

SECTION I: INVITATION TO BID

Sealed bids for the purchase of **One 16' Displacement Plow with Carrier Vehicle, and a 12' Heavy Duty Underbody Scraper, and 18' Stowing Inline Tow Broom with High Velocity Air Blast System, and Liquid Material Spreader** for the Lebanon Municipal Airport, subject to the conditions herein, will be received at the Airport Manager's Office at 5 Airpark Road, Lebanon, New Hampshire, 03784, until (2:30 PM) in the afternoon of Wednesday, April 18th, 2020, at which time and place bids will be opened and read aloud. Any bids submitted after this time and date will not be accepted. These bids shall include all charges for freight, delivery, setup, and all incidentals required for a complete and ready-to-use system. Bids must be submitted in a sealed envelope, plainly marked "Lebanon Municipal Airport, One 16' Displacement Plow with Carrier Vehicle, and a 12' Heavy Duty Underbody Scraper, and 18' Stowing Inline Tow Broom with High Velocity Air Blast System, and Liquid Material Spreader, AIP Project No. 3-33-0011-XXX-2020."

Specifications and contract documents may be examined at the Airport Director's Office, Lebanon Municipal Airport, 5 Airpark Road, Lebanon, New Hampshire 03784.

Copies of the specifications and contract documents may be obtained at the Airport Director's Office, Lebanon Municipal Airport, 5 Airpark Road, Lebanon, New Hampshire 03784, telephone (603) 298-8878 upon payment of twenty-five dollars (\$25.00) per set which is non-refundable. Partial documents or individual sections of the documents will not be distributed.

Bid security in the amount of at least five percent (5%) of the total bid must be submitted with the bid. The bid security may be either a certified check or a proposal guaranty bond executed by a surety company authorized to do business within the State of New Hampshire. Bid security shall be made payable to the City of Lebanon. Bids submitted without security will not be considered.

The bid security will be returned to all bidders except the two lowest responsible bidders within ten (10) calendar days after the date of the opening of bids. The remaining bid securities will be returned promptly after the City of Lebanon and the selected bidder have executed the contract. If no award of contract is made, the remaining bid securities will be returned within one hundred twenty (120) calendar days after the date of the opening of the bids.

No delivery shall become due or be accepted unless a contract has been issued by the City of Lebanon. Procurement of the equipment under this contract will be funded by federal grant under the Airport Improvement Program (AIP), with participation by the State of New Hampshire and the City of Lebanon. This contract will be subject to all applicable requirements of the U.S. Department of Transportation/Federal Aviation Administration. **All equipment shall be delivered within 180 days from the award of contract.** Award of this contract will be contingent upon receipt of federal funding under the AIP.

The selected bidder must comply with the Federal Fair Labor Standards Act (29 USC 201) and the Occupational Health and Safety Act of 1970 (20 CFR Part 1910).

The **City of Lebanon**, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

The City of Lebanon reserves the right to reject any and all bids, to waive technical or legal deficiencies and to accept any bid that it may deem to be in the best interest of the airport. No bidder may withdraw his bid for a period of sixty (60) calendar days following the actual bid opening.

By:

CITY OF LEBANON

Carl Gross
Airport Manager

SECTION II: INSTRUCTIONS TO BIDDERS

1. Each bidder shall include all requested equipment in his bid. Bids for the equipment may be accepted so long as a price is provided for the respective attachment as described in these specifications. **Partial bids will not be accepted.**
2. Proposals shall be typewritten or written in ink on the form attached. Officials of corporations shall designate their official title; partners or sole owners shall so state giving the names of all interested parties. All corrections or erasures shall be initialed by the person signing the bid. **The entire bid document shall be returned as a submission of the bid.**
3. Bidders shall not stipulate in their proposals any conditions not contained in the specifications except as provided for under paragraph 10 below. Any proposal which fails to comply with the literal letter of these instructions and the specifications may be rejected forthwith.
4. Requested descriptive material and manufacturer's literature shall be furnished with the bid.
5. Bid prices shall remain in effect until sixty (60) calendar days have passed since the time of the actual bid opening. No delivery shall become due or be accepted unless a contract has been issued by the City of Lebanon. Acceptance of a contract will be provided within sixty (60) after the bid opening date.
6. The City of Lebanon reserves the right to accept and reject any and all bids for due cause, to negotiate with any party, to waive informalities or defects in bids, to require test proving of proposed equipment by the airport's operators, to request and check references for similar equipment or to accept/reject such bids as it shall deem in the best interests of the Lebanon Municipal Airport.
7. Discounts for immediate payment or credit terms where offered will not be a factor in the determination of the lowest responsible bidder. Payment terms by the City of Lebanon, will be cash less any applicable discounts to be paid within thirty (30) calendar days of delivery of the equipment and associated documentation by the successful bidder and formal acceptance by the City of Lebanon.
8. The successful bidder shall indemnify and hold harmless the City of Lebanon, against all claims for royalties, for patents, or suit for infringement thereon which may be involved in the manufacture or use of the equipment to be furnished.
9. All equipment shall remain the property of the seller until delivered to and accepted by the City of Lebanon.
10. **Any deviations, variations or exceptions from the attached specifications must be listed in the Bid Proposal Form under the Exceptions to Bid Conditions and Specifications.** Optional equipment furnished by the dealer or manufacturer which is not described or required by these specifications but shall be provided with the equipment at no additional cost may be listed separately under a heading entitled "Optional Equipment."

11. The package entitled "One 16' Displacement Plow with Carrier Vehicle, and a 12' Heavy Duty Underbody Scraper, and 18' Stowing Inline Tow Broom with High Velocity Air Blast System, and Liquid Material Spreader", AIP Project No. 3-33-0011-XXX-2020" must be submitted with all applicable sections and appendices filled in and the bid security enclosed. All signatures within the submitted package must be original. It is recommended that all bidders make a copy of the package for their files. Pages to be completed and submitted with the bid are as follows:
 - a. Buy American Certification, pages 7 and 8.
 - b. Tax Delinquency and Felony Conviction Certification, pages 12 and 13
 - c. Bid Bond, pages 21 and 16.
 - d. Bid Proposal Form, pages 23 through 29.
12. Questions relating to this Invitation to Bid may be directed to:

Carl Gross
Airport Manager
Lebanon Municipal Airport
5 Airpark Road
Lebanon, ME 03784
Telephone: (603) 298-8878
13. **Selection Criteria:** The award will be provided to the bidder whose bid represents the best overall value to the airport in the opinion of the City of Lebanon. The primary criteria to be used for the comparison of bids shall be the bid price. Secondary criteria to be considered will include equipment service schedules, delivery schedule, service and parts availability, and previous dealer experience (if any).

SECTION III: CONTRACT AGREEMENT

CONTRACT AGREEMENT

KNOW ALL PERSONS BY THESE PRESENTS of this agreement entered into this _____ day of _____, 2020, by and between City of Lebanon, New Hampshire, a body politic and corporate, hereinafter referred to as the "Owner", and _____ hereinafter referred to as the "Vendor".

WITNESSETH

WHEREAS, the Owner did advertise by bid for:

Airport Improvements to Include:

Purchase of Snow Removal Equipment –

One 16' Displacement Plow with Carrier Vehicle, and a 12' Heavy Duty Underbody Scraper, and 18' Stowing Inline Tow Broom with High Velocity Air Blast System, and Liquid Material Spreader

for the

**Lebanon Municipal Airport
Lebanon, New Hampshire**

A.I.P. Project No. 3-33-0011-XXX-2020

WHEREAS, the Vendor did under date of _____ submit a bid for such work; and

WHEREAS, after due consideration of all the bids, the Owner did award the Contract to the Vendor.

NOW THEREFORE, in consideration of the mutual promises made by each party to the other, the parties covenant and agree as follows:

1. The Vendor will furnish all snow removal equipment in compliance with the specifications (herein referred to as "Contract Documents") of which this Agreement is a part.

All equipment shall be supplied in strict conformance with the provisions of this Agreement, the Invitation to Bid, Instruction to Bidders, Required Federal Provisions, Notice to Bidders, Bid Bond, the Vendor's Proposal, General Specifications, and Technical Specifications which are attached hereto and shall be considered a part of this Agreement.

The restatement in this Contract of any of the terms of said Contract Documents and Standard Specifications shall not be deemed to waive any terms not so restated.

2. All equipment shall be delivered within 180 days from the award of contract.

3. A standard warranty shall be provided for the equipment.

4. It is agreed that the equipment in the "Schedule of Prices" in the Vendor's Proposal section of the Contract Documents will be used as the basis for determining the amount due under this Contract Agreement. The amount due under this Agreement so determined is _____

(\$_____), hereinafter referred to as the Contract Price.

IN WITNESS WHEREOF, the said City of Lebanon, New Hampshire, has caused this Contract to be signed and sealed in its corporate name by its City Manager, respectively, being duly authorized, and _____

_____ has caused this Contract to be signed and sealed in its corporate name by _____, its _____, being duly authorized, the day and year first written above at _____.

OWNER: City of Lebanon, New Hampshire

By: _____

Name: Shaun Mulholland

Title: City Manager

VENDOR: _____

By: _____

Name: _____

Title: _____

(SEAL)

SECTION IV: REQUIRED FEDERAL PROVISIONS

BUY AMERICAN CERTIFICATION

The Contractor agrees to comply with 49 USC § 50101, which provides that Federal funds may not be obligated unless all steel and manufactured goods used in AIP-funded projects are produced in the United States, unless the FAA has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

A bidder or offeror must submit the appropriate Buy America certification (below) with all bids or offers on AIP funded projects. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive.

Certificate of Buy American Compliance for Manufactured Products

(Non-building construction projects, equipment acquisition projects)

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101 by selecting one on the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (not both) by inserting a checkmark (✓) or the letter "X".

- Bidder or offeror hereby certifies that it will comply with 49 USC § 50101 by:
- a) Only installing steel and manufactured products produced in the United States, or;
 - b) Installing manufactured products for which the FAA has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing, or;
 - c) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

1. To provide to the Owner evidence that documents the source and origin of the steel and manufactured product.
 2. To faithfully comply with providing US domestic product
 3. To furnish US domestic product for any waiver request that the FAA rejects
 4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.
- The bidder or offeror hereby certifies it cannot comply with the 100% Buy American Preferences of 49 USC § 50101(a) but may qualify for either a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:
1. To the submit to the Owner within 15 calendar days of the bid opening, a formal waiver request and required documentation that support the type of waiver being requested.

2. That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination may result in rejection of the proposal.
3. To faithfully comply with providing US domestic products at or above the approved US domestic content percentage as approved by the FAA.
4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 3 Waiver - The cost of the item components and subcomponents produced in the United States is more that 60% of the cost of all components and subcomponents of the "item". The required documentation for a type 3 waiver is:

1. Listing of all product components and subcomponents that are not comprised of 100% US domestic content (Excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety)
2. Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly at place of manufacture.
3. Percentage of non-domestic component and subcomponent cost as compared to total "item" component and subcomponent costs, excluding labor costs associated with final assembly at place of manufacture.

Type 4 Waiver – Total cost of project using US domestic source product exceeds the total project cost using non-domestic product by 25%. The required documentation for a type 4 of waiver is:

- a) Detailed cost information for total project using US domestic product
- b) Detailed cost information for total project using non-domestic product

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date

Signature

Company Name

Title

GENERAL CIVIL RIGHTS PROVISIONS

The Contractor agrees to comply with pertinent statutes, Executive Orders and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

Compliance with Nondiscrimination Requirements

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 (hereinafter includes consultants) will comply with the **Title VI List of Pertinent Nondiscrimination Statutes and Authorities**, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will 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 will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.
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 will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will 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 to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor’s noncompliance with the Non-discrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:
 - a. Withholding payments to the contractor under the contract until the contractor complies; and/or
 - b. Cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the sponsor to enter into any litigation to protect the interests of the sponsor. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

Title VI List of Pertinent Nondiscrimination Authorities

(Source: Appendix E of Appendix 4 of FAA Order 1400.11, Nondiscrimination in Federally Assisted Programs at the Federal Aviation Administration)

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “contractor”) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination in Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq.*), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq.*), (prohibits discrimination on the basis of age);

- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration’s Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs and activities (20 U.S.C. 1681 *et seq.*).

ACCESS TO RECORDS AND REPORTS

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 representatives 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.

BREACH OF CONTRACT TERMS

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 thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

CLEAN AIR AND WATER POLLUTION CONTROL

Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 USC § 740-7671q) and the Federal Water Pollution Control Act as amended (33 USC § 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The Owner assumes responsibility for notifying the Environmental Protection Agency (EPA) and the Federal Aviation Administration.

Contractor must include this requirement in all subcontracts that exceeds \$150,000.

CERTIFICATE REGARDING DEBARMENT AND SUSPENSION (BIDDER OR OFFEROR)

By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that at the time the bidder or offeror submits its proposal that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

CERTIFICATION OF OFFERER/BIDDER REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

The bidder must complete the following two certification statements. The bidder must indicate its current status as it relates to tax delinquency and felony conviction by inserting a checkmark (✓) in the space following the applicable response. The bidder agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts.

Certifications

- 1) The bidder represents that it is () is not () a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.
- 2) The bidder represents that it is () is not () is not a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

Note

If a bidder responds in the affirmative to either of the above representations, the bidder is ineligible to receive an award unless the City of Lebanon has received notification from the agency suspension and debarment official (SDO) that the SDO has considered suspension or debarment and determined that

further action is not required to protect the Government's interests. The bidder therefore must provide information to the owner about its tax liability or conviction to the City of Lebanon, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

Term Definitions

Felony conviction: Felony conviction means a conviction within the preceding twenty-four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the U.S. code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 U.S.C. § 3559.

Tax Delinquency: A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

Date

Signature

Company Name

Title

CERTIFICATION REGARDING DEBARMENT AND SUSPENSION (SUCCESSFUL BIDDER REGARDING LOWER TIER PARTICIPANTS)

The successful bidder, by administering each lower tier subcontract that exceeds \$25,000 as a "covered transaction", must verify each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally assisted project. The successful bidder will accomplish this by:

1. Checking the System for Award Management at website: <http://www.sam.gov>
2. Collecting a certification statement similar to the Certificate Regarding Debarment and Suspension (Bidder or Offeror), above.
3. Inserting a clause or condition in the covered transaction with the lower tier contract.

If the FAA later determines that a lower tier participant failed to tell a higher tier that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedy, including suspension and debarment.

DISADVANTAGED BUSINESS ENTERPRISES

The requirements of 49 CFR part 26 apply to this contract. It is the policy of the City of Lebanon dba Lebanon Municipal Airport to practice nondiscrimination based on race, color, sex, or national origin in the award or performance of this contract. The Owner encourages participation by all firms qualifying under this solicitation regardless of business size or ownership.

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.

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 City of Lebanon. The prime contractor agrees further to return retainage payments to each subcontractor within **30** 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 City of Lebanon. This clause applies to both DBE and non-DBE subcontractors.

TEXTING WHEN DRIVING

In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving", (10/1/2009) and DOT Order 3902.10, "Text Messaging While Driving", (12/30/2009), the Federal Aviation Administration encourages recipients of Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or subgrant.

In support of this initiative, the Owner encourages the Contractor to promote policies and initiatives for its employees and other work personnel that decrease crashes by distracted drivers, including policies that ban text messaging while driving motor vehicles while performing work activities associated with the project. The Contractor must include the substance of this clause in all sub-tier contracts exceeding \$3,500 that involve driving a motor vehicle in performance of work activities associated with the project.

FEDERAL FAIR LABOR STANDARDS ACT

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part-time workers.

The Contractor has full responsibility to monitor compliance to the referenced statute or regulation. The Contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

ENERGY CONSERVATION REQUIREMENTS

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 (Public Law 94-163)

LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

The bidder or offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

- 1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the bidder or offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- 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 this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

RIGHTS TO INVENTIONS

Contracts or agreements that include the performance of experimental, developmental, or research work must provide for the rights of the Federal Government and the Owner in any resulting invention as established by 37 CFR part 401, Rights to Inventions Made by Non-profit Organizations and Small Business Firms under Government Grants, Contracts, and Cooperative Agreements. This contract incorporates by reference the patent and inventions rights as specified within 37 CFR §401.14. Contractor must include this requirement in all sub-tier contracts involving experimental, developmental, or research work.

TERMINATION OF CONTRACT

a. 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.

b. 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.

The Owner may, by written notice of default to the Contractor, terminate all or part of this Contract if the Contractor:

1. Fails to commence the Work under the Contract within the time specified in the Notice- to-Proceed;
2. Fails to make adequate progress as to endanger performance of this Contract in accordance with its terms;
3. Fails to make delivery of the equipment within the time specified in the Contract, including any Owner approved extensions;
4. Fails to comply with material provisions of the Contract;
5. Submits certifications made under the Contract and as part of their proposal that include false or fraudulent statements; or
6. Becomes insolvent or declares bankruptcy.

If one or more of the stated events occur, the Owner will give notice in writing to the Contractor and Surety of its intent to terminate the contract for cause. At the Owner's discretion, the notice may allow the Contractor and Surety an opportunity to cure the breach or default.

If within [10] days of the receipt of notice, the Contractor or Surety fails to remedy the breach or default to the satisfaction of the Owner, the Owner has authority to acquire equipment by other procurement action. The Contractor will be liable to the Owner for any excess costs the Owner incurs for acquiring such similar equipment.

Payment for completed equipment delivered to and accepted by the Owner shall be at the Contract price. The Owner may withhold from amounts otherwise due the Contractor for such completed equipment, such sum as the Owner determines to be necessary to protect the Owner against loss because of Contractor default.

Owner will not terminate the Contractor's right to proceed with the Work under this clause if the delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such acceptable causes include: acts of God, acts of the Owner, acts of another Contractor in the performance of a contract with the Owner, and severe weather events that substantially exceed normal conditions for the location.

If, after termination of the Contractor's right to proceed, the Owner determines that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the Owner issued the termination for the convenience the Owner.

The rights and remedies of the Owner in this clause are in addition to any other rights and remedies provided by law or under this contract.

TRADE RESTRICTION CLAUSE

By submission of an offer, the Offeror certifies that with respect to this solicitation and any resultant contract, the Offeror –

- 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 as 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 included on the list of countries that discriminate against U.S. firms as published by the USTR; and
- 3) has not entered into any subcontract for any product to be used on the Federal project that is produced in a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR.

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 USC Section 1001.

The Offeror/Contractor must provide immediate written notice to the Owner if the Offeror/Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The Contractor must require subcontractors provide immediate written notice to the Contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

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 an Offeror or subcontractor:

- 1) who is owned or controlled by one or more citizens or nationals of a foreign country included on the list of countries that discriminate against U.S. firms published by the USTR, or
- 2) whose subcontractors are owned or controlled by one or more citizens or nationals of a foreign country on such USTR list or
- 3) who incorporates in the public works project any product of a foreign country on such USTR list.

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.

The Offeror agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in all lower tier subcontracts. The Contractor may rely on the certification of a prospective subcontractor that it is not a firm from a foreign country included on the list of countries that discriminate against U.S. firms as published by USTR, unless the Offeror has knowledge that the certification is erroneous.

This certification is a material representation of fact upon which reliance was placed when making an award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration (FAA) may direct through the Owner cancellation of the contract or subcontract for default at no cost to the Owner or the FAA.

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 CFR Part 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

PROCUREMENT OF RECOVERED MATERIALS

Contractor and subcontractor agree to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, and the regulatory provisions of 40 CFR Part 247. In the performance of this contract and to the extent practicable, the Contractor and subcontractors are to use products containing the highest percentage of recovered materials for items designated by the Environmental Protection Agency (EPA) under 40 CFR Part 247 whenever:

- 1) The contract requires procurement of \$10,000 or more of a designated item during the fiscal year; or
- 2) The contractor has procured \$10,000 or more of a designated item using Federal funding during the previous fiscal year.

The list of EPA-designated items is available at www.epa.gov/smm/comprehensive-procurement-guidelines-construction-products.

Section 6002(c) establishes exceptions to the preference for recovery of EPA-designated products if the contractor can demonstrate the item is:

- a) Not reasonably available within a timeframe providing for compliance with the contract performance schedule;
- b) Fails to meet reasonable contract performance requirements; or
- c) Is only available at an unreasonable price.

VETERAN'S PREFERENCE

In the employment of labor (excluding executive, administrative, and supervisory positions), the Contractor and all sub-tier contractors must give preference to covered veterans as defined

within Title 49 United States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 USC 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

SECTION V: NOTICE TO BIDDERS

NOTICE TO BIDDERS

It is REQUIRED that the following Bid Bond form be completed by all bidders.

Alternative forms submitted in lieu of the enclosed WILL NOT BE ACCEPTED. The Bid Bond form may be photocopied on another colored paper as long as it retains the original format. Attachments to the completed bond form are acceptable.

SECTION VI: BID BOND

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____

as Principal, and _____

as Surety, are hereby held and firmly bound unto the City of Lebanon, New Hampshire, as OWNER in the penal sum of five (5) percent of the bid amount not to exceed _____

_____ (spell out & write in numbers)
for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors, and assigns.

Signed, this _____ day of _____, 2020. The condition of the above obligation

is such that whereas the Principal has submitted to _____
a certain Bid, attached hereto and hereby made a part here of to enter into a contract in writing,
for the:

Purchase of Snow Removal Equipment –
One 16’ Displacement Plow with Carrier Vehicle, and a 12’ Heavy Duty Underbody Scraper, and
18’ Stowing Inline Tow Broom with High Velocity Air Blast System, and Liquid Material Spreader

AIP Project No. 3-33-0011-XXX-2020
Lebanon Municipal Airport
Lebanon, New Hampshire

NOW, THEREFORE, if said Bid shall be rejected, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its Bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year set forth above.

Principal

Surety

By:_____

IMPORTANT - Surety companies executing Bonds must appear on the U.S. Treasury Department's most current list (Circular 570, as amended) and be authorized to transact business in the State of New Hampshire.

SECTION VII: BID PROPOSAL FORM

SCHEDULE OF PRICES

BID

1. **One 16' Displacement Plow with Carrier Vehicle, and a 12' Heavy Duty Underbody Scraper, and 18' Stowing Inline Tow Broom with High Velocity Air Blast System, and Liquid Material Spreader** in accordance with the specifications:

TO BE PAID BY the City of Lebanon for the sum of: \$_____

Spell out dollars in words: _____

Make: _____ Model: _____

Total BID \$_____

NOTES:

1. In the event of a bidder's mathematical error in tabulating any bid prices, the written unit price shall govern. Selection of the lowest bidder will be based on the calculated total of all items as written in words.
2. This purchase is tax exempt.

EXCEPTIONS

Exception(s) to Bid Conditions and Specifications (if none, so state):

BIDDER’S CERTIFICATION:

The undersigned agrees that the foregoing statements contained herein are true and correct and were made without collusion, and agrees to the conditions set forth in this request for bids and in the following technical specifications.

Name of Bidder: _____

Signature of Bidder: _____

Date of Signature: _____

Title of Bidder: _____

Company Making the Bid: _____

Address: _____

City, State, Zip: _____

Telephone Number: _____

Expected Date of Delivery: _____

SECTION VIII: Specifications for SNOW REMOVAL EQUIPMENT – ONE 16’ DISPLACEMENT PLOW WITH CARRIER VEHICLE, AND A 12’ HEAVY DUTY UNDERBODY SCRAPER, AND 18’ STOWING INLINE TOW BROOM WITH HIGH VELOCITY AIR BLAST SYSTEM, AND LIQUID MATERIAL SPREADER “

INTRODUCTION:

It is the intent and purpose of these specifications to describe a truck with attached dump bodies, tilting hitches and underbody scrapers for use in snow removal for airport operations. Any item omitted from these specifications which is clearly necessary for the satisfactory performance of the proposed equipment shall be considered a part of the contract, even though not directly specified. All items furnished shall be new and unused and shall meet the minimum requirements contained herein.

The basic specification used is FAA AC 150-5160-20A - Airport Snow and Ice Control Equipment and ARP5943 (Pertinent sections are attached). Where the advisory is obsolete, incomplete, or does not meet local operational requirements, the note is made herein.

Any exception or clarification to these specifications shall be clearly detailed in a separate section of the bid proposal. If no notation is made, the airport expects the delivered vehicle and equipment to comply with the specifications.

Anticipated uses and/or features of vehicle.

The carrier vehicle will be used with a 16-foot displacement plow to plow, underbody scraper, 18-foot tow behind sweeper and liquid deice material spreader to remove all the snow on all surfaces of the airport in the winter. In the summer this truck will be used to haul materials for maintenance of the airfield.

EQUIPMENT REQUIREMENTS:

TRUCK TYPE CONVENTIONAL CARRIER VEHICLE

PART A -AIRPORT OPERATOR CHECKLIST.

FORWARD: When preparing a solicitation to purchase a carrier vehicle, an airport operator or specification writer should use PART A to identify user requirements and PART B to define the specification to meet these requirements. Part A is important because it tailors the carrier vehicle to the unique requirements of the purchaser, i.e. automatic transmission, diesel engine, heated windshield versus plain etc. Both parts, when combined, become the technical basis for a user's request for proposal.

1. Turning Radius chassis only, wall to wall: With AWS, not to exceed 75 Feet.
2. Engine/Transmission.
 - a. Engine.
 - i. Horsepower: Engine shall be a minimum of 550 horsepower.
 - ii. Torque: Engine shall have a minimum of 1,850 lb.-ft torque.
 - iii. Fuel: Diesel
 - b. Transmission.
 - i. Type: Automatic
 - ii. Number of forward speeds:
 1. Minimum – four
 2. Maximum – six
 - c. Transfer case.
 - i. Shall be single ort two speed type
 - ii. Front axle disconnect - automatic or manual type.
 - d. Axle capacities:
 - i. Minimum front: 16,000 pounds
 - ii. Minimum rear: 23,000 pounds
 - e. Fuel capacity: 150 gallons minimum for carrier vehicle.

PART B - SPECIFICATION FOR CARRIER VEHICLE.

1. MATERIALS. Materials used on a carrier vehicle (vehicle) shall conform to the specifications listed in the FAA advisory circular 150/5160-20, latest edition, and appropriate sections of Title 49, Chapter III, Subchapter B - Federal Motor Carrier Safety Regulations (Title 49). When not specifically listed, materials shall be of the best quality available for their intended commercial use. Component parts shall be new and free of all defects and imperfections that could affect the serviceability of the finished product.

2. DESIGN. Equipment shall be developed in accordance with the best engineering practices available. This includes the incorporation of ergonomic designs specifically directed at the vehicle's cab environment. Vehicle design shall include current state-of-the-art procedures that consider improved cab visibility, communications systems, interior lighting and the mitigation of noise and vibration. Design and installation of equipment shall permit easy accessibility for

maintenance and service. All vehicle stress points shall be designed to distribute and dissipate shock forces.

3. CONSTRUCTION. Vehicle construction shall provide maximum protection against failure of structural members. Equipment shall withstand the cold, moisture, strains, jars, vibration, and other conditions that are likely to be encountered during operation. All components and assemblies shall be free of hazardous protrusions, sharp edges, cracks, or other elements which might cause injury to personnel or damage to equipment. Location of all oil, hydraulic, and air lines and electrical wiring shall be in protected positions properly attached to the frame or body structure. Wherever these lines pass through structural members, they shall be protected with looms or grommets except where a through-frame connector is necessary.

4. CHASSIS.

GENERAL. The design of the vehicle chassis shall be based on an all-wheel drive concept for optimized performance and safety. It shall have power assisted steering and a transmission with suitable load ranges to accommodate normal operating conditions. A dual pintle hook shall be permanently attached to the rear frame structure capable of towing a vehicle. All installed parts and accessories necessary for the safe operation of the vehicle shall conform to applicable provisions of Title 49. Structural Members. The frame shall be made of pressed steel channel and reinforced as required to prevent distortion under maximum load conditions. All frames and stiffeners shall be treated with a corrosion inhibitor and shall be primed and painted before assembly.

A. Dimensions and Clearances. Carrier vehicles shall have the following overall dimensions:

- a. Minimum Ground Clearance. The minimum ground clearance of a vehicle chassis shall be 8 inches (20 cm).
- b. Maximum Overall Height. The overall height of a vehicle excluding discharge chutes, lights, and exhaust stacks shall not exceed 13 feet (4.0 m).
- c. Maximum Overall Width. The overall width of a vehicle including displacement plows (if specified) at their maximum angle shall be no more than 24 feet.
- d. Maximum Overall Length. Maximum vehicular length should not exceed 35 feet (10.7 m) without front attachment for single purpose vehicles. For multifunction single unit vehicles, maximum overall length should not exceed 70 feet.
- e. Minimum Turning Circle Diameter. Using two wheel steering only, single purpose vehicle must be capable of turning within a circle whose diameter is 100 feet (30 m). For multifunction single unit vehicles, multi-axle steering is mandatory. For multi-function single unit vehicles, the maximum turning circle shall be a diameter of 75 feet. This diameter is measured from center to center of the outside front tire tread ground imprint.

- B. Weight Distribution. The gross vehicle weight of the vehicle shall essentially be distributed equally over its axles. Under normal operating conditions, there shall not be more than a 20 percent variation in weight on any axle. The center of gravity shall be kept as low as possible under maximum load conditions. While it is loaded, the vehicle shall be capable of resting on a 20 percent transverse grade without danger of overturning.

5. ENGINE. The vehicle engine shall be of internal combustion, diesel design having a minimum of six cylinders. It shall be able to meet the performance characteristics specified herein on commercial grade fuel. The engine shall develop sufficient torque and horsepower to meet its normal operational requirements without exceeding the no-load speed at the peak of its certified gross brake horsepower curve. Engine noise and vibration can be reduced in the vehicle cab by placing engines behind the cab.

6. COOLING SYSTEM.

- A. General. The engine cooling system shall be based on a liquid design. Internal temperatures shall be controlled by a by-pass thermostat that regulates the flow of engine coolant. Even upon failure of the thermostat, the design of the system shall allow the engine to continue temporary operation without overheating. Drain cocks shall be installed at the lowest point of the cooling system and at other points necessary to completely drain the system.
- B. Coolant Temperatures. Coolant temperatures shall not exceed 212°F (100°C) nor be less than 140°F (60°C) when operated in ambient temperatures during snow removal operations.

7. FUEL SYSTEM.

- A. General. The fuel system shall comply with Title 49. It shall include fuel injectors, fuel pump, fuel strainers, dry filter type air cleaners, fuel lines, valves, drains, return lines, and other accessories required to provide a complete operational system.
- B. Fuel Tank(s) and Lines. Fuel tank(s) shall have the capacity to supply fuel continuously to the engine(s) for a period of not less than 8 hours while it is operating at its rated horsepower under normal conditions. If dual tanks are used, the supply system shall be designed to ensure an uninterrupted flow of fuel to the engine(s). Fuel lines shall be securely fastened in place, installed to prevent chafing or strain, and protected by grommets where lines project through metal apertures. Each fuel tank is to be equipped with an accessible bronze or brass drain plug or a quick drain.
- C. Fuel Filler Pipe. The fuel filler pipe shall be located in an accessible location outside of the vehicle cab. A light chain shall be attached near its opening and to the filler cap to prevent loss of the cap. Left/right crossover connections are required that are rated for sufficient flow to allow filling of saddle tanks from either side without delay.

D. Air Cleaner. The air cleaner shall be of a two-stage design. The first stage incorporates a centrifuging pre cleaner while the second consists of a dry type replaceable paper filter. It shall display an indicator that shows when the dry type paper filter needs servicing. The connection between the air cleaner outlet(s) and the engine intake(s) shall be waterproof and dust tight. The air cleaner intake shall be positioned in a manner to discourage the ingestion of snow and other contaminants, e.g. within the hood cavity.

8. EXHAUST SYSTEM AND MUFFLER. The engine shall be equipped with an efficient and safe exhaust system including mufflers. Its location shall minimize noise and exhaust gases entering the vehicle cab under all operating conditions. Further noise reductions by noise suppression materials, such as muffler insulation, is encouraged. Horizontal portions of exhaust systems shall be protected, whenever possible, from corrosive agents and fuel spills. Exhaust systems shall be positioned on the vehicle in a manner to minimize contact with slush and snow. Muffler(s) are to be made of aluminum, stainless steel, or materials coated with ceramics. Devices shall be installed to prevent snow and slush from entering vertical exhaust stacks.

9. GOVERNOR. Engine speed shall be regulated by a governor set to provide the maximum operating speed recommended by the engine, driveline, and power train manufacturers.

10. LUBRICATION. An engine's lubricating system shall be equipped with standard production fittings and accessories. Engine oil filter(s) shall be of either full-flow or by-pass design with either able to accept commercial replacement elements. All engine(s) shall receive lubrication prior to delivery with lubricants designated for use under ambient temperature conditions at the point of delivery. The unit(s) shall be tagged to identify the proper lubricants and their temperature ranges by means of a lubrication chart on the body.

11. ACCESSIBILITY.

- a. Component Location.** Engine and chassis components shall be positioned to allow easy access for inspection and maintenance purposes. Components that historically present maintenance problems or those that have the potential to cause operational problems should particularly be located in unobstructed areas. Locks, controls, and fasteners shall be designed to prevent over-torqueing.
- b. Cover Plates.** Cover plates shall be equipped with either quick-disconnect fastenings or hinges.

12. TRANSMISSION. Transmission and vehicle manufacturers shall provide an application approval, at the time of vehicle delivery that states the transmission is suitable for use in the vehicle as configured. The transmission shall operate smoothly and efficiently and be capable of transmitting the maximum gross torque generated by the engine to the drive wheels through all gear reductions. Drive trains shall be in conformance with SAE requirements and shall be designed to minimize the number of joints.

The torque converter shall not operate at less than 70 percent efficiency. The gear or range selector shall have forward, neutral, and reverse positions clearly identified.

13. TRANSFER CASE. The vehicle and transfer case manufacturers shall provide an application approval at the time of vehicle delivery that states the transfer case is suitable for use in the vehicle, as configured. Transfer case assemblies shall provide positive drive to the front and rear axles and be of optional single or multi-speed design. Three proven alternatives are the manual front axle disconnect type, the center differential with manual or automatic lockout type, or an overriding clutch type, any of which may be selected by a purchaser as an option (see specification checklist above). The transfer case may be a separate unit mounted independently or integrated with the transmission or axle.

14. AXLES. The axle and vehicle manufacturers shall provide an application approval at the time of vehicle delivery that states the front and rear axles are suitable for use in the vehicle, as configured. The axle manufacturer's published rating shall at the least be equal to the load imposed at ground level when the vehicle is at its rated gross vehicle weight (GVW). Each non-steering axle shall be equipped with a retarding type device to ensure a torque transfer to each wheel having traction. When appropriate, manual lockout controls shall be located in the vehicle cab. The torque capacity of each axle and differential shall be at least 10 percent in excess of the maximum torque that the axle may experience under any GVW operating condition. The power transmitting shaft on a steering axle shall incorporate steering joints that do not produce objectionable steering characteristics while the vehicle is operating on uneven surfaces.

15. BRAKE SYSTEM. A vehicle service and emergency braking systems shall meet Title 49 requirements for vehicles of similar design. These systems, whether air, hydraulic, or of another design, shall be complete with all necessary equipment to safely control, stop, and hold a fully equipped vehicle under all normal operating conditions. Both systems shall be readily accessible for external adjustment. An ABS system (minimum 4S 4M) is required regardless of axle weight rating.

16. STEERING MECHANISM. The vehicle shall have a power assist steering mechanism which is operated from the driver's seat. During normal operations, the mechanism shall be capable of controlling the vehicle with all equipment operating. The design of the steering mechanism should, in the event of a power assist failure, be capable of safely bringing the vehicle to a park position from the maximum design speed allowed on the airport.

17. SUSPENSION SYSTEM. Vehicles shall be equipped with a current production model suspension system having a minimum rated capacity equal to the GVW of the carrier vehicle. System capacity may be determined by taking measurements from ground level with the vehicle loaded to its rated GVW and the attached equipment in its storage position. When required, front and rear axles shall have auxiliary suspension springs. Manufacturer's capacity ratings may not be raised to conform to the requirements of this specification. The suspension system shall exhibit no permanent set after the load is removed.

18. WHEELS, RIMS, TIRES, AND TUBES.

- a. Wheels. Rim and tire ratings shall conform to the published recommendations of the Tire and Rim Association.
- b. Tires. Each tire shall have a rated carrying capacity at least equal to the loads imposed on them by a fully loaded vehicle measured at each wheel. Tires on each axle shall be of the same size, except where dual tires require different sizes, and they shall have an aggressive tire tread. Tires (and tubes when applicable) shall meet the first line commercial grade requirements for the speed and type of service required. The front and rear tread widths shall not vary by more than four percent.
- c. Spare Rim/Tire. Provisions for carrying the spares on the vehicle are not necessary.

19. HYDRAULIC SYSTEM.

- a. General. The hydraulic system shall consist of appropriate rams, pumps, piping, fittings, valves, controls, fluid reservoirs and filters, coolers, and other parts essential to its full operation. The system shall be capable of hydraulically positioning equipment through the entire range of its design limits. It shall be capable of operating all controls simultaneously without a noticeable reduction in power response. All hydraulic controls shall be located in the vehicle cab. The system shall be ruggedly constructed and able to withstand all loads imposed on it without relying on the use of mechanical locks. Filters within the hydraulic system shall conform to the Society of Automotive Engineers (SAE) Information Report, SAE J 931- Hydraulic Power Circuit Filtration.
- b. Pump and Power Takeoff. The pump shall be ruggedly constructed and powered by the engine through a crankshaft power takeoff. It shall have sufficient capacity to operate the hydraulic equipment specified herein under all operating conditions and speeds. Belt driven hydraulic pumps are not acceptable.
- c. Lines and Fittings. Only commercial quality hydraulic lines, hoses, and fittings 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.
- d. Fluid Tank. The hydraulic fluid tank shall have a filler neck consisting of a strainer, drain plug, air vent, and baffles. Its capacity shall exceed the volume of oil required for the operation of any combination of attachments by 50 percent, and it shall have a hydraulic fluid quantity level measurement.
- e. System Winterization. The hydraulic system shall meet the same low temperature requirements as the engine coolant system.

20. ELECTRICAL SYSTEM.

a. General. 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 waterproof, 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 the Society of Automotive Engineers (SAE).

b. Power Supply. The carrier vehicle shall be equipped with a self-regulating electric alternator having an output capacity that exceeds the anticipated electrical load.

c. Batteries. Batteries shall be securely mounted and adequately protected against physical injury, water, chemicals, and exhaust heat. They shall be properly sized based on vehicle manufacturer recommendations and be readily accessible for change out and for other purposes. Enclosed battery compartments shall have adequate ventilation. Battery capacity (cranking amps, voltage, reserve power, continuous/deep cycle demand) shall be compatible with the size of the engine and the anticipated electrical load expected under normal operating conditions. Minimum battery size to start the engine shall be rated at 120 ampere-hours over a 20-hour discharge rate.

d. Starting Device. The vehicle shall have an electrical starter that shall not introduce a voltage drop sufficient to affect adversely the ignition system. It shall be equipped with an overload protection device. One of the following electrical/starting systems shall be provided:

- 1) 12 volt electrical and starting.
- 2) 12 volt electrical/24 volt starting.
- 3) 24 volt electrical and starting.

e. Ignition System. Ignition systems for diesel engines may be equipped with or without glow plugs, depending on make, model, and manufacturer. Under extreme weather conditions, a block heater should be considered for improved ignition.

f. Sounding Device. Excluding pick-up trucks, each vehicle shall be equipped with an audible sounding device that is activated when the vehicle is shifted into reverse gear.

21. LIGHTING SYSTEM. The lighting system, including reflectors and clearance lights, shall be standard equipment currently used by the manufacturer. Task-oriented lights should be capable of lighting those areas to be cleared.

The system shall include:

a. Headlights. The carrier vehicle shall be equipped with two or more sealed-beam quartz-halogen or equivalent headlights with upper and lower driving beams and a hand-controlled switch for beam selection. Snow removal attachments and other accessories should not be positioned so as to obstruct the illumination of these lights.

b. Dual Tail lights and Dual Stop lights. Each vehicle operating on airport property shall be equipped with dual tail lights and dual stop lights. The stop lights shall be activated whenever service brakes are applied.

c. Turn Signals. The carrier vehicle shall be equipped with two front and two rear turn signals that conform to SAE Turn Signal Units, Type I Class A, with self-cancelling controls and a visual/audible indicator. In addition to signaling turning movements, the system shall also be capable of signaling a hazardous condition by flashing simultaneously with the ignition of the vehicle turned on or off.

d. Spotlight. There shall be a corrosion resistant spotlight securely mounted near the cab roof.

e. Reflectors, Markers, and Clearance Lights. This equipment shall conform to the requirements of Title 49. The clearance lights shall have commercial truck lenses.

f. Engine Compartment Lights. These lights shall adequately illuminate both sides of the engine(s). Location of the switches shall be in the engine compartment(s) with proper clearances so that they can be activated by operators wearing heavy winter gloves and outer garments.

g. Backup Lights. There shall be at least two backup lights installed at the rear of and at either side of the vehicle that will automatically be activated when the vehicle is shifted into reverse gear.

h. Vehicle Safety Identification Lights. The vehicle shall have a minimum of one flashing yellow strobe, mounted on its uppermost part (see AC 150/5210-5B, Painting, Marking, and Lighting of Vehicles on an Airport). The light emitted from the strobe should not reflect off rearview mirrors and into the operator's eyes. The flashing strobe shall have the following characteristics:

1) 360° azimuth (horizontal) coverage.

2) peak intensity from 0° to 10° above the horizontal and reduced intensity to 1/10 of peak intensity from 10° to 15° above the horizontal.

16. OPERATOR'S CAB.

a. General. Carrier vehicle cabs shall be made of either metal or fiberglass construction. They shall be fully enclosed accommodating a single operator plus assistant/trainee (full cab). A definite separation shall exist between the engine and operator's compartment. All non-glass surfaces, such as the floor, sides, and roof of the cab, shall have insulation to reduce exterior noise. The maximum interior cab noise measured at the operator's seat shall not exceed 85 dBA under the following conditions: windows closed, heater and defrost systems at maximum operation, and carrier vehicle and equipment engines operating at maximum rated capacity. To the extent possible, the interior of the cab shall be

ergonomically designed providing the operator with a pleasant working atmosphere that is devoid of the stark conditions normally associated with older equipment.

b. Communications Equipment Space. Transceivers shall be installed in carrier vehicles to establish voice communication with other vehicles, the air traffic control tower, snow control center and maintenance facilities. The vehicle cab shall be designed to provide convenient space near the operator for the installation of a pair of transceivers.

The radios shall be:

1. Radio #1.

Icom A160M or equivalent, 8-watt output (minimum) aviation band transceiver. This radio shall be equipped with a roof mount antenna (Icom K160C), remote speaker (SP-35) and a noise-canceling microphone (HM-176). This radio shall be preprogrammed with the following frequencies:

Channel 1 – 125.95 MHz

Channel 2 – 121.600 MHz

2. Radio #2

Icom A120 with UT-133 Bluetooth or approved equivalent, 9-watt output (minimum). This radio shall be equipped with a roof mount antenna (Icom K160C), remote speaker (SP-35) and a noise-canceling microphone (HM216). This radio shall be preprogrammed with the following frequencies:

Channel 1 – 116.775 MHz

Channel 2-118.65 MHz

c. Fire Extinguisher. The vehicle cab shall have at least one 2A-10BC interior mounted fire extinguisher that is readily accessible to the operator.

d. Operator Seat. The vehicle cab shall provide an operator and trainee seat that can easily be adjusted up and down, fore and aft, a minimum of three inches (7.6 cm) in each direction. The seat should also be capable of reducing the effect of vehicle vibration by featuring air-cushion shock absorbing seat systems. Adjustable lumbar required for both cab seats. All vehicle seats shall have approved seat belts. Seats shall be fully upholstered with a good quality fabric or plastic material.

e. Windows. The vehicle cab shall maximize the use of glass, including the placement of panels if possible, in the lower sections of door panels, to increase the operator's view of operational areas and ground surfaces. All installed glass shall be laminated, and safety rated. The location and size of the windshield shall minimize visual obstructions to the operator. The windshield shall be designed to avoid snow buildup and be equipped with at least one two speed automatically operating wiper (standard or wet) that is capable of sweeping a clear view for all occupants. The windshield washer reservoir shall have a capacity of at least one-half gallon (2 liter). Fluid applicators shall be located to provide at least 75% coverage to the windshield. The cab shall be equipped with sun visors.

f. Exterior Rearview Mirrors. Two electrically heated, remote control exterior rear view mirrors of the extension arm type shall be mounted on each side of the vehicle cab. Each mirror shall have an area of not less than 100 in² (650 cm²).

g. Heater-Defroster.

1) Heating System. The carrier vehicle cab shall have a heating system that is capable of maintaining a minimum interior temperature of 65° F (18° C) at an ambient outside temperature of -20° F (-29° C). Heat output shall be controllable from within the cab by a selector switch that is conveniently located to the operator. Under all conditions of heating and ventilation, the temperatures measured in the operator's immediate environment should be uniform within 9° F (5° C) (see SAE J 1503, Performance Test for Air-conditioned, Heated and Ventilated off-Road Self Propelled Work Machines).

2) Windshield. Windshields and other glass surfaces in the vehicle cab used in the operation of the vehicle and or to view pavement surfaces, including rear windows if installed, shall be defrosted through a heat energy transfer system. The front windshield shall be electrically heated.

h. Ventilation. Each vehicle cab occupant should receive a minimum of 25 ft³/m (.71 m³/m) of filtered fresh air under all heating and ventilating conditions (see SAE J 1503). Cab ventilator intakes should be screened and positioned in such a manner to minimize the entry of snow.

i. Hour meters. Every engine permanently attached to a carrier vehicle shall be equipped with an hour meter that registers engine operation time from zero to 9999 hours. Hour meters shall be prominently displayed so that they can be easily read by operator or service personnel.

j. Instrumentation. The cab shall display an instrument panel equipped with rocker, push button, and/or toggle switches and controls (instruments) that are user friendly to operators wearing bulky winter clothing. Toggle switches, where used, shall have a minimum length of 1 1/2 inches (4 cm). Frequently used instruments shall be located in direct line-of-sight and within forearm reach of a medium-sized person sitting in the operator's position. All instruments shall be clearly identified with labels that indicate their function. Instruments should display urgency-of-action lights, i.e., green for normal operation, amber for warning, and red for emergency. Instruments shall be illuminated by background lighting regulated by dimmer switches capable of providing infinitely variable lighting intensities. Circuit breakers shall be grouped for easy access and convenience.

Typical instruments that report and track major functions of a carrier vehicle are as follows:

1) Engine.

a) Voltmeter.

b) Lubricating Oil Pressure Gauges.

c) Coolant Temperature Gauge(s).

d) Tachometer(s) including hour meter(s).

e) Starting Controls (including auxiliary cold start controls).

2) Vehicle Chassis.

- a) Brake-air Pressure Gauges.
- b) Low-air Pressure Warning, visual and audible type.
- c) Light Switches and Headlight Beam Indicator.
- d) Speedometer with Recording Odometer.
- e) Fuel Quantity Gauge(s).
- f) Equipment Controls.

23. SHEET METAL COMPONENTS.

a. General. The carrier vehicle engine, as well as its mechanical components, shall be protected wherever possible from snow, rain and other winter elements. Body and engine enclosures shall be fabricated from aluminum, fiberglass, and steel. Self-tapping bolts are unacceptable in the construction of these enclosures.

b. Body Accessories. The following parts and accessories are necessary for operational safety:

- 1) Steps. Four-way safety tread design steps are required. These steps, together with assist handles, shall be of ample size to ensure safe and easy access for persons wearing bulky winter clothing.
- 2) Walkway. A four-way safety tread design walkway shall be provided, as necessary, for access.
- 3) Handrails. Handrails shall be provided as required at all steps walkways, and work stations. They shall be made of corrosion-resistant materials or otherwise treated to prevent corrosion.
- 4) Fenders. All carrier vehicles shall be equipped with fenders and when determined by the operator, non-sail mud flaps to prevent wheels from throwing snow and other debris.
- 5) Drains. Plugged or free flowing drains shall be provided at all body and compartment locations where standing water can collect. Free flowing drains shall not drain onto sensitive mechanical or electrical components or on areas anticipated to be occupied by personnel during normal operations.
- 6) Doors. Doors shall be equipped with a positive closing mechanism and, where appropriate, a locking mechanism. Top hinged compartment doors shall be held in the open position by support arms.
- 7) Gutters. The vehicle cab shall be equipped with gutters, located above the entrance doors, of sufficient length to span the door width and provide runoff protection to occupants either entering or exiting the cab.

24. PAINTING, MARKING, AND LIGHTING OF VEHICLES.

a. Painting and Marking. The vehicle shall be painted Chrome-Yellow in accordance with color tolerance charts that have been made available for FAA regional airport inspectors and key potential users in the aviation safety equipment industry (see AC 150/5210-5B).

- 1) Preparation and Finish. The carrier vehicle and all mounted and towed equipment shall be cleaned first, then treated with a corrosion inhibitor, primed, puttied,

sanded, and finally painted. The paint shall consist of not less than two coats of Chrome-Yellow polyurethane enamel having a combined minimum thickness of 7 mils.

2) Quality. The finished paint shall be free of "fisheye", "orange peel", chips, runs, or other imperfections that detract from the equipment's corrosion resistance and appearance.

b) An 8" white reflective stripe is required on sides of vehicle

c) Chevron striping is required on rear bumper

d) Airport name and number designation required on sides and top:

1. Logo as supplied by airport to be applied on each side of unit

2. The number 1 on each side in 18" high numbers, and on the top in 24" numbers

3. Airport Name shall be applied to each side as directed by the airport

25. MISCELLANEOUS.

a. Name, Service, and Instruction Plates. All information plates shall be made of either noncorrosive metal or plastic with the information engraved, stamped, or etched thereon. Plates shall be mounted in a conspicuous place with screws, bolts, rivets, or exterior type pressure sensitive tape.

1) Plastic plates. Plastic plates are acceptable only in locations that are not exposed to the elements and subject to weathering or excessive heat.

2) Information. Plates shall identify make, model, serial number, and any other relevant data.

b. Technical Publications. The manufacturer shall furnish two electronic sets of the following publications:

1) Operator's Manual. The operator's manual includes lubrication charts and instructions (two paper copies of operator's manual also required).

2) Parts Manual. The parts manual identifies and lists all parts, components, and sub-assemblies used in the fabrication of the carrier vehicle.

3) Maintenance and Service Manual. A maintenance and service manual provides guidance to non-specialists performing routine services. The manual should also describe in detail with appropriate schematics the overhaul and major maintenance procedures required to maintain the vehicle.

c. Accessories and Tools. The carrier vehicle shall be provided with the following tools and accessories.

1) Tire Tools.

2) Jack. A jack specifically adapted to the carrier vehicle that is capable of raising it to a position where a flat tire can be changed.

3) Specialized Tools. Specialized tools required for routine servicing of the carrier vehicle and its auxiliary equipment.

26. DELIVERY.

a. Preparation for Delivery.

1) Shipment. The vendor "seller" is responsible for the safe and timely delivery of the vehicle and its accessories, spare parts, and tools to the agreed place of delivery.

- 2) Marking. Carrier vehicles shall be marked for shipment in accordance with instructions agreed to by the purchaser.
- b. Instruction and Training. The manufacturer shall, at no additional cost, furnish the services of trained personnel to the purchaser at a time and place agreed to by all parties. These individuals shall provide instructions to airport personnel sufficient for the personnel to familiarize themselves with the operational and maintenance characteristics of the vehicle and its auxiliary equipment. The period of instruction shall not be less than 24 hours.

HEAVY DUTY UNDERBODY SCRAPER

Heavy Duty Underbody Scraper: The intent of these specifications are to describe a hydraulically operated truck underbody scraper specifically designed for the purpose of snow and ice control. The underbody scraper needs to meet the minimum specs of ARP5943. The scraper shall incorporate a shock absorbing trip mechanism.

Moldboard: Made of 1 " thick steel, 20" in height and 12' long. It will have a foil length crimp along the lower edge to make a flush mounting with the replaceable cutting edge. The moldboard shall be attached to the support connection at the turntable by a 2-1/2" diameter hinge shaft 96" long with four (4) 6-1/2" wide hinge supports.

Turntable: One piece 1" thick reversing table with a 5" center pin pivot with 6-1/2" x 1-1/2" thick bushings. It shall have 3/8" replaceable polyurethane wear pads for increase wear and easier adjustment movement. It shall have 1" hold down blocks.

Lift Cylinders: It shall have two (2) double-acting lift cylinders with trip spring canisters, 3-1/2' diameter bore nitride and 2" diameter rod.

Power Reversing: It shall have two (2) double-acting cylinders with 4" diameter bore, 2" diameter nitride rod with 2" diameter mounting pins. It shall have a cushion valve (to relieve pressure if solid object is hit). Or an auto locking system to keep underbody moldboard angled.

Cutting Edge: It shall have two (2) 8" x 6' x 3/4" grader type blades with standard punching.

Mount Plates: 5/8" thick steel with shim spacers provided (if needed) if truck frame is wider than underbody frame.

Hardware: All hardware (bolts, hoses, fittings, etc.) needed to mount and make underbody scraper operational.

Note: Due to installation of underbody scraper, the truck frame will need to be clean from a minimum of 16" behind cab to front tandem on rear end. Any questions may be referred to Lebanon Municipal Airport or underbody scraper vender.

DISPLACEMENT PLOW SPECIFICATIONS

Heavy Duty Underbody Scraper: The intent of these specifications are to describe a electric over hydraulically operated truck mounted displacement plow specifically designed for the purpose of snow and ice control. The displacement plow needs to meet the minimum specs of ARP5943.

Size of priority 1 paved area.

Current: 887,000 square feet.

Proposed: 160,000 square feet.

Total: 1,107,000 square feet.

Type of plow preferred. Extra-large power reversible plow.

Plow

Length: 16 ft.

Height: 50" at center.

Width @ 35 degrees: 18ft.

Anticipated speed of operation: 25mph.

Unusual conditions/problems/obstructions that may be encountered.

In ground lights, Surface mounted hold signs, Ice, FOD.

Typical Snow Conditions: The average snowfall for Lebanon is 76 inches. Snow conditions vary from heavy wet snow to freezing mist.

SRE Storage Building Door Dimensions: The door opening for the snow removal equipment storage building is 16 feet wide by 18 feet high.

Moldboard: Polyethylene Moldboard with Uniform Height. Typically, moldboard height shall be 50 inches. The moldboard sheet shall provide a low coefficient of friction and resistance to corrosion and impact. The moldboard sheet shall be formed from 3/8-inch-thick high molecular weight polyethylene sheet. When tested in conformance with ASTM D 638-03, it shall evidence a minimum of 250% elongation at the break. Polyethylene material shall have an abrasion resistance rating of no higher than 44 for VHMW and 15 for UHMW type polyethylene materials as rated by ASTM G 75-01 sand slurry testing. (The lower the rated number, the more resistant to abrasion.) The polyethylene sheet shall be formed from new resin (recycled material is not acceptable and shall be ultraviolet stabilized). The sheet shall evidence no break following izod impact test conducted in accordance with ASTM D 256-05. Alternate moldboard sheet materials may be specified by the user. The moldboard shall include a reinforcing frame with a top and bottom full-length reinforcing angle or other structure. Airport sponsor shall specify the overhang after consultation with other airports facing similar snow removal situations and plow manufacturers. When requested, the plow manufacturer shall provide certification for the moldboard material.

Cutting Edge Reinforcement: Shall consist of structural steel angle or other suitable structure with equally spaced reinforcement welded to the top of the angle for added strength.

Moldboard Attack Angle Adjustment: Moldboard attack angle adjustment shall be incorporated so to provide 65°, 75° and 85° settings (from ground plane to back of cutting edge for use with either steel, carbide, rubber or urethane cutting edges) for the purpose of enhancing the plowing operation to meet specific requirements (e.g. in-pavement lighting, scraping action, wearability).

Cutting Edge: There will be two cutting edges both shall be Urethane two (2) inches thick, twelve (12) inches long, and 144 inches wide.

Spray Guard: A spray guard shall be affixed to the top moldboard flange or reinforcement. It shall be of sufficient size and strength to direct snow to the proper discharge area and minimize snow coming over the top of the plow. It shall be a minimum of 3/8 inch thick by 12-inch-wide rubber belt or polyethylene with metal retaining strap and necessary mounting hardware.

Drive Frame: The drive frame shall be of either oscillating or floating design, readily detachable (not permanently affixed) from the push frame of the carrier vehicle. A drive frame equipped with oscillating bars allows the plow to follow surface contours without putting excessive strain on the carrier vehicle chassis. Floating drive frames must be capable of supporting the weight of the displacement plow, eliminating the transfer of the plow weight to the carrier vehicle's lift device. The drive frame shall connect to the moldboard at a minimum of four attachment points and to the chassis via a push plate with standard 31-inch centers or by means of an acceptable quick hitch.

Shock/Impact Absorbers: An automatic cushioning device shall be installed between moldboard and drive frame to minimize damage to the moldboard, cutting edge, and carrier vehicle, and to enhance driver safety.

Reversing Mechanism: Reversing may be achieved by hydraulic cylinders that are either double or single acting, single or telescoping type. Larger diameter and double acting cylinders provide more force for plow movement but requires more hydraulic flow to achieve cycle times more easily achieved by single acting and telescoping style cylinders. A relief system shall be provided and plumbed in series to minimize damage in the event of contact with immovable obstructions. Reversing mechanisms can be specified that either remain attached to the vehicle and enable disconnect of the plow drive frame and moldboard without hydraulic disconnect of the reversing mechanism, or that remain attached to plow providing a cleaner face to the carrier vehicle for use other capacities.

Caster Wheel Assemblies: The caster assemblies shall be single or dual wheel type as specified by the user. Caster wheels shall be rated by the manufacturer for the weight loading and operating speed of the plow. Casters shall be capable of 360-degree rotation and equipped with spring loaded adjustable brake dampeners to minimize wobbling. Vertical adjustment shall

be accomplished through a caster barrel arrangement provided for each caster assembly. Infinite adjustment within the range of adjustment shall be accomplished by means of a stainless-steel screw adjustment rod of sufficient diameter to provide the strength required to support the weight intended. Typically, the screw adjustment rod shall be minimum 1-3/8 inch diameter stainless steel threaded rod.

Hydraulic Controls: Operation of the plow functions is accomplished through the use of hydraulic control valves activated by an electric over hydraulic system, with no high-pressure hydraulics in the cab. Pump and control valves must be adequately sized to operate all plow and carrier vehicle accessories (spreader, liquid system, dump box) functions. Controls must be conveniently located in vehicle cab within easy reach of operator and must be clearly and permanently marked.

Support Stands: The power reversible plow shall be equipped with support stands to assist in holding the plow upright and steady when decoupled from the carrier vehicle and to assist in positioning the plow for easy when re-hitching before use. Such stands shall be of sufficient strength to hold the plow's weight in the appropriate position and attitude during hitch and unhitch. They shall be equipped with a means for stowage out of the way during plow operation by means of a positive locking pin. The design of the stands and locking device shall also allow positive locking in the deployed position.

Warning Labels: Permanent labels are required at all pinch points on hitch and plow, torque at side plates, and any other appropriate instructions.

Paint: Paint shall be in accordance with FAA AC150/5210-5B Painting, Marking, and Lighting of Vehicles on an Airport.

RUNWAY BROOM WITH AIR BLAST SPECIFICATIONS

Runway Broom with Air Blast: Anticipated uses and/or features of broom with air blast: 18' Tow behind sweeper with air blast for High speed sweeping of Runways, Taxiways, and Ramps. Broom setup with a 46" diameter core for longer broom life. The combination of plow, broom and air blast are used for clearing sand, snow, slush and debris prior to application of de-icing product. Runway broom with air blast must comply with SAE ARP 5564.

Size of Priority 1 paved area to be swept: Primary surface areas to be swept total 1,445,875 SF.

Time required to sweep primary surface area: 60 Minutes.

Sweeper Speed needed to meet clearance time: 30 mph.

Type of sweeper desired: Tow behind Stowing In-line. Direct dual pintle hook with jack stand.

General Description: This airport runway broom will be primarily used in the sweeping and cleaning of snow slush and ice from airport runway, taxiway, and ramp areas. The broom must be manufactured expressly for airport pavement sweeping. All items of design and equipment not listed in these specifications, but involved in carrying out their intent, are required to be furnished the same as if these items were specifically mentioned and described in these specifications. Components shall be new, unused, of current production to the satisfaction of the purchaser. They shall be free of all defects and imperfections that could affect the serviceability of the finished product. Components should be readily accessible for repair and replacement, with minimal removal or disturbance to adjacent parts or components. Designs must use components within their rated values. Parts which are exposed to wear shall be capable of being replaced. Regular maintenance and servicing should be readily accomplished under normal working conditions. All broom components shall be designed to provide continuous service under difficult working conditions in -20 degrees F to +100 degrees F weather conditions or as specified without degradation of performance. The broom shall be designed to allow bristles to be easily replaced once worn or damaged. When mounted on a carrier vehicle, no components of the broom shall interfere with the servicing and maintenance of the carrier vehicle. The broom shall have the ability to remove snow, ice, slush, sand and other debris at the rated speed, capacity, and conditions per the following:

1. The broom must be able to move 3 inches of snow at 15 pounds per cubic foot at the rated vehicle speed and full swept path. And,
2. The broom must be able to move 1 inch of snow at 40 pounds per cubic foot at the rated vehicle speed and full swept path.

Tow broom frame: The tow broom chassis frame shall be fabricated from heavy gauge tubular, channel or wide flange sections reinforced as required to minimize loading distortion. It

shall have gussets front to rear at each welded joint. It shall be designed to minimize flexing and bouncing bounce.

Axles for the broom frame shall be rigid suspension (no springs) type and shall use a standard truck axle and air brakes (or electrical, user to specify) for ease of service and parts availability. The axle, wheels and tires manufacturer's published rating shall at least be equal to the load imposed at the maximum load configuration. The equipment shall not overload the rating of the frame, axles, wheels, tires, or steering.

The suspension shall be rigid (no springs). All tires and wheels on the unit shall be interchangeable. The system will use air brakes. Air brake units shall have ABS brakes, FMVSS 121 compliant for trailers.

The hitch to the towing chassis shall be: Dual pintle hooks with draw bar with height adjustment for chassis frame leveling and hydraulic jack stand for ease of hooking up and detaching. Two pintle hooks shall be supplied and installed by the user at the rear of the towing chassis.

When trailer steering is specified, the brush must follow in the plowed path at all times. There shall be provisions for centering and disengaging the axle steering system from both the main (cab) and service control consoles. There shall also be a provision for constantly and automatically recentering the steering system during operation to accommodate any drift in the system.

The lighting system, including reflectors, markers identification and clearance lights, shall conform to FMVSS 108 as though the vehicle were an on-highway vehicle. Lighting shall be an all LED sealed wiring lighting system for reduced maintenance costs and improved lighting system reliability. In addition, task-oriented lights, and other lighting shall be furnished to help the operator identify the overall width, and when practical to project a beam or light pattern on the ground in front of the broom to assist the operator in determining those areas to be cleared and to provide adequate illumination for the operator and service personal when the unit is on darkened aeronautical areas.

In addition, at a minimum one high mounted stop light and a back-up alarm shall be provided.

Backup Lights: There shall be at least two backup lights installed at the rear of and at either side of the vehicle that will automatically be activated when the vehicle is shifted into reverse gear.

Vehicle Safety Identification Lights: The vehicle shall have a minimum of one revolving yellow beacon or flashing strobe mounted on its uppermost part (see FAA AC 150/5210-5B, Painting, Marking and Lighting of Vehicles on an Airport). The light emitted from the beacon should not reflect off rearview mirrors and into the operator's eyes.

An SAE 7 pin or 7-wire flat prong (type must be specified) trailer connector shall be supplied and installed by vendor at rear bumper of the towing chassis by the user.

The wiring for broom controls, which shall be a harness with weatherproof and structurally sound connectors at both the cab and rear bumper, shall be supplied and installed by the manufacture. Trailer lights connector and the broom controls connector cannot be interchangeable.

Broom Engine Assembly (or Power Supply): The broom engine manufacturer and broom manufacturer shall provide an application approval, at the time of sweeper delivery, which states the engine is suitable for use in the broom as configured and that the installation is approved by the engine manufacturer. The engine shall develop sufficient torque and horsepower to meet the operational requirements of the broom. It shall be of internal combustion type. It shall meet current (at time of build) federal emissions standards and local requirements as defined by the user. It shall be 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. The diesel engine shall be designed and tuned for operation using ASTM D975-93 Standard Specifications for Diesel Fuel Oils, unless otherwise specified by the user, at the performance characteristics specified herein. Engine noise and vibration shall be minimized for the operator by use of best engineering practices and machine layout. The brush and air blast must be designed to efficiently utilize the rated engine horsepower.

The engine shall be provided with a full-flow replaceable oil filter and bypass filter and an air intake with a three-stage air cleaner. A filter restrictor indicator with tattletale features shall be supplied.

- External turbine type pre-cleaner or other means to prevent snow ingestion into the air cleaner
- Internal fixed vane centrifugal pre-cleaner
- Primary dry element and safety element

The engine shall be equipped with an efficient and safe exhaust system including mufflers. Its location shall minimize noise and exhaust gases entering the vehicle cab under all operating conditions. Noise reduction by noise suppression materials, such as muffler insulation, is encouraged. Horizontal portions of exhaust systems shall be protected, whenever possible, from corrosive agents and fuel spills. Mufflers and exhaust components positioned in or near normal operator work areas shall include appropriate guards to minimize the burn risk to airport personnel. Exhaust systems shall be positioned on the vehicle in a manner to minimize contact with slush and snow. Muffler(s) are to be made of aluminum, aluminized steel, stainless steel, or materials coated with ceramics. Devices shall be installed to prevent snow and slush from entering vertical exhaust stacks. Purchaser may specify the location and direction of exhaust system discharge when appropriate for storage building ventilation systems or other operational needs.

The engine cooling system shall be based on either a liquid or forced air design. Internal temperatures of liquid cooled engines shall be controlled by a by-pass thermostat that regulates

the flow of engine coolant. Drain cocks shall be installed at the lowest point of the cooling system and at other points necessary to completely drain the system. A sight glass or other device is required in all liquid cooling systems to allow the operator to determine that there is sufficient fluid for normal and safe operation without the need to open the system. Coolant shall be per engine manufacture recommendation and approval. A tag or label shall be supplied at the fluid servicing point indication proper coolant.

The design and installation of the system shall assure that coolant temperatures shall remain within the engine manufacturer's operational specification (both high and low) when properly maintained and operated in ambient temperatures during snow removal operations. In areas which frequently experience temperatures below 0 degrees F and/or units stored outside, cooling system heaters, oil pan heaters, lubricating oil heaters, battery heaters, and cold start aides are required unless otherwise specified.

Engine speed shall be regulated by a governor set to provide the maximum operating speed recommended by the engine manufacturer.

An engine's lubricating system shall be equipped with standard production fittings and accessories. Engine oil filter(s) shall be engine manufacturers approved design and able to accept commercial replacement elements. All engine(s) shall receive lubrication prior to delivery with lubricants designated for use under rated temperature conditions. The unit(s) shall be tagged to identify the proper lubricants and their temperature ranges.

An automatic engine protection system to prevent engine damage due to low engine pressure, high coolant temperature, or low coolant level is required. A provision for the emergency movement of the unit from a runway or taxiway must be provided.

Fuel System: The fuel system shall comply with Title 49 and include all components necessary for a complete operational system.

Fuel Tank(s) and Lines: Useable fuel capacity should be no less than an 8-hour supply unless the user requires a longer period. Engine literature shall be provided in the bid package that includes certified fuel usage rates. For estimating purposes, useable fuel capacity may be calculated using the value of: (total maximum brake horsepower for all engines) x (0.055 gals/hr/bhp) x (desired operating hours) x (0.5 for a 50% load factor). If dual tanks are used, the supply system shall be designed to ensure an uninterrupted flow of fuel to the engine(s) without input by the operator, and to allow shutoff of each tank should the crossover lines (or either tank) be damaged. Dual tanks shall also have adequately sized crossover lines to allow refilling both tanks from one location. Fuel lines shall be securely fastened in place, installed to prevent chafing or strain and protected by grommets where lines project through metal apertures. Each fuel tank is to be equipped with an accessible bronze or brass drain plug or a quick drain. A properly rated fuel water separator with integral heater shall be installed in an accessible location in the engine compartment or near the tank. If the engine requires a boost pump to assure adequate fuel flow to the engine, a pressure-operated switch with in-cab warning light shall be furnished to warn the operator of low boost pump pressure. The boost pump should be installed to shut off when the engine is turned off, or to have an emergency shutoff switch or circuit breaker located near

the light to allow the operator to shut off the boost pump in the event of fuel leakage downstream of the boost pump.

Fuel Filler Pipe: The fuel filler pipe(s) shall be located outside of the vehicle cab preferably accessible from the ground. A light chain shall be attached near its opening and to the filler cap to prevent loss of the cap. The filler neck shall include a screen to prevent the entry of foreign objects into the tank. 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). If fuel fillers are not installed on both sides of the vehicle, a label shall be installed in the cab near the fuel gauge indicating which side of the vehicle must be positioned towards the fuel pumps (e.g., Fuel Fill).

Electrical System: The electrical system shall be negatively grounded and installed in accordance with current state-of-the-art practices and appropriate Federal requirements. All vehicle wiring shall be in accordance with J1292. All broom electrical equipment, components, and wiring shall meet the requirements set forth in ARP1247, latest revision. All parts of the electrical system shall be waterproof, 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 by 10%. Insulation of electrical wiring shall be equal to the recommended standards established for insulation materials by the Society of Automotive Engineers (SAE). All wiring shall be either harness, cable, split loomed, or shrink-wrapped. All wiring shall be color-coded or wire numbered matching drawing schematics and terminal strip, and labeled every 3 inches as to what it is used for. The gauge wire and processes shall be in accordance with common wiring practices, SXL insulation type. The wiring codes shall match information to be provided in the supporting service manuals.

All vehicle components and systems shall operate without being affected by interference damage or disruption including detrimental effects or interference to on-board computer modules from either vehicle generated noise, or stray EMF or RMF fields encountered from any airport operations. EMF and RMF noise sources that may be generated by the vehicle, especially if such noise is detrimental to aircraft, Air Traffic Control, or air navigation equipment, shall be shielded.

When required, the broom shall be equipped with self-regulating electric alternators having an output capacity that exceeds the anticipated electrical load by 20% at idle. An electrical load analysis worksheet shall be provided to the purchaser prior to construction showing the electrical loads during the above described conditions.

When required, the batteries shall be securely mounted and adequately protected against physical injury, water, chemicals and exhaust heat. They shall be properly sized based on vehicle manufacturer recommendations and be readily accessible for change out and for other purposes. Enclosed battery compartments shall have adequate ventilation. Battery capacity (cranking amps, voltage, reserve power, continuous/deep cycle demand) shall be compatible with the size

of the engine and the anticipated electrical load expected under normal operating conditions. An on-board self-regulating battery charger may be specified by the purchaser. A battery master disconnect switch shall be provided with a means to secure it in the off position for servicing.

The vehicle shall have an electrical starter that shall not introduce a voltage drop sufficient to adversely affect the ignition system. It shall be equipped with an overload protection device if such device is available from the manufacturer of the starter. The electrical systems shall be 12 volt electrical and starting systems.

Sheet Metal Components and Accessibility: The engine and other components shall be positioned to allow easy access for inspection and maintenance purposes. Components that historically require frequent maintenance or those that have the potential to cause operational problems should particularly be located in unobstructed areas. Fluid capacities that must be checked during a pre-trip inspection, such as engine oil, engine coolant, hydraulic oil level(s), windshield washer fluid level, and diesel fuel level shall be visually observable or otherwise capable of being checked without the need for tools, and without requiring work stands, portable ladders, or other equipment to check the service levels. Lighting in these areas shall be adequate to perform the checks without the need for flashlights or other portable lighting. Cover plates shall be equipped with either quick disconnect latches or hinges. Locks, controls and latches shall be designed to prevent over-torquing.

Engine Enclosure: The broom engine, as well as all attached hydraulic, electrical, and mechanical components, shall be protected wherever practical from snow, rain, chemicals, and other winter elements. Enclosures may be fabricated from aluminum, fiberglass, steel and/or other durable material commonly used for this application. Self-tapping bolts are unacceptable in the construction of these enclosures. The enclosure shall be designed with openings which allow adequate cooling air flow to prevent overheating of the engine and other components. Adequate switched lighting shall be included. Drain lines shall be provided for engine oil, radiator coolant and hydraulic oil.

Steps: Steps, stairways, ladders, walkways, handholds, and handrails used to access the cab, maintenance areas, operation areas, or other areas of the equipment shall conform to the most recent additions of J185 – Access Systems for Off-Road Machines, using the “preferred” dimensions offered in this standard. When required, four-way ‘safety tread’ design steps shall be supplied to ascend and descend certain high-profile area. These steps, together with assist handles, shall be of ample size to ensure safe and easy access for persons wearing bulky winter clothing.

Walkways: A four-way safety tread design walkway shall be provided, as necessary, for access.

Handrails: Handrails shall be provided as required at all steps, walkways, and workstations. They shall be made of corrosion-resistant materials or otherwise treated to prevent corrosion.

Doors: Door openings of adequate size to facilitate equipment servicing shall be provided. Doors shall be equipped with a positive closing mechanism and, where appropriate, a locking mechanism. Top hinged compartment doors shall be held in the open position by a support arm(s).

Drains: Plugged or free flowing drains shall be provided at all body and compartment locations where standing water can collect. Free flowing drains shall not drain onto sensitive mechanical or electrical components or on areas anticipated to be occupied by personnel during normal operations.

Broom Hitch: The broom hitch shall be capable of sustaining all loads imposed during operation. It shall provide low friction and free flotation for the brush head for bounce and skip free operation. It shall allow the brush head to be independent, so the broom chassis does not induce bounce into the brush. The broom hitch shall have the necessary degrees of freedom to follow normal contours in the pavement and to accommodate surface irregularities, while sweeping at the rated speed, bouncing skipping, binding or sustaining damage. The broom oscillation shall provide true flotation left to right for the brush head. It shall have at least 8 degrees (+4, -4) of free-floating oscillation from left to right.

Brush Angle: The brush angling mechanism shall be power actuated and controlled by the operator. The brush shall be capable of swinging at least 30 degrees left and 30 degrees right from the straight-ahead position. Angling from full right to full left shall not take more than 10 seconds and shall not change the brush pattern. In between full left and full right, the pattern shall not change more than 50%.

Brush Elevation and Brush Pattern Adjustment: The brush elevation mechanism shall be power actuated and controlled by the operator, typically a joystick, which shall raise the brush off the surface and lower it for sweeping. The elevation mechanism shall have adequate stroke to achieve 4 inches of ground clearance with a new brush. The lift cylinders shall be equipped with a counterbalance valve, which prevents the brush head from creeping down.

An easily adjustable and accessible height adjustment that sets the brush pattern shall be provided. The adjustment, when preset, shall act as a stop for the elevation mechanism allowing repeatable pattern adjustment. A toggle switch near the adjustment for remote brush elevation control and pattern confirmation shall also be provided.

Brush Head: The brush head frame must sustain the loads imposed by the snow removal capacity of the unit. The brush head and air blast shall be hydrostatic drive with infinitely variable speed hydraulic pump(s) and fixed displacement motor(s) or as specified by the user. If gearboxes are used, they shall be made with precision gears, AGMA 10 rating minimum, and a method for checking oil level without the use of tools. Hydrostatic motor(s) shall be tightly coupled to the brush core shaft with no looseness in any connection. The connection must be capable of handling the loads imposed by the hydrostatics.

The brush shall be vibration analyzed at final inspection with report on vibration provided upon request.

The brush head shall allow an easy access for core and / or bristle replacement allowing repeatable location of brush centerline alignment during brush core remove and replace operations.

Brush Hood: The brush hood shall be fabricated from heavy gauge sheet steel or other durable material and securely fastened to the brush frame. It shall shield the top half of the brush completely and shall be non-clog design to prevent snow and ice buildup underneath the hood. It shall provide the necessary quick access to the brush for replacement of bristles and for inspection.

There shall be a device on the front of the hood to strip the snow from the brush, preventing snow carryover from the front of the brush to the back of the brush. It shall be the full length of the brush. The device must be easily adjustable to the brush diameter as the bristles wear.

The broom must have the capability to control the snow and ice once it is airborne. The snow must be put where and only where the operator desires and the operator must have visibility. The snow control device must be automatic or adjusted by the operator from the operator control station.

Broom Casters: The weight of the brush head shall be supported by swivel caster tire assemblies. They shall be mounted along the rear of the brush frame. The quantity of tires shall be commensurate with the loading from the brush head. The mounting position must be spaced for uniform weight distribution and shall track within the swept path of the brush. The caster tire assembly shall be capable of revolving a full 360 degrees or 270 degrees if the brush head raises automatically when reversing the vehicle. The caster assembly shall not bind or come into contact with the brush or any other surface of the broom throughout their full rotational arc. Loading and operating speed of the broom shall not overload the caster assembly manufactures rating of the entire caster assembly including the tires, wheels, hubs, bearings and shafts. To keep the caster assembly from shimmying, a shimmy damper device is required for each assembly. The mounting of the tire, wheel, hub, shaft and bearings must be quick change type for easy change while on the airfield.

Brush Bristles: The bristles for the brush shall be designed for runway operation and shall withstand the normal operation of the broom. They shall be made with adequate retention to keep the bristle from falling out, fatigue strength to keep them from breaking, and wear resistance for acceptable life. The bristles shall withstand storage temperatures ranging from -60 °F to + 160 °F and operating temperatures ranging from -40 °F to +125 °F, without functional degradation due to the environment.

Wafers, Flat: The bristles shall be fastened in a radial wafer fashion and shall consist of a steel support ring filled with steel wire bristles or polypropylene (poly) bristles. The wafers may

be separated by a steel spacer. Typical wafer bristles dimensions are: Outside diameter: 46 inches, Inside diameter = 19.50 +0.13 -0.00 inches.

The support ring for the wafer shall be made of coil steel, minimum thickness 0.048 inch with edge protection to protect bristle from premature wear and breakage. All joints shall be welded to ensure structural integrity. Each ring shall have steel drive pins to engage the sweeper core. These pins shall have a minimum diameter of 0.250 inch and 0.63 inches long with 0.50 inches of protrusion from the inside of support ring. One of the drive pins shall be installed at the center of overlap of support ring. The 46-inch wafer shall have not less than 4 drive pins spaced at 90 degrees around the inside circumference. Each wafer shall be marked on the ring to indicate the point of maximum static unbalance. The maximum static unbalance for any wafer shall be 50 oz-in.

The wire bristles shall be crimped and made of zinc galvanized drawn steel wire. The bristles shall have a minimum diameter of 0.0165 to 0.0180-inch nominal with minimum tensile strength of 325 000 pounds per square inch (psi). The bristles crimp shall be not less than 3 crimps per inch at amplitude of 1/16 inch minimum. The total weight of the 46-inch wafer shall be 10 pounds minimum.

The poly bristles shall be made from extruded and pulled strands. The material shall be virgin polypropylene with UV inhibitor. Typically, the bristles shall have an oval cross section not less than .060 x .090 inch with minimum tensile strength of 4800 pounds per square inch (psi). The total weight of the 46-inch wafer shall be 8 pounds minimum. The spacer ring which separates the wafer shall be made of coil steel with a minimum thickness of 0.048 inch. Forming the spacer shall create a flat bottom cross section with a welded overlap end seam to create adequate stiffness and strength to withstand the load imposed.

Brush Cores: The core shall be bearing supported and may be driven from either end, center, or from both ends. Each core shall be individually dynamically balanced by the manufacture at rated RPM. The bristles on the cores shall be full width to the rated length and replaceable. All steel on steel couplings of the drive and core must be replaceable hardened steel.

Wafers: The cores shall be made of tubular steel construction with four hardened steel (163 Brinell hardness minimum) drive bars, equally spaced to center each wafer bristle. The diameter which the four drive bars create must be such that the wafer bristle is easily installed and removed but not to allow movement of the wafer bristle on the core. The diameter of the core must also be industry standard for compatibility of various bristle manufacturers.

The provided cores shall be 50% poly, 50% steel. They shall be mixed poly, steel, poly, steel, etc.

Forced Air Blast: The system shall feature either a single or double inlet centrifugal blower. Unless otherwise specified, the centrifugal impeller(s) shall be hydrostatically driven including a variable displacement pump and fixed displacement motor(s). It shall be capable of varying its speed allowing blower speed from the operator station.

Air duct(s) shall be installed at the outlet of the impeller(s). Nozzles(s) shall be attached to these air duct(s). Nozzle ends shall direct the flow to one side or the other. When the brush is angled, the air blower direction shall be capable of automatically following, directing air perpendicular to the direction of travel and toward the direction of broom discharge. The nozzles direction control shall be interlocked with the brush head angle to blow in the direction of broom casting thus controlled by the operator's joystick. A separate control shall allow the nozzle direction opposite of the brush angle by choice. The controls shall permit blowing without broom operation. All controls for the air blast shall be operated from the operator station.

The air ducts shall retract within the width of the vehicle for transport and storage unless otherwise specified. There shall be 8 inches of ground clearance minimum when raised unless otherwise specified.

The impeller / shaft assembly(s) shall be dynamically balanced at the rated RPM. The velocity and CFM at each nozzle shall be certified by an independent test facility and supplied with the bid.

Volume 23,000 CFM @ 400mph.

Hydraulic System: The hydraulic system shall consist of appropriate rams, pumps, piping, fittings, valves, controls, fluid reservoirs, filters, coolers, and other parts essential to its full operation. The system shall be capable of hydraulically positioning equipment through the entire range of its design limits. It shall be capable of operating all controls simultaneously without a detrimental reduction in power response.

All controls shall be located in the vehicle cab. All hydraulic functions of the broom shall be electric over hydraulic valving. Connectors to the solenoids shall be interlocking type to provide a secure connection, which can withstand normal pressure washing procedures. All positioning functions (for example but not limited to: brush head lift, brush head swing, deflector, and air nozzle lift) shall be equipped with a position locking system as necessary to prevent unwanted movement. There shall be no hydraulic lines within the operator station.

The system shall be ruggedly constructed and able to withstand all imposed loads. It shall maintain operating temperatures suitable to all system components throughout normal operating conditions. The hydraulic system shall meet the same low temperature requirements as the engine coolant system.

Filters within the hydraulic system shall conform to the Society of Automotive Engineers (SAE) Information Report, SAE J 931- Hydraulic Power Circuit Filtration. Proper filtering shall be done on both the high pressure and low-pressure circuits. There shall be a 5-micron absolute rating on the hydrostatic pumps' filters and placed in the charge pressure lines. There shall be a clogged filter indicator light at the operator's station indicating filter replacement. Shut off valves for all filters below tank fluid level shall be installed to allow filter changes with minimal loss of oil.

All hoses for all systems shall be properly sized and strength to work with the pressure and volume of oil required and have the appropriate temperature ratings for the climate conditions in which they will be used. 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 required, hoses should be equipped with quick couplers as necessary to facilitate rapid removal and attachment.

The hydraulic fluid tank shall have; a filler neck with a strainer, a drain plug, a shutoff valve, an air vent and baffles. Its capacity shall exceed the volume of oil required for the operation of any combination of attachments by 50 percent. A sight glass shall be provided to allow the operator to verify that fluid level is sufficient for safe operation without the necessity of opening the system. A low oil level warning and engine shutdown device shall be provided in the cab. A high hydraulic oil temperature warning and engine shutdown device shall be provided in the cab. A low hydraulic oil temperature or high back pressure warning shall also be provided in the cab.

Controls and Instrumentation: All controls shall be electric over hydraulic type. All instruments and controls shall be labeled in a manner to remain legible for the life of the unit and shall be illuminated. The operator station shall be conveniently mounted in-cab, user friendly and easily accessed by operators wearing heavy winter clothing. Frequently used instruments shall be located in direct line-of-sight and within forearm reach of a medium-sized person sitting in the operator's position. The controls shall allow the operator to direct all functions required to fully operate the equipment. Gauges showing fluid pressures, temperature, and warning readings shall also be furnished. Instruments should display urgency-of-action lights, i.e., green for normal operation, amber for warning, and red for emergency. Instruments shall be illuminated by background lighting regulated by dimmer switches capable of providing infinitely variable lighting intensities. Circuit breakers shall be grouped for easy access and convenience.

The operator's control shall have diagnostic capabilities for the broom, broom engine, and air blast. It must incorporate automatic diagnostics which displays what is wrong with a particular system. All systems for the broom and broom engine must be part of the diagnostics.

The operator's control in the chassis cab shall have all the necessary functions to operate the broom and air blast and shall have the following:

System On / off (keyed)

- Joystick for lift/lower and left/ right swing. The brush swing lift and blower nozzle shall have automatic one touch for cycle control. This allows the operator to have hands free operation during cycle movement. Moving the joystick in the opposite direction can reverse the cycle. An additional switch shall allow the operator to use the automatic control or disengage the system.

- Engine oil pressure with visual and audible warning alarms
- Engine coolant temperature with visual and audible warning alarms
- Hydraulic oil temperature with visual and audible warning alarms

- Fuel level with low fuel visual and audible warning alarm
- Low coolant level alarm
- Engine tachometer
- Voltmeter and warning indicators
- Alarms for engine diagnostics and visual warning indicators and displayed faults.
- Lights On / Off
- Deflector Up / Down
- Mode Auto / Manual
- Brush On / Off and speed adjustment
- Blower On / Off and speed adjustment
- Engine hour meter
- Brush down and operating hour meter for determining brush life
- Single circuit breaker with Master Battery disconnect
- Rear vision camera monitor if specified.

An additional “service” control station shall be supplied unless otherwise specified, at the broom engine assembly when the broom engine is not installed on the carrier vehicle such as a tow broom. This service control station shall have all of the same features as the main operator’s control in the chassis cab. In additions it shall have a selector switch for main or service controls station. The service control station shall have engine speed control priority over main control station.

Finish and Paint: The broom shall be painted Chrome-Yellow in accordance with FAA AC 150/5210-5B: Painting, Marking, and Lighting of Vehicles on an Airport or as specified. The rear of the broom head on a front mounted broom shall have a non-glare finish to reduce glare for the operator or as specified. Other configuration brush heads can have a non-glare finish.

All equipment shall be cleaned first, then treated as necessary per coating manufacturer’s recommendations with; corrosion inhibitor, primer, putty, sanding, and finally, the finish coating process. The coating of customer specified color shall be applied per the coating manufacturers approved process and shall consist of polyurethane enamel, acrylic enamel, acrylic urethane, or similar high durability, long life coating having a combined thickness per the manufacturer’s recommendations.

The finished paint shall be free of “fisheye,” “orange peel,” chips, runs, or other imperfections that detract from the equipment’s corrosion resistance and appearance.

Technical Publications: The manufacturer shall furnish two complete sets of manuals. One in hardcopy form and one in electronic format. The set of manuals shall consist of:

- Operation, Maintenance, and Troubleshooting manual,
- Supplied equipment manual,
- Parts manual identifying every part on the unit both in parts list form and exploded view or schematic form in the case of electrical and hydraulic.

Delivery, Start-up and Training: The unit must be fully assembled and tested prior to delivery. The manufacturer is responsible for the safe and timely delivery of the broom and its accessories, spare parts, and tools to the place of delivery.

The manufacturer shall, at no additional cost, furnish the services of trained personnel to the purchaser at a time and place agreed to by all parties. A qualified factory representative must fully install, start-up, and test the unit prior to training. Training shall be performed by a factory trained and authorized technician. The training shall be performed at the customer's site and shall be 4 hours for operators training and an additional 4 hours for mechanics training (mechanics shall attend the operating training first). The purpose of this training is to review safe and effective procedures for use and maintenance of the machine, review and test all systems, assure the full function of the machine.

Warranty: The equipment provided shall be warranted against defective materials and workmanship for a period of 12 months after the machine is delivered. Warranty includes replacement or repair of defective parts or material and the associated labor to perform the repairs

Other:

1. Broom Core shall be two abutting sections.
2. Broom Shaft Torque shall be 4800 Ft-lbs. at Maximum hydraulic pressure of 5075 psi.
3. Brush Shaft Speed (RPM) shall be 600 RPM minimum.
4. A hydraulically operated snow deflector shall be mounted on front of broom head.
5. Spare Broom Core. One Spare Broom Core shall be provided, 2 (Two) Pieces.

Optional equipment:

1. Any required specialized tools, not including computers and engine diagnostic machines.
2. LED marker lights located per SAE ARP 5564. An automatic lubrication system for all possible points.
3. Bristle Tip Speed (MPH) shall automatically self-adjust with vehicle speed and broom wear.
4. 20-pound Fire Extinguisher. Mounted outside of the engine housing.
5. Foreign object debris (FOD) pickup box with cab controls.

LIQUID DE-ICER SPECIFICATION

General: The material spreader will provide the Airport with the ability to apply a continuous, unrestricted, accurately metered flow of liquid deicers/anti-icers per AC 150/5160-20 to a pavement surface over a predetermined spread area. The vehicle and its components must be designed and manufactured in the United States in accordance with Buy American Requirements.

Performance Requirements. The material spreader shall be slip-in type spreader to fit the bed of the carrier unit with a Boom-less spray bar assembly. A tank for the liquid deicer agent and pump system shall be mounted to the carrier vehicle between the fifth wheel hitch and engine compartment.

1. Specific performance requirements for the material spreader include:
 - a. Liquid spreader swath shall be 20 ft. minimum spray bar
 - i. The stainless steel, boom-less, hands free spray bar shall provide for a spray path of 20 feet by way of evenly spaced spray nozzles along the horizontal run of the spray bar, and additional spray nozzles on upright pipe stands at the outer width of the vehicle.
 - b. Liquid deicer agent used on the airport is potassium acetate.
 - c. Agent pump must be hydraulic driven and have sufficient capacity for full width spraying at a discharge rate of at least 1.5 gallons per 1000 square feet while operating at 25 mph.
 - d. Boom less spray bar functions and application rate shall be selectable from inside the cab via the main vehicle control display.
 - e. Control system shall be open loop electronic design to automatically adjust flow rate for fluctuating vehicle Speeds
 - i. Constant pump discharge pressure shall be maintained electronically.
 - f. Tank, Pump, plumbing systems
 - i. Liquid material tank shall be constructed of grade 304 stainless steel or better.
 - ii. Interior tank baffles are required. Optional construction, using polymer or fiberglass materials, is acceptable providing that the manufacturer certifies the materials used meet the same stress and fatigue requirements as stainless-steel counterparts.
 - iii. The shell, head, and baffles of steel tanks with a capacity of 1000 gallons or less must be made of at least 12-gauge material.
 - iv. A visual quantity gauge or gallon markings shall be designated on the agent tank side
 - v. All plumbing fittings and valves that are exposed to de-ice agent will be constructed of glass- reinforced polypropylene or stainless steel, labeled, installed in location easily accessible to operator.
 - vi. All fittings must be sized to accommodate maximum flow requirement and plumbed with flange fittings where possible for ease of maintenance.
 - vii. System valving shall include provisions for recirculation of agent to the tank.
 - viii. Spray nozzles must be located to provide uninterrupted surface coverage with

easy maintenance access.

- ix. Serviceable mesh style filters must be installed on lines leading to the spray nozzles
 - x. Check valves to be plumbed in line with each nozzle.
 - xi. A serviceable mesh strainer shall be installed between tank and pump
 - xii. A ¼ turn shutoff valve shall be installed between the tank and pump
 - xiii. All fittings must be sized to accommodate maximum flow requirement. A 1 ½” dry break coupler shall be installed at the truck/trailer connection point to minimize agent spillage.

The system will be capable of self-loading liquids from a ground-based tank. A 2” cam-loc female coupler with plug shall be provided to fill the tank from the ground. Agent pump shall be of centrifugal type design. The hydraulic motor shall be directly coupled to the agent pump (no belt/chain drive).

Warranty: Standard Manufacturer’s Warranty