:
			1. The push frame shall be of severe duty design with no less than three horizontal steel tubes each having a minimum cross section of 3 inch x 5 inch X 0.25 inch wall rectangular tube.
			2. There shall be six urethane cushions on the bottom of the plow frame compressed to a length of 4 inch by means of six bolts – 1.25 inch in diameter and six lock nuts.
			3. Each cushion assembly shall have a 1.50 inch OD hardened steel sleeve tube over each bolt for sliding inside the push frame to prevent over compression of the urethane cushion when assembling and prevent wear of the bolt. The urethane cushions mount to a pivot weldment that connects the push frame to the moldboard via four (4) pivot pins. The pivot pins shall be 1045 CR steel, 1.50 inches in diameter.
			4. The swing stops shall have a poly liner installed to allow free oscillation of the plow frame. When swung to 32-degrees, the plow push frame shall stay against the stops as the operator raises and lowers the plow, no additional swing adjustment needed.
			5. Four heavy-duty braces on top of the plow frame shall allow the plow and cutting edge angle to be adjusted to positions of 65, 75, and 85 degrees from horizontal for optimum snow handling performance.
			6. Stands:
				1. The moldboard shall have a pair of adjustable leg stands to be used for plow removal / storage with the other remaining weight on the caster tires. They shall aid in raising the cutting edge during change.
				2. They are required for safety and storage reasons.
9. **24 FOOT REVERSIBLE AIRPORT RUNWAY PLOW: (OPTIONAL ITEM PRICED SEPERATELY)**
	1. This plow is to be a 24 foot “J” type reversible plow with a polymer moldboard and cutting edge length of 24 feet. To be a Heavy-Duty Plow provided the following minimum specifications are met.
	2. The 24 foot plow, at full angle, is to be capable of clearing an area of 20 foot 4 inches (20’4”).
	3. This plow is to be manufactured expressly for airport runway high speed plowing work under extreme conditions of snow removal.
	4. The moldboard shall not be less than 50 inches high in the center portion and not less than 70 inches high at the discharge ends when the moldboard is set at 65 degree attack angle and formed so as to lend itself to high speed plowing operations.
	5. The moldboard sheet shall be formed from 0.38 inch thick VHMW un-welded polyethylene sheet.
	6. When set at 75 degrees, the moldboard shall overhang the cutting edge by a minimum of twelve inches the entire length of the plow.
		1. The sheet shall be formed from a polyethylene material that is made from new resin (recycled material is not acceptable), and shall be color impregnated and ultra violet stabilized pigmentation for best visibility in snow removal operations.
	7. Moldboard Reinforcement:
		1. Shall include a full-length heavy-duty angle across the top front of the steel shell and at least 14 vertical ribs tying the upper shell to the cutting edge mounting angle and its reinforcement.
		2. There shall be a minimum of fourteen (14) ribs.
		3. The steel vertical ribs shall be made from 3/8 (0.375) inch thick plate if 14 rib design and ¼ (0.250) inch thick plate if sixteen rib design and have a varying cross section, becoming wider as they approach the cutting edge mounting angle.
		4. There shall be no span between reinforcing ribs in excess of 3 ½ (3.5) feet.
		5. The vertical ribs shall provide support and frame work for a series of window openings in the rear steel moldboard backing frame, tying top reinforcement to the bottom reinforcement.
		6. Window opening design shall provide long term, stable backing support for the moldboard, and help prevent moisture buildup behind the polymer plow face.
		7. The polymer moldboard shall be bolted to this durable framework for maintenance of proper snow handling shape.
		8. Moldboard shall consist of three (3) separate polyethylene sheets, one (1) for the center section and one (1) for each flared end of the plow.
		9. Polyethylene to be retained by 5/8 (0.625) inch diameter carriage bolts with locking hardware to avoid loss on the operations area of the airfield.
	8. Cutting Edge:
		1. Overall length, 24 feet.
		2. Shall be of the tungsten carbide insert type with corner bit protectors.
		3. The inserts shall be single beveled and the blade shall be not less than 0.75 inch thick by 6 inches wide.
		4. The cutting edge shall be supplied in multiple 3 and 4 foot sections to assemble the overall length for ease of installation and handling.
	9. Spray Guard/Deflector:
		1. A spray guard/deflector shall bolt to the top discharge point at the moldboard flange or reinforcement, tangential to the upper radius of the modified “J” style moldboard to direct snow forward, down, and toward the trailing edge of the plow.
		2. It shall consist of a heavy-duty rubber belting that is 0.40 inch thick x 12 inches wide, and shall include a metal retaining strap, ¼ (0.25) inch thick x two (2) inches wide, with necessary mounting hardware.
		3. The hardware shall be of the locking type to minimize opportunity for loss on the aircraft operating areas of the airport.
		4. Provisions shall be provided in the mounting system to adjust the spray guard perpendicular to the moldboard on a case by case basis as desired by the airport for seasonal variation in operations.
	10. Adjustable Caster Wheel Assemblies:
		1. There shall be two (2) tire and wheel assemblies with one (1) assembly mounted to each end of the swing frame.
			1. Casters shall be capable of swiveling 360 degrees.
		2. Each caster strut assembly shall be equipped with a spring loaded adjustable brake dampener so to minimize wheel wobble.
		3. Tires shall be shall be foam filled 20.5 x 8.0 inch, 10 ply rating.
		4. Wheels shall be eight (9) inch diameter x 6.0 inch wide minimum.
			1. They shall ride on hubs fitted with *TIMKEN* tapered roller bearings.
			2. Each bearing shall include seal, lubrication fitting and pressure relief plug.
			3. Each caster spindle shall have a rating of no less than 3000 pounds.
		5. Wheel, tire, and axle assembly shall be easily removed from the caster fork.
		6. Caster wheels shall be of a sufficient rating to support a portion of the weight of the plow at operating speeds since a weight transfer system will support the remaining weight of the plow during use.
		7. Casters shall be designed to rotate in conjunction with plow at any given angle.
	11. Paint:
		1. Color of the plow to be flat or low gloss black. The poly moldboard is not to be painted.
		2. To be cleaned of all contamination and mill scale by media blasting.
		3. To be then primed and painted, minimum of 3.5 mils, with urethane product to manufacturer’s recommendations or powder coated.
	12. All grease fittings are to be a threaded zerk. Press-in type zerks are not acceptable.
10. **UNDER BODY SCRAPER: (OPTIONAL ITEM PRICED SEPERATELY)**
	1. Power reversible 3-function underbody scraper suited for continuous work under conditions imposed by airport snow removal operations.
	2. Moldboard:
		1. The moldboard shall not be less than 0.625 inch thick, a minimum of 12 inches in height and a minimum of 12 feet in length.
		2. The unit shall be made of high strength wear resistant steel with a minimum moldboard thickness of 5/8 inch with a replaceable 0.5 inch x 6 inch reversible curved steel cutting edge.
		3. The main hinge shaft must be 2.5 inch diameter, 0.5 inch wall cold rolled tube material.
		4. The moldboard shall be capable of rising to a horizontal position with a minimum ground clearance of 6 inches (Per SAE ARP 5943 6.1.1) when not in use, depending on truck frame height.
	3. Main Swing Frame:
		1. The main swing frame shall be one piece, flame cut from minimum 0.625 inch plate with reinforcing ribs at high stress areas near mounting brackets and around swing attachment points.
		2. The reversing table shall have provisions for attachment of two 3 inch X 12.5 inch double acting swing cylinders.
		3. The swing frame is to be supplied with all necessary mounting brackets and hardware for attachment to the chassis frame rails.
		4. The center pin shall be a minimum of 5 inches in diameter with two grease point~~s~~.
		5. A retaining plate with three bolts minimum shall be included to retain the swing bearing.
		6. The reversing table shall provide for infinite position adjustment between the two extreme swing positions. Protection for the operator and the equipment shall be provided by hydraulic relief that will allow the blade to swing upon excessive force from obstruction contact. Metal pin locks at specific intermittent blade positions are not desired. Moldboard to be hydraulically angled up to 40 degrees left and right. Swing clamps shall have a poly pad to reduce friction and prevent galling of the swing frame.
	4. Moldboard Pitch or Curl:
		1. Moldboard pitch or curl shall be provided by two 3 inch x 6 inch double acting cylinders with cushion provided by hydraulic accumulator to protect scraper and chassis in the event of contact with an immovable obstruction.
		2. The accumulator will permit the moldboard to trip up and over the obstruction and return it to plowing position when clear of the obstruction.
		3. All hinge and pivot points shall be greaseable to ensure easy movement and longevity.
		4. The entire underbody scraper assembly shall be thoroughly cleaned, shot blasted to remove mill scale and stress relieves the components.
		5. The assembly shall be painted with one primer coat and one finish coat.
	5. Scraper Lift:
		1. A means of elevating and lowering the scraper blade after pitch or curl has been established shall be provided.
		2. This function shall allow a positive attack angle for heavy scraping, and serve to apply down pressure at the cutting edge.
		3. This shall be accomplished by means of two hydraulic cylinders, 3 inches in diameter and 8 inches in length, one on each side, at approximately truck frame width. These shall serve to move the assembly up and down by means of parallel linkage between the swing frame and heavy duty mounting brackets attached to the left and right truck frame rails.
		4. The linkage shall consist of four scraper lift arms, two on each side. Lift arms shall be attached to mounting brackets and swing frame brackets by means of eight 1 inch diameter grade 8 bolts with lock nuts through steel scraper lift pivot tubes inside bushings made from urethane that in turn fit inside the circular ends of the scraper lift arms.
		5. The hydraulic lift cylinders shall attach to the truck frame by means of mounting brackets and 1 inch diameter bolts with lock nuts at the upper end, and to the scraper swing frame brackets at the lower end. Scraper lift and lower guide shall be lined with poly for freedom of movement and elimination of metal on metal contact between the moving and stationary parts of the guide.
		6. Protection for the system and equipment shall be provided by means of an accumulator that shall serve to cushion the shock caused by uneven surfaces, while maintaining the designed and desired down pressure on the cutting edge.
		7. Controls, valves, and hydraulics for the scraper shall be fully integrated with the chassis hydraulics and controls.
11. **HEAVY DUTY HIGH SPEED CRADLING TOWED BROOM: (OPTIONAL ITEM PRICED SEPERATELY)**
	1. The broom head shall provide a swept path of 18 feet. It shall be 46 inches in diameter and be capable of producing 4,000 Ft-Lbs. of torque and 600 RPM, with an air blower system capable of producing a total minimum of 13,400 CFM at 231 mph.
	2. The broom head and air blower shall be hydrostatic drive with infinitely variable speed hydraulic pumps and fixed displacement motors. The broom shall have the ability to remove snow, ice, slush, sand and other debris at rated speeds up to 40 MPH depending on conditions.
	3. (\*) To confirm this, the following must be supplied with the bid.
		1. The exact proposed broom and air blower drive power system components including engine, gearbox, and hydrostatic pumps and motors must have in field proven experience.
		2. A written certification and listing recent delivered tow broom units suffice as evidence.
		3. Engineering hydraulic power calculations confirming the broom speed and available torque values must be supplied with the bid. This includes sizes and specifications of all components from the engine to the broom shaft including specification sheets for the broom and air blower hydrostatic pumps and motors showing type, size, and manufacture. Efficiency losses must also be accounted for. The calculations must be understandable, complete, logical, and in a mathematical order per the Society of Automotive Engineers (SAE) and the Fluid Power Society standard formulas and practices. The burden of proof is the responsibility of the bidder.
		4. Failure to provide the above information for whatever reason will result in disqualification.
	4. Engine Assembly:

The engine used to power the broom head and air blower system shall be a six-cylinder turbocharged diesel engine rated a minimum 475 HP, 11.9 liter displacement minimum. The broom engine shall be Tier 4I or Tier 4F EPA emissions, no exceptions. Engine shall be supplied and equipped with electronic controls for fuel injection and engine management including an automatic shutdown system with manual override and an electrical connector for diagnostic system.

* + 1. The engine shall be provided with a full-flow replaceable oil filter and bypass filter.
		2. 12-volt or 24-Volt starter is acceptable.
		3. Minimum 160amp alternator for 12V Starting, or Minimum 100amp for 24-Volt.
		4. Three Group 31 batteries each have 950 CCA.
		5. To include a master battery switch.
		6. Two-stage air cleaner with an external turbine type pre-cleaner.
		7. Exhaust system with rain-cap shall be mounted on top of engine enclosure.
		8. The heavy-duty cooling radiator and heavy-duty charge air cooler.
		9. Antifreeze shall have protection to -50 ℉ with distilled water.
		10. The cooling fan for the radiator and charged air cooler shall be hydraulically or belt driven with automatic thermostat (high / low) control.
		11. The broom fuel tanks shall be capable of holding up to a total of 150 gallons of diesel fuel for 10 hours of operation.
		12. A heated fuel water separator with 200-watt heater shall be supplied.
		13. Central remote drain lines with valves and caps shall be provided for engine oil, radiator coolant and hydraulic oil.
		14. Application approval from engine manufacturer must be supplied with bid.
	1. Winterization:
		1. Engine Cold Starting Aids:
			1. Automatic electronic ether injection system, or engine manufactured fuel line pre-heater.
			2. To be wired through ignition system.
			3. To include an engine sensor switch.
			4. System to be installed in engine compartment and to have maximum protection from the elements.
		2. Engine Block Heater:
			1. Immersion type, highest wattage available, 110 volt AC (OEM if available).
			2. To include an onboard 12V trickle charger/battery maintainer.
			3. Cord for block heater and trickle charger to be joined and routed to the rear below engine cover single connection point.
	2. Engine Enclosure:
		1. The fiberglass engine enclosure shall cover the chassis including wheels / fenders, engine, and control panel to eliminate snow accumulation.
		2. The enclosure shall be fully enclosed, weatherproof, with left and right side openings.
		3. Airflow through the enclosure must be controlled.
		4. The engine enclosure shall be pressurized using the cooling fan for the radiator and charged air cooler.
		5. The enclosure shall be designed to provide easy access to engine for servicing and repairs.
		6. An auxiliary electric motor / pump shall be provided to operate all the broom control functions and the engine enclosure tilting without running the broom engine. Horizontal opening style doors do not require the motor/pump to open/close the doors.
		7. Access doors shall also be provided in the enclosure to enable routine maintenance inspections as well as providing access to the fuel tank filler, battery box and the service control station.
		8. The doors must have a provision to hold them open or closed as desired. Vertically opening doors require a pendant control to raise and lower the enclosure assembly shall be provided. Horizontal opening doors to have locking provisions to hold the doors open for servicing.
		9. The pendant on vertical opening doors shall be provided with a minimum 12 foot cable length if required.
		10. Two switched lights in the enclosure, one on left, one on right side shall be included.
		11. The platforms shall be continuous along full length inside the engine enclosure, both sides, allowing access to all components requiring periodic maintenance.
		12. Steps and assist handles shall be provided for access to both the left and right side platforms.
		13. Rear crash bumper (yellow) with black chevron striping to be installed to protect fiberglass enclosure.
	3. Broom Chassis Assembly:
		1. The towed chassis with steering axle shall be designed to eliminate flexing and ultimately bounce using a framework consisting of twin full-length welded 16” x 8” x 0.38” steel tubes.
		2. It shall have gussets front to rear at each welded joint.
		3. The broom chassis / towing vehicle hitch shall be a fifth wheel type with SAE 2” diameter kingpin with height adjustment for chassis frame leveling.
		4. Spring loaded parking brake chambers in addition to standard service brake chambers shall be provided.
		5. It shall be simple, easy and quick connect / disconnect.
		6. The hitch shall be adjustable for height variations of the towing vehicles and there shall be dual jack stands for ease of hooking up and detaching.
		7. The rear steering axle mechanism shall incorporate hydraulic actuators for control, two in the front as a master for the two in the rear steering axle or equivalent.
		8. There shall be provisions for, centering and disengaging the axle steering system from both the main and service control consoles.
		9. There shall also be a provision for constantly and automatically re-centering the steering system during operation to accommodate any drift in the system.
		10. The rear axle steering and broom hitch shall keep the broom swept path centered on the cleared path of the front mounted plow at all times, whether turning or in a straight path.
		11. The rigid suspension rear steering axle shall use a standard truck axle and brakes for ease of service and parts availability.
		12. 26,000-pound capacity, minimum.
		13. It shall use hydraulic actuators to power the steering, controlled as a slave from the hitch actuators.
		14. The tires shall be 445/65R 22.5 (L), quantity one each side.
		15. Air drum service brakes (16.5 x 7 S-cam) with parking brake chambers shall be controlled by the tow vehicle utilizing glad hand connections at the rear of the tow vehicle.
		16. The unit shall also have ABS brakes, FMVSS 121 compliant for trailers. A visual and audible low trailer air alarm shall warn of possible application of trailer parking brakes.
		17. Dual four inch diameter LED stop, tail, turn, flasher lights shall be controlled by the tow vehicle utilizing a standard SAE electrical connection at the rear of tow vehicle.
		18. LED marker lights shall be located at each end of the broom head.
		19. They shall be visible to the operator in the tow vehicle rear view mirrors during sweeping operations and use amber LED’s on the front of the light assembly with red LED’s facing the rear.
		20. Four floodlights shall be supplied. One on each side of the engine enclosure and one on each side of the chassis frame shining backward towards the broom.
		21. One LED red marker light bar shall be mounted at top of rear engine enclosure panel.
		22. Two (2) each, LED Beacons mounted on top rear of unit, shielded to prevent flashing of light into operator’s cab. Amber/Blue.
	4. Broom Hitch:
		1. The broom hitch shall provide low friction, free flotation, shock absorbing, and weight transfer for the broom head.
		2. A parallel arm system with four horizontal pins shall be used. The two arms shall be box construction for torsional stiffness with 2-inch diameter pins on greaseable low friction bushings, DX pre-lubricated type (no metal on metal).
		3. To maximize vehicle tractive effort, braking, steerability, and overall handling of the broom chassis, the broom chassis shall carry approximately 50% of the broom weight by utilizing a weight transfer system.
		4. A pair of hydraulic cylinders shall support the parallel arms of the hitch. Pressure in the hydraulic cylinders provides the lift necessary to transfer approximately 50% of the broom weight to the chassis. A control valve adjusts the oil in and out of the cylinders to provide the same weight transfer no matter what the surface irregularities. The vertical stroke of the cylinders and thus the hitch shall be 12” minimum.
		5. The pair of hydraulic cylinders shall also “free float and dampen” the parallel arms of the hitch to minimize broom bounce at high vehicle speeds. The broom hitch must have hydraulic cylinders to provide an active shock absorbing systems.
	5. Broom Angle and Cradling (Stowing):
		1. The broom head shall be capable of swinging 35 degrees maximum left or right, selectable from an operator’s joystick.
		2. The broom head must have the ability to be hydraulically positioned in line with the broom frame and totally within the outside width of the tires for an overall transport width of no more than 102 inches.
		3. The broom caster tires must be off the ground when in the transport position.
		4. The swing shall be accomplished by means of an overhead, center positioned turntable.
		5. The broom pattern shall not vary more than 0.5 inches end to end for the whole width of the broom whether swung left or right.
		6. For safety and positive retention for transport, provisions shall be provided to mechanically lock the broom head in transport position.
	6. Broom Oscillation:
		1. The broom oscillation shall provide true flotation left to right for the broom head so that it is independent of broom chassis to accommodate surface irregularities and thus minimize brush pattern variation during operation.
		2. It shall have at least 8 degrees (+4, -4) of free floating oscillation from left to right.
		3. The ability of the broom head to oscillate shall be provided by means of a spherical bearing assembly and low friction nylon pads.
	7. Broom Elevation and Brush Pattern Adjustment:
		1. The broom head lift shall be achieved utilizing two 4 inch diameter hydraulic lift cylinders, one on each end of the broom frame, controlled by the operator’s joystick.
		2. The lift cylinders shall be equipped with a counterbalance valve, which prevents the broom head from creeping down.
		3. The pivoting action shall have adequate stroke to achieve ground clearance during transport when not in use.
		4. A linkage attached to the broom lift cylinders, or an electrical position sensor, shall also provide the brush pattern adjustment mechanism.
		5. The linkage shall activate a limit switch, which controls the cylinders’ valve limiting the down travel of the two lift cylinders. An electrical position sensor shall be embedded in the broom head lift cylinder which shall provide feedback to the broom pattern control system for closed loop assessment of the lift position.
		6. If required by design, a thumbscrew shall adjust the linkage / limit switch relationship, thus allowing brush pattern adjustment.
		7. A toggle switch for remote broom lift control and pattern confirmation shall also be provided.
		8. A weatherproof control box housing the micro switch, or thumbscrew shall be located on the left side of the chassis allowing easy, repeatable pattern adjustment from a standing position
		9. Returning to operator’s cab to confirm pattern adjustment is unacceptable. For safety reasons the operator cannot be positioned under or near the broom head to make the pattern adjustment. The brush pattern adjustment process shall be accomplished without the use of tools.
	8. Broom Head:
		1. The brush itself shall be 46 inches in diameter and 22 feet long.
		2. (\*) Pricing for broom WITHOUT cassette core and bristles. Airport will purchase SIB Core separate. Must accept a SIB 20 ft. cassette type core.
		3. The broom head frame must sustain the loads imposed by the snow removal capacity of the unit.
		4. It shall be fabricated from 6.5 inch diameter steel tube in tube design with .38 inch walls and include provisions for grease between the mating surfaces.
		5. The hydrostatic broom drive shall be dual end drive.
			1. Power shall be supplied from two variable displacement hydrostatic pumps mounted on the engine’s gearbox. The gearbox shall be a parallel shaft pump drive with precision gears, AGMA 10 rating and a dipstick for oil level measurement.
		6. Two high-speed hydrostatic motors each connected to a planetary reduction gearbox shall be mounted within the inner diameter of the broom cores outer ends to minimize overall width.
			1. The motor gearbox connections shall utilize a static O-ring seal, wet spline type.
			2. No dynamic seal shall be used for reliability purposes.
			3. The motors shall not support the broom core loads and the planetary gear box shall be hydraulic oil bath lubricated (case flushing type).
			4. The entire broom head shall be vibration analyzed as a final inspection with report on vibration spectra (FFT plot).
			5. (\*) A sample of QA report with FFT plot shall be included in bid.
			6. Speed of broom shall be infinitely variable from 0 to 600 RPM.
			7. Available torque at the broom shaft shall be 4,000 ft. lbs. at maximum hydraulic pressure of 5,075 psi for maximum snow moving capabilities.
			8. (\*) Engineering hydraulic power calculations confirming these values must be provided with the bid.
			9. Power shall be transmitted to the broom core from the gearboxes utilizing keyed tapered hubs to prevent any looseness in the connection for vibration concerns and high strength molded urethane drive cogs into replaceable hardened steel core drive sprockets of the core.
			10. Hardened steel pilot plates shall support the radial load.
			11. A maximum 2 inch gap between broom core sections shall be obtained by using a center bearing assembly utilizing the same components as the drive ends.
			12. The center bearings shall be encased in a sealed housing and be provided with oil bath lubrication. Manual greasing of bearings is unacceptable.
			13. The left and right side core sections shall be connected to each other by a center shaft so the two sections rotate at the same speed, and that the power produced by each of the end drive assemblies is transmitted across the full length of the core assembly.
			14. The broom end plates shall be steel fabricated using 0.38 inch thick welded steel plate construction with 14 inch diameter, 0.38 inch thick steel tube for mounting the broom drive gearboxes.
			15. The end plates shall be reinforced horizontally and vertically using, 2” x 6” structural rectangular tubing on the inside and 3” x 6.5” formed channel on the outside.
			16. The broom end plates shall be secured to broom frame with four 1 inch diameter grade 8 bolts.
			17. The unbolted end plates shall slide outward to allow easy access for core and bristle replacement.
			18. The slide mechanism shall be 4.50 inch round telescoping tube in tube design.
			19. A second 2 inch square tube shall slide on a plastic slide providing additional support and allowing repeatable location of brush centerline alignment during broom core remove and replace operations.
	9. Broom Head Vibrator:
		1. Attached to the broom head shall be a dump truck body vibrator to shake snow and ice accumulation off the broom head, 12 volt “Cougar” type or equivalent.
		2. 3000 pounds thrust impact force minimum.
		3. The vibrator shall be cab controlled with on / off rocker style switch.
	10. Broom Cores:
		1. The single core sections must be split core design for easy handling and efficient (tight) wafer stacking and sustain the loads imposed by the snow removal capacity of the unit.
		2. They shall be tubular steel construction with four drive bats, equally spaced around a tube to center each brush wafer.
		3. The drive sprockets shall be replaceable hardened steel. Each core shall be individually dynamically balanced to acceptable values at rated RPM.
		4. The brush on the cores shall be full width and designed for runway operation and shall be field replaceable with maximum ease without the use of special tools.
		5. The wafers shall be a 50/50 combination of polypropylene and wire, conforming to Mil Spec F-83002.
		6. The bristles shall be fastened in a radial wafer fashion to a steel ring.
		7. Polypropylene bristles shall be fastened to the steel ring by fusing their base to form a solid loop about the circumference of the ring, then mechanically holding them in place by wrapping the top of the ring over the fused bristle ends to form a dovetail.
		8. Wire bristles shall be fastened to the steel ring with wire.
		9. The polypropylene bristles shall be 0.075” x 0.105” oval shaped with an 8 pounds total wafer weight minimum.
		10. The wire bristles shall have a mean diameter of 0.018 inches, galvanized, with a carbon content of 0.81 to 0.86 percent and a 10 pounds total wafer weight minimum.
		11. All wafers shall be within 50 oz. /in. static balance and marked at the heavy location.
		12. To also include set of 4 broom carts for easy broom core loading.
	11. Broom Casters:
		1. There shall be four single tire caster assemblies. Since a weight transfer broom hitch shall be utilized, the chassis carries approximately 50% of the broom weight. The broom casters shall carry the remaining weight of the broom head. With the reduction in weight and tires, fewer tires shall be required and tire maintenance reduced.
		2. Each caster assembly shall be free to rotate 360 degrees.
		3. The foam filled tires shall be 180/70R8 16 ply.
		4. Spring-loaded adjustable automotive type disk brake shall be supplied per caster to prevent caster shimmy at all sweeping speeds.
		5. Caster hubs shall be oil filled to provide oil bath lubrication to the caster bearings.
		6. No greasing necessary or allowed.
		7. The caster assembly shall be a non-suspension type allowing the brush to follow the ground contours as close as possible.
		8. The broom head caster support shall be mounted to the main broom frame by means of welded brackets constructed of 0.50 inch steel plate, minimum.
		9. The steel caster assembly shall be attached to the broom head caster support by means of four bolts for serviceability. The caster axle shall be supported by the caster mounting body constructed of 0.63 inch plate.
	12. Broom Hood:
		1. The broom hood shall shield the top half of the brush completely.
		2. Fabricated from heavy-duty 10-gage sheet steel securely bolted to the broom frame.
		3. It shall be non-clog design to prevent ice buildup during freezing slush removal operations at rated speeds.
		4. It shall provide the necessary quick access to the brush for replacement of bristles and for inspection.
		5. There shall be an adjustable and replaceable stripper bar across the front of the broom to prevent snow carryover.
			1. The stripper bar shall be near tangential to the broom outside diameter.
		6. A smooth curved scoop hood shall be incorporated across the full length of the broom.
		7. The stripper bar shall be attached to this scoop hood.
			1. It shall be connected to but move independent of the stationary hood.
		8. A snow deflector shall be mounted on the front of the scoop.
		9. Two hydraulic cylinders spaced appropriately along the length of the deflector shall adjust the angle of the defector with respect to the scoop.
		10. The deflector angle shall be controlled and adjusted from the operator's cab.
		11. The stripper bar, the scoop hood, and the deflector structure shall have no abruption to a smooth flow at any broom / bristle diameter or at any deflector angle.
		12. The adjustment to bristle diameter wear shall be performed using two mechanical acme thread jacks, one each end of the scoop and broom frame.
		13. The adjustment shall position the stripper bar to the bristle diameter.
		14. This scoop design is required for efficient stripping of the snow off the bristles to prevent carryover, especially with the high performance snow moving capacity specifications of the bid. No substitutes are allowed.
	13. Forced Air Blower:
		1. The forced air blower shall be dual centrifugal impeller type with dual inlets and dual outlets.
		2. It shall produce 13,400 CFM at 231 mph **v**elocity air out both sides at the same time.
		3. Both nozzles shall blow in same direction at any given time.
		4. Deflectors at the nozzle ends shall direct the flow to one side or the other. The nozzle deflector’s control shall be hydraulic and interlocked with the broom head angle to blow in the direction of broom casting thus controlled by the operator’s joystick.
		5. The nozzle deflectors change direction as the broom swings. A separate control shall allow the nozzle deflector’s direction opposite of the broom angle by choice.
		6. An additional control shall permit blowing without broom operation.
		7. The manufacturer is responsible for conducting tests to ensure that its snow removal and ice control equipment meets the operational and performance requirements it advertises. The manufacturer must submit certified records of these compliance tests with each response to an invitation to bid. Equipment tests must be conducted on standard production models and not on specially constructed prototypes.
		8. The air ducts and air blower impellers shall rise within the width of the tires of the chassis for transport and storage.
		9. There shall be 9 inches of ground clearance minimum when raised.
		10. For safety reasons and clean design, the air ducts and air blower impellers shall not impede access to the engine compartment of the vehicle.
		11. The centrifugal impellers shall be independently driven via hydrostatic motors.
		12. The two motors, one for each impeller, shall be mounted directly to the impeller shaft.
		13. Power to the motors shall be supplied from a variable displacement hydrostatic pump mounted on the engine’s gearbox allowing incremental control of blower speed from 0 to 100%.
		14. Both impeller / shaft assemblies shall be dynamically balanced at the rated RPM.
		15. All controls for the air blower shall be remotely operated from within the cab.
	14. Hydraulic System:
		1. All hoses for all systems shall be of proper size and strength to work with the pressure and volume of oil required.
		2. All hydraulic positioning functions (broom head lift, broom head swing, deflector, and air nozzle lift) shall be equipped with a hydraulic position locking system.
		3. A counterbalance valve shall be used for broom lift and swing and a pilot operated check valve for the other functions.
		4. All hydraulic functions of the broom shall be electric over hydraulic valving.
		5. Connectors to the solenoids shall be interlocking type to provide a secure connection, which can withstand normal pressure washing procedures.
		6. Pilot operated check valves shall be installed for the deflector up and down, air ducts up and down, and air nozzles left and right.
		7. Fluid and components shall be design for temperature to –30 ℉ ambient cold start. The hydraulic fluid reservoir shall be of sufficient capacity to provide hydraulics for the broom, air blast and steering components. Lowest volume possible for the design is desired. Shut off valves for all filters below tank fluid level shall be installed to allow filter changes without loss of oil.
		8. Proper filtering shall be done on both the high pressure and low pressure circuits and shall conform to SAE J931.
		9. There shall be a 5 micron absolute rating on the hydrostatic pumps’ filters and placed in the charge pressure lines.
		10. There shall be a clogged filter indicator light on the cab control panel indicating filter replacement.
		11. The hydraulic oil cooler shall be separate from the engine radiator to ensure adequate airflow.
		12. A fan for the hydraulic oil cooler shall be equipped with automatic thermostat (high/low) control for correct temperature under all conditions, winter and summer.
		13. It shall be controlled by a thermostatic switch to avoid excessively cold oil operation and designed such that thermostatic failure results in the cooling fan being engaged.
		14. A pressure relief shall allow cold hydraulic oil to bypass the cooler for shorter warm up times.
		15. A hydrostatic oil temp gauge and warning light for low hydrostatic oil level shall also be supplied.
	15. Broom Controls and Instrumentation:
		1. All controls shall be located at the Operator Control Station (OCS) in the vehicle cab as described in 5.17. All hydraulic functions of the broom shall utilize electric over hydraulic valving. Connectors to the control solenoids shall be interlocking type to provide a secure connection, and able to withstand normal pressure washing procedures. All hydraulic positioning functions (broom head lift, broom head swing, deflector, and air nozzle lift) shall be equipped with a hydraulic position locking system
			1. Key switch and e-stop or e-stop type button (twist for on, push for off).
		2. Multifunction CAN controlled joystick with multi switch head for plow and broom lift/lower and left/ right swing.
			1. Broom controls integrated with electric over hydraulic plow controls for simple operator control.
			2. It shall also incorporate the snow shed hood lift / stow, deflector angle and the joystick control: broom only, air blower duct only, or both.
			3. The broom swing, lift and blower nozzle shall be microprocessor controlled (no relays) and have automatic one touch for cycle complete control.
			4. Moving the joystick in the opposite direction can reverse the cycle.
			5. A switch shall allow the operator to use the automatic control or disengage the system.
		3. Multi-function display or gauges to display at a minimum:
			1. Engine, broom and air blower speed control and display
			2. Oil pressure with visual and audible warning alarms
			3. Coolant temperature with visual and audible warning alarms
			4. Hydraulic oil temperature with visual and audible warning alarms
			5. Low fuel visual and audible warning alarms
			6. Engine tachometer
			7. Voltmeter and warning indicators
			8. Air filter restriction warning and alarm
			9. Alarms for engine diagnostics and visual warning indicators
		4. Status display for:
			1. Broom / air duct coordination
			2. Lights
			3. Weight transfer system
			4. Rear Steering
			5. Enable a video system to be manually turned on and off
			6. Lighting
			7. Daytime / nighttime display brightness
			8. Beacon on / off
			9. Front flood on / off
			10. Rear Flood on / off
			11. Engine hour meter
			12. Broom hydrostatic pressure (optional)
		5. Joystick control: broom only, blower duct only, or both
			1. Air blower nozzle direction: coordinate / opposite broom swing
			2. Weight transfer with audible alarm.
			3. Cradle / un-cradle
			4. Core life hours
			5. Maintenance hours
			6. Broom hydrostatic pressure (optional)
			7. Automatic broom pattern control (optional)
			8. Pattern increase / decrease
			9. Broom height position
		6. Separate back light touch pad, switches or Joy Stick controls for:
			1. Deflector up / down
			2. Mode auto / manual
			3. Broom on / off
			4. Air Blower on / off
			5. Hood lift
			6. Hood stow
			7. Vibrator
		7. The wiring for the main operator control shall be with weatherproof and structurally sound quick disconnect connectors.
			1. A jumper harness shall be connected from the chassis bumper to the main frame of the broom for serviceability reasons.
		8. An additional “service” control station shall be supplied at the broom engine assembly and shall have all of the same features (including an MDC station or gauges) as the main operator’s control in the chassis cab except for the following:
			1. Single circuit breaker with master battery disconnect located in broom engine enclosure
			2. Service control station to have engine speed control priority over main control station.
	16. Installation and Hookup Requirements Of Towing Chassis:
		1. The wiring for broom controls shall be harnessed with weatherproof and structurally sound connectors and shall be in three sections:
			1. A four foot section from the control station in the cab to the cab floor
			2. An Eighteen foot section from the cab floor to just in front of the fifth wheel
			3. A nine foot jumper section from just in front of the fifth wheel to the broom frame for serviceability reasons.
			4. A solid mounting plate shall be supplied at each connection point.
			5. Bidder shall be responsible for the integration of broom and plow hydraulics and controls within the tow vehicle
		2. The chassis itself must be protected from snow and debris from the broom.
			1. Provisions must be made to protect the chassis rear axle area from snow and debris from the broom.
			2. The protector shall be rubber skirting and cover the entire area between the broom and chassis.
			3. It shall be mounted to the broom frame so it follows the broom.
1. **COUNTER WEIGHTS:**
	1. Removable steel counter weights, five (5) each (similar design, bolted to frame) providing a total weight of approximately 8,800 pounds shall be furnished.
		1. Weight includes sub frame.
	2. To include four (4) lifting points on each weight, designed and placed for easy removal and not to interfere with vision from rear view mirrors.
2. **DIMENSIONS:**
	1. Overall height, 144 inches
	2. Overall transport width, without any attachment, 102 inches (8 foot 6 inches) maximum.
	3. Turning diameter, without towed broom, but with Runway Plow angled, outside wall to wall, utilizing 4-wheel steer, 63 feet.
3. **WEIGHT AND BALANCE:**
	1. Balance: Unit must be able to stop transversely on a 30 percent grade with no danger of overturning.
	2. Gross Weight, with 24 Foot Runway Plow and Belly Blade attachment (optional). The unit must not exceed the manufacturer’s weight rating of the vehicle at any tire or axle position. This includes transport or working mode.
	3. (\*) Weight on Front Axle: With 24 Foot Runway Plow attachment and Belly Blade: 20,380
4. **TRAINING (OPTIONAL ITEM PRICED SEPERATELY):**
	1. The vendor shall provide a factory certified instructor(s) within 30 days of acceptance by the State. This (these) representative(s) shall be prepared and qualified to make all necessary adjustments to the unit and give instruction to the operators to assure correct operation of the unit when it is placed in service.
		1. Please give advance notice to the person listed on the Purchase Order of each unit ordered.
	2. Total of 16 hours at the location as noted in each individual Lot Item, Section IV – Bid Price Schedule.
		1. To include a minimum of eight (8) hours of operator training including the following, as a minimum applicable agenda:
			1. Operating procedures per operating manual.
			2. Break-in procedures.
			3. Equipment limitations.
			4. Operator maintenance.
			5. Before operations checks and lubrication.
			6. Safety.
			7. Cold weather operations.
			8. Jump starting.
			9. Welding on equipment.
			10. Towing or transporting equipment.
			11. Instruments and controls.
			12. Gauge interpretation.
			13. Equipment operation, Do’s and Don’ts.
			14. Attachment operation, Do’s and Don’ts.
		2. To include a minimum of eight (8) hours of mechanics (Journeyman level) training including the following theory, trouble shooting, and test procedures for, as a minimum applicable agenda:
			1. Electronics.
			2. Electrical.
			3. Hydraulics.
			4. Air system.
			5. Drive train.
			6. Engine and transmission electronics.
5. **MISCELLANEOUS:**
	1. Weight Scale Verification Slips:
		1. Required not later than time of delivery.
		2. Separate weight for front plow.
		3. Separate weight of the carrier without plow.
		4. Separate weight on the carrier’s front tires with the front plow in transport position.
	2. Easy access to all maintenance components shall be provided for items such as air cleaners, batteries, radiator fill and drain, oil filters, oil drain (hydraulic and engine), generator, etc.
	3. Winterization: Entire unit to be winterized to provide satisfactory performance in temperatures to -40 ℉. Antifreeze to be of permanent type only providing protection to – 50℉.
	4. Fire Extinguishers: To have two (2) each five (5) pound Halotron, or equivalent, units easily accessible to operator. One (1) in cab, and one (1) exterior of cab. Mounting location will be determined at time of pilot inspection.
	5. Hydraulic tubes, hoses and fittings used shall conform to SAE J514, J516, J517 and J524. A minimum number of fittings, joints and connections shall be used to prevent excessive backpressure, vibration and leakage. Hydraulic lines shall be of sufficient size to permit free flow of hydraulic fluid at temperatures down to minus 40 degrees Fahrenheit.
	6. Testing:
		1. During the pilot inspection (if held) or if there is no pilot inspection, not later than time of delivery, a test report verifying proper operation and power output of chassis engine and drive train will be required.
		2. Test shall require engine and chassis to be run for at least 20 minutes and shall show run up to various output levels with chassis mph to 45 mph minimum.
		3. Test report to include truck serial number. A sample report of a similar chassis shall be included in the bid package.
	7. Alignment Certified:
		1. The vehicle is to be delivered with a wheel alignment report verifying proper alignment and set up of all steering axles, both left and right side.
		2. Report shall show camber, caster and toe-in before and after adjustment against acceptable product limits. A sample report of a similar chassis shall be included in the bid package.
	8. Rustproofing and Corrosion Protection:
		1. The complete vehicle (moldings, fenders, doors, panel wells, underside of cab floor, interior cab floor, etc.) shall be treated with Class one (1) rust-proofing protection.
		2. Two Auxiliary power outlets required near center of cab for access by operator or passenger.
	9. Paint:
		1. Lead free.
		2. Color to be CHROME YELLOW acrylic urethane, *as per FAA.* Including sandblasting and three (3) mils of appropriate primer.
		3. The vehicle and all attachments shall be cleaned, treated, primed and painted in accordance with the best commercial practice. The finished paint shall be free of imperfections that detract from vehicle's appearance.
		4. Metal portions of all plow backs facing the operator shall be flat black to minimize glare.
		5. One quart of chrome yellow touch up paint to be delivered with tractor.
	10. Striping:
		1. Each unit must be striped per FAA Guidelines. White strip along vehicle and chevron pattern on the bumper.
	11. Radios:
		1. To include an AM/FM/Weather band stereo radio with speakers, antennae, and auxiliary input.
	12. Communications Radios: (OPTIONAL ITEM PRICED SEPERATELY)
		* 1. *ICOM Model IC-A210 (AM)* aeronautical band, complete with microphone, speaker, external transmit/receive antenna mounted on cab.
		1. Installation:
			1. To include noise canceling microphone, external speaker (for inside cab), and cab mounted external antenna.
			2. Speakers shall be mounted in cab so the operator can hear with engine running at full power.
			3. Main unit to be shock mounted.
			4. Installation to be performed by holder of a current FCC Radio Telephone license (copy of certification to be provided with delivery of unit).
		2. Headset:
			1. Listen only headset compatible with ICOM IC-A210.
			2. When requested, the VHF radio must be equipped with an easy accessed and labeled, headset jack. The speakers described above would still be required so that unit could be used with or without the listen only headset.
	13. Weight Transfer System: (OPTIONAL ITEM PRICED SEPERATELY)
		1. In order to maximize vehicle tractive effort, braking, steer ability, and overall handling of the plow chassis, either the plow hitch or the chassis hitch shall incorporate a hydraulically controlled weight transfer system that is capable of transferring approximately 50 percent of the plow’s weight to the chassis thus removing weight from the casters and cutting edge and transfer it to the chassis for maximum traction and cutting edge life / wear control. A control valve adjusts the oil in and out of the cylinders to provide the same weight transfer no matter what the surface irregularities.
		2. The hydraulic cylinder(s) used shall also “free float and dampen” to maximize plow handling at high vehicle speeds.
		3. The system must provide active shock absorbing.
	14. Snow Shed Hood: (OPTIONAL ITEM PRICED SEPERATELY)
		1. Hydraulic pivot tilt to remove snow that has deposited on top during sweeping operations. Snow shed hood is in addition to the standard hood…both. Skeletal steel framework construction with a black polyethylene cover bolted in place. Positive prevention of any operator error damage to bristles or other components. Tilt operational while the broom is rotating, no stopping. Tilt rotate forward in excess of 100 degrees. Positive stowed position against poly supports. The snow shed hood shall cover the entire length of the broom hood without interruptions for the most efficient snow removing capabilities. When in the automatic control mode, the hood shall lift and lower with one touch of the control switch

**DELIVERY**: Not more than 300 days ARO (After Receipt of Order).

**FOB**: Airport as designated on Purchase Order.

**LOT #1**

Item Total

# Unit Description $ Amount

1a ea. **4X4 CARRIER TRACTOR:** $320,656.10

 Per Specification #743-Multi-Function - AIP, contained herein.

 (Below optional items not included in above pricing)

 Includes: Carrier Chassis with 158” Wheel Base, 5Th Wheel, Hitch DIN Plate

 **State Class #285**

 Carrier - Year, Make and Model Offered:

 2018 M-B Companies, Inc. MB2

**OPTIONAL ITEMS (Pricing Required):**

1b ea. 24’ Reversible Flared Runway Plow: $43,821.58

 Includes Hands Free DIN Hitch, Controls

(As per spec. 9.0)

1c ea. Under body 12 foot scraper: $11,377.02

Price Upgrade from “1a” for Carrier Chassis with 170” Wheel Base,

5th Wheel, Hitch DIN Plate

 (As per spec. 10.0)

1d ea. High Speed Tracking 22’ Broom w/ Blower: $275,819.10

 Included Controls and Chassis Integration

 Wafer Cores, 50/50 Poly/Wire Bristles

 (As per spec. 11.0)

Make/Model Offered:

 M-B Companies, Inc. 4622 CRDL Broom

1e ea. Two Spare Wafer Cores – 11 Foot $4,263.29

1f ea. One Spare Set of 50/50 Poly Wire Bristles for 22 Foot Broom $3,044.30

1g ea. One set of four broom carts $820.25

1h ea. Credit for broom only (no cores) ($6,510.54)

1i ea. Training in Anchorage $2,000.00

(As per Spec 15.0)

1j ea. Publications, (Paper), per set $871.00 (As per Section I, Paragraph 8.0)

1k ea. VHF communications radio package: $2,150.00 (As per spec. 16.12.2)

1l ea. Weight Transfer System (As per spec. 16.13) $189.87

1m ea. Snow Shed Hood (As per spec 16.14) $2,569.62

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| M-B Companies, Inc.COMPANY \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_AUTHORIZED SIGNATURESteve KarlinPRINTED NAME11/6/17DATE | 1200 Park StreetADDRESSChilton, WI 53014CITY, STATE, ZIP(920) 898-1080 / (920) 849-2629PHONE/FAXskarlin@m-bco.comE-MAIL ADDRESS980447ALASKA BUSINESS LICENSE NO: |