

MINNESOTA MULTI-PURPOSE STADIUM
MINNEAPOLIS, MINNESOTA

SECTION 112423

FAÇADE ACCESS EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Work of this section includes the design, supply, and installation of the façade access equipment (FAE).
2. This specification is intended to cover the performance requirements of the complete design, manufacture, and installation of the exterior FAE and all work and material necessary to accomplish this complete installation, except that specifically excluded.
3. Any and all of the FAE which must be installed in related work executed by others shall be identified and listed.
4. Provide proposal drawings with tender which clearly delineate the nature and scope of submittal, including the method and total equipment required to clean all exterior surfaces of the building.
5. Notwithstanding any reference in this performance specification to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number, such references shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The FAE Contractor, in such cases, may at his option use any article, device, product, material, fixture, form, or type of construction which, in the judgment of Owner, Architect, and Consultant expressed in writing, is equivalent to that specified. For final dimensions of architectural, structural, mechanical, and electrical elements see the Construction Documents.

1.3 RELATED WORK TO BE PROVIDED BY OTHERS

- A. Unloading and hoisting of equipment to multiple roof levels.
- B. Protected mainline power and weatherproof, twist-lock receptacle to suit FAE requirement power outlets based upon house power.
- C. Temporary power as required to install, test and adjust the equipment.
- D. Fresh water supply (frost proof hose bibs).

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- E. Roof Slab
- F. Catwalks
- G. Flashing
- H. Sealants
- I. Sufficient structure for connection to FAE systems.
- J. Curtain wall specifications.
- K. Cast-in-place concrete, including installation of embedded items.

1.4 REFERENCES

- A. All work and FAE, its performance, use, inspection, testing and maintenance shall comply with the most stringent requirements of all applicable standards, including but not limited to the most recent amendment of the following:
 - 1. AISC "Load and Resistance Factor Design Specification for Structural Steel Buildings. ", including the "Commentary" thereto.
 - 2. AISC "Code of Standard Practice for Steel Buildings and Bridges",, including the "Commentary" thereto
 - 3. AISC "Manual of Steel Construction, Allowable Stress Design."
 - 4. AA ADM-1-Aluminum Design Manual; Aluminum Association; and AWS D1.2 Structural Welding Code – Aluminum.
 - 5. AWS D1.1 Structural Welding Code – Steel.
 - 6. ANSI/IWCA I-14.1 Window Cleaning Safety Standard (International Window Cleaning Association).
 - 7. ASME A120.1, Safety Requirements for Powered Platforms for Building Maintenance.

1.5 DESIGN REQUIREMENTS

- A. Design FAE system to suit building and in accordance with plans, specifications, codes, and standards contained in sections 1.2 and 1.5.
- B. Locate anchorages to suit suspension equipment that will be used on the building with respect to items such as reach, rigging, spacing, roof edge condition, and similar items.
- C. Design all anchor components to provide adequate attachment to the building and suited to current FAE maintenance practices. Ensure compatibility with industry standard equipment.
- D. Ensure all anchor components conform to proper engineering principles and have been designed by a Professional Engineer registered in the State of California and qualified in the design of FAE maintenance equipment, its application and safety requirements.

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- E. Design system fall arrest safety anchors and equipment supports to comply with the following structural requirements.
- 1.6 SUBMITTALS
- A. Provide a single DVD or CD and three (3) hardcopies of the following:
 - 1. Product Data: For each product indicated.
 - 2. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use room designations indicated on Drawings.
 - 3. Submit shop drawings showing complete layout and configuration of complete FAE maintenance system, including all components and accessories. Clearly indicate design and fabrication details, window "drops," hardware, and installation details.
 - 4. Shop drawings to include installation and rigging instructions and all necessary Restrictive and Non-Restrictive Working Usage Notes and General Safety Notes.
 - B. Shop drawings to be stamped by a professional engineer registered in the state of Minnesota, complete with calculations and/or test reports.
 - C. Operating Procedures Outline Sheet (OPOS)
 - 1. Submit electronic copy and three (3) hardcopies of an Operating Procedures (OPOS) and include all of the necessary elements in both pictorial and written form, to instruct employees in the safe use of FAE systems.
 - 2. Provide corporation of revisions as required to obtain approved OPOS from Cal-OSHA.
 - 3. Provide coordination with the building owner and maintenance group for the areas where FAE equipment is not being provided to ensure the OPOS captures the plan for safely cleaning all areas of the building.
 - 4. Ensure that the OPOS contains at least the following elements:
 - a. Isometric or plan view drawing of the building's roof, including the building's name, address, and the date the OPOS was prepared.
 - b. The drawing shall be legible and kept with the building's management office.
 - c. Identification of drop zones, recommended drop sequences, platform configurations, and specific building maintenance procedures including the equipment to be used. e.g. building maintenance unit (BMU), permanent roof rigged platform, ground rigged platform, davits, outrigger beams.
 - d. Identification of all anchorage points for personal fall arrest systems and FAE.
 - e. Identification of all personal fall protection requirements and, if applicable, procedures for securing equipment.
 - f. If applicable, identification of all dangerous areas on the roof by highlighting all of

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the "Danger Zone(s)" on the drawing(s).

- g. Description of the means and methods to be used to transfer equipment from drop location or between building levels.
- h. Identification of equipment limitations, load ratings, and special use conditions.
- i. Provisions for pre-operational, operation and maintenance inspections.
- j. Identification of the access and egress to the work locations and the storage area(s) for the permanent or transportable FAE.
- k. Indication of the location and the method of stabilization provided for the suspended equipment; and
- l. Emergency and rescue procedures, and means of communications to be used during such procedures; and
- m. Method(s) to be used to control employee exposure to falls while they are in the "Danger Zone."

1.7 QUALIFICATIONS

- A. Manufacturer: Work of this Section to be executed by manufacturer specializing in the design, fabrication, and installation of FAE maintenance systems having a minimum of 5 years documented experience.
- B. Loading and Safety Assurance: Work of this Section to meet the requirements of governing codes and jurisdiction and to comply with properly engineered loading and safety criteria for the intended use.
- C. Insurance: Manufacturer to carry specific liability insurance (products and completed operations) in the amount of \$5,000,000.00 to protect against product/system failure.
- D. Welding to be executed by certified welders in accordance with AWS requirements.

1.8 REGULATORY REQUIREMENT

- A. All work and FAE, its performance, use, inspection, testing and maintenance shall comply with the most stringent requirements of all applicable codes and jurisdictions, including but not limited to the most recent amendment of the following:
- B. Comply with the following OSHA regulations:
 - 1. 1910, Subpart D (Walking and Working Surfaces).
 - 2. Appendix C to 1910 Subpart F (Personal Fall Arrest Systems).
 - 3. 1910.66, Subpart F, Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms.
- C. Comply with all local codes and standards.

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1.9 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that develop visible defects within 2 years from date of Substantial Completion.
- B. Inspect the installed equipment at least two times per year during the warranty period and provide a written report documenting any deficiencies noted or recommendations for equipment improvement.

PART 2 - PRODUCTS

2.1 AVAILABLE MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following :
 - 1. Atlas Anchor Systems USA, Co.
18866 72nd Ave. S.
Kent, WA 98032
Telephone: 425-251-9480
Fax: 425-251-1491
 - 2. EW Cox USA Inc.
216 North Ave. East
Cranford, NJ 07016
Telephone: 908-325-6587
e-mail: jonathan.lin@coxgomyl.com
 - 3. Sky Rider Equipment Co., Inc.
1180 N. Blue Gum Street
Anaheim, CA 92806
Telephone: 714-632-6890
e-mail: martin@sky-rider.com
 - 4. Tractel Swingstage Division/South Central US
21210 Kelliwood Greens Drive
Katy, TX 77450
Telephone: 281-829-6655
e-mail: mike@tractelwingstage.com
 - 5. Winsafe
One Valleywood Drive, Unit 1
Markham, Ontario, Canada
L3R 5L9
Telephone: 905-474-9340
e-mail: hans@winsafe.com

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6. XS Platforms USA
30 Bellsmine Court
Chico, CA 95928
Telephone: 530-343-1400
e-mail: philshumway@xsplatforms.com

2.2 BASIS-OF-DESIGN PRODUCTS:

- A. The designs for products described in Part 2 are based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
1. Safety Tieback Anchors
 2. Monorails
 3. Horizontal Lifeline System
 4. Aerial Work Platform
 5. Permanent Powered Platforms
 6. Platform Stabilization (Tie-in Guides)
 7. Other Equipment/Accessories

2.3 SAFETY TIE-BACK ANCHORS

- A. Safety Tiebacks: Hot dipped galvanized per ASTM A123 or hot zinc flame sprayed per SSPC-23. Single tiebacks designed for 5,000 lb. ultimate load; double tiebacks designed for 10,000 lb. ultimate load.
- B. Safety anchor eye plate: Mild steel, Type A36 with minimum yield strength of 36 Ksi; includes sling link with 2" eye opening having rounded edges.
- C. Securement bolts: Mild steel, ASTM A307 with minimum yield strength of 60 Ksi; optional welding tiebacks in place.
- D. Pipe stanchion: Mild steel, ASTM A53 GRB with minimum yield strength of 35 Ksi. Wall thickness to suit application.
- E. Base plate: Mild steel as above with minimum yield strength of 36 Ksi. Thickness and securement to suit application.

2.4 MONORAILS

- A. Monorails and Mounting:
1. Designed to carry minimum vertical service load of 1,250 lbs.

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2. Monorail fabricated from aluminum extruded bars and shapes to ASTM B221, alloy 6061-T6.
 3. Install monorails plumb, square, parallel to soffit and free from defects which negatively affect appearance and performance.
 4. Mounting hardware fabricated from stainless steel bar stock, ASTM A276, type 304. 1.
 5. Mounting brackets to be spaced no greater than 10 ft – 0 in on center and maximum of 30 inches from the vertical façade. Façade access sub-contractor to coordinate with Architect and General Contractor on final design and installation of mounting brackets.
- B. Monorail Finish:
1. Exterior finish painted with two coats of machinery enamel, color specified by the Architect.
- C. Materials/Fabrication:
1. "C" type profile fabricated using extruded aluminum alloy to ASTM B221 "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire Profiles, and Tubes" for use on horizontal or inclined applications together with friction type or rack and pinion traversing trolleys.
- D. Monorail Capacity: Design monorail to carry the following loads:
1. A maximum vertical service load of 1,250 lbs. and an ultimate load of 5,000 lbs.
 2. A maximum horizontal service load of 150 lbs. and an ultimate load of 600 lbs. in any direction.
- E. Data Plates:
1. Monorail staging areas are to have non-corrosive equipment data plates which are prominently displayed and clearly state the equipment's maximum service capacity, manufacturer's name, date of manufacture, and product serial numbers.
- F. Trolleys:
1. Provide two trolleys per monorail track segment. Each trolley must have the capacity to suspend a minimum combined dead and live load of 1250 lbs.
 2. Trolleys to be equipped with heavy-duty rollers and two rigging points with minimum 2 inch eye opening.
 3. Trolleys must have secondary braking system to prevent unintentional movement in case of drive mechanism failure or loss of power.
 4. Design trolleys to run smoothly under load with minimum discontinuity at rail splices and provide end stops to ensure trolley cannot become detached from the rail unintentionally.
 5. Removable stops or access points to be provided so trolleys can be removed for service

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and maintenance.

2.5 HORIZONTAL CABLE LIFELINE SYSTEM

- A. Shall be hands free.
- B. Hollow Steel (HSS) Pier Supports: Galvanized mild steel as above. Sized to suit application and the maximum number of workers to be attached.
- C. Base Plate and All Other Sections: Galvanized mild steel as above Sized to suit application and the maximum number of workers to be attached.
- D. Securement Bolts: Mild steel, sized to suit application and the maximum number of workers to be attached, hot-dip galvanized to ASTM A123/A123M-2000.
- E. Continuous Attachment Horizontal Lifeline System:
 - 1. Cable: Type 316 stainless steel, sized to suit application and the and the maximum number of workers to be attached complete with permanently swaged cable ends.
 - 2. Data Plate: Cable system entry points to be equipped with prominently displayed non-corrosive data plate clearly stating Maximum Service Capacity and Number of Users.
 - 3. Standard Intermediate Support Brackets: Multi-position Type 316 stainless steel with reinforcing end caps and suitable for installation at any height. Secured using fasteners sized to suit application and the maximum number of workers to be attached.
 - 4. Mobile Intermediate Support Brackets: Multi-position Type 316 stainless steel for working both sides of sloped roof at ridge point.
 - 5. Corner Units: Manufacturer's standard 90° or 135° flexible corner units as required.
 - 6. End Terminal Hardware: Stainless steel swaged termination at one end and stainless steel tensioner with shock absorber at other end as required.
 - 7. Lanyard Cable Runner: For each system type, provide two (2) Type 316 stainless steel with automatic runner bypass for continuous "hands-free" operation that can be inserted or removed anywhere on the cable.
- F. Harness System:
 - 1. A minimum of two (2) manufacturer's standard full body harness with lanyards and shock absorbers sized for a fall arrest condition shall be provided.
 - 2. Lanyards sized for fall restraint condition are strictly prohibited..

2.6 AERIAL WORK PLATFORM (AWP)

- A. Aerial Work Platforms (AWP) and all similar aerial devices shall meet the design and construction requirements of ANSI92.2-2001, American National Standard for Vehicle-Mounted

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Elevating and Rotating Aerial Devices. For access to the exterior and interior of the building structure, the AWP must meet the following minimum specifications:

1. Working height = 180'-0"
 2. Footprint in working position = 15'-0" x 15'-0"
 3. Lift Capacity = 500 lbs
- B. Product must be manufactured by one of the following manufacturers or an approved equivalent:
1. Genie
 2. JLG
 3. Reachmaster
 4. Teupen

2.7 PERMANENT POWERED PLATFORM

- A. Provide one (1) Suspended Platform: Type 6061-T6 aluminum alloy modular platform system of engineered length and width to suit application based on load bearing frame, with non-slip, aluminum deck, soft rubber wall rollers, and tubeless tires compatible with all landscaping, roof tops, hardscapes, and grade changes.
1. Nominal Length: 5 feet
 2. Maximum Width: 30 inches
- B. Frame and Rails: Side frames and connecting frames to be structural aluminum; guard rails and guard rail posts to be square, thick wall aluminum extrusions with rails a minimum of 36 inches above deck level at working side of platform and 42 inches at non-working side. A 3½ inches high toe-board to be provided around circumference of platform with spaces between toe-board and guardrails covered with perforated aluminum screen, excluding front of platform between mid-rail and top rail.
- C. Stirrups: Hot-dip galvanized steel fitted with manufacturer's standard hoist unit, top limit switch assembly
- D. Wire Winders: Electric powered twin drum built into stirrups, to allow drums to wind evenly to prevent loose wires and jamming. Capacity and dimension to suit application.
- E. Cable Storage Bin: Fitted to rear guard rail. Capacity and dimensions to suit application.
- F. Upper Limit Switch Assembly: Fitted on top of each hoist. Designed to cut electric power supply to hoist when switch contacts striker plate on suspension rope at top limit of travel.

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- G. Electro Mechanical Overload System: Integral with each hoist preset to safe working load plus 25 percent. Designed to operate limit switch and cut power supply if overloading of platform should occur.
- H. Lower Limit Trip Bar Assembly: Consisting of hinged aluminum bar under working face of platform. Designed to operate limit switch and interrupt electric power supply to both hoists in the event bar is pushed upwards by any obstruction on the building façade during descent, but still allowing platform to be operated in upward direction.
- I. Main and Auxiliary Control Boxes: Electric control for both hoists and wire winder motors contained in central control box and mounted to rear guardrail. Standard layout to contain:
 - 1. UP/DOWN continuous pressure type buttons
 - 2. Hoist selector switch –dual
 - 3. Slack rope sensor
 - 4. Emergency stop button
 - 5. Slack rope/underload bypass
 - 6. Power on indicator light
 - 7. Three-phase protection and voltage protector with indicator light
 - 8. Overload protection
 - 9. Watertight electrical “quick” connections
- J. Hoist Unit: Platform to be powered by two UL listed traction type hoists with the following features:
 - 1. Hoist with minimum lift capacity for the required minimum weight and live load.
 - 2. To be powered by house current.
 - 3. Typical maximum speed: 35 feet per minute.
 - 4. Slack rope safety device acting on safety rope
 - 5. Electro-mechanical overload system
 - 6. Electro-mechanical main brake
 - 7. “No power” controlled emergency descent system
 - 8. Hoist protection cover
- K. Steel Wire Rope:
 - 1. Platform to be supplied complete with four galvanized high tensile steel wire ropes of

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length as required. Each rope to be fitted with thimble and a brazed "bullet-end."

2. Construction: 6 x 19 Seale & IWRC, standard diameter 5/16 inch depending on system loads.
- L. Electrical Supply Cable: Supply cable to be fitted with strain relief connectors.
- M. Dog line or attachment points shall be provided for securing safety lanyards and harnesses. Additional independent points shall be provided for the restraint of miscellaneous window washing equipment.
- N. Portable Fire Extinguisher: To be securely attached to platform.
- O. Accessories: Water container fitted at rear guard rail.

2.8 PLATFORM STABILIZATION (TIE-IN GUIDES)

- A. Intermittent Stabilization Anchors:
 1. Detent Pin Receptacle Type:
 - a. Locate as indicated on Construction Document drawings.
 - b. Receptacles to be stainless steel or other corrosion resistant material detent pin handles 5/8 inch diameter with spring loaded ball lock, to suit building façade.
 - c. Include sufficient quantity of adjustable stainless steel stabilizer ties.
 - d. The design load for stabilization components such as tie-in guides/buttons/detent pins are designed for a working load of four times the maximum anticipated load and a minimum of 600 lbs against fracture or detachment.
 - e. Bolts and other connecting hardware to be made of stainless steel or hot-dipped galvanized steel.
 2. ~~Angulated Stabilization: Where intermittent stabilization is employed, ensure a stabilizing force at the platform of at least 10 lbs is maintained under all conditions of loading.~~

2.9 OTHER EQUIPMENT/ACCESSORIES

- A. FAE Subcontractor to provide the following.
 1. All electrical controls, interlocks and attachments for a safe and efficient operation.
 2. Supply any and all items, in a quantity as specified of special rollers and any other items required for safe operation of the ladders and tiebacks.
 3. Confirm the size and location of electrical and water supply outlets.

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- B. Non- marking protective pads to span over/protect electrical floor boxes, portable ramps for navigating parking and working positions, and any items, in a quantity required for safe operation of FAE equipment.
- C. Communications Requirements: A two-way radio shall be provided for every manned platform.
- D. Wind Anemometer: A hand held wind anemometer shall be provided for every manned platform.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas upon which the work of this section depends. Report to the Contractor in writing defects of work prepared by other trades and other unsatisfactory site conditions which would cause defective installation of products or cause latent defects in workmanship and function.
- B. Verify site dimensions.
- C. Commencement of work will imply acceptance of prepared work.

3.2 HOISTING AND PLACEMENT

- A. All required FAE hoisting shall be provided.
- B. All moving and placement of FAE shall not interfere with any other.

3.3 INSTALLATION

- A. Install equipment in accordance with approved shop drawings and manufacturer's recommendations.
- B. Coordinate installation with work of related trades.
- C. Install all work true, level, tightly fitted, and flush with adjacent surfaces as required.
- D. Manufacturer to assist and/or supervise installation of window cleaning/suspended maintenance equipment installed by others.
- E. Structural steel shall be designed to receive safety tie back anchors or davit sockets/pedestals shall have adequate bearing surface as indicated on architectural drawings to ensure 100% weld or bolted connection.
- F. The contractor shall be responsible for all required equipment hoisting. The FAE Contractor shall be responsible for moving around his equipment at the site as required so as not to be in the way of any other construction.

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3.4 FINAL ADJUSTMENT AND INSPECTION

- A. Adjust and leave equipment in proper working order.
- B. Touch Up: After installation of all equipment, enamel painted areas shall be touched up as necessary to eliminate scratches and abrasions.
- C. Provide four sets of as-built drawings, in hardbound and electronic forms for the Owner and Building Engineer.
- D. Provide two sets of keys and any other special tools required to operate and maintain the equipment.
- E. Complete "Initial Inspection - Certification for Use" form included in Equipment Manual and Inspection Log Book.

3.5 TESTING

- A. The Contractor shall include in his tender the following:
 - 1. Load Testing:
 - a. Testing of each davit pedestal at two times the rated load.
 - b. Testing of each davit arm at two times the rated load.
 - c. Testing of each HLL stanchion at two times the rated load.
 - d. Testing of monorail at two times the rated load.
 - e. Testing of each powered platform at 125% hoist rated load.
 - f. One full height drop per platform configuration.
 - 2. Should the equipment not pass the required initial operational or acceptance testing, the manufacturer shall pay the reimbursable costs for the Consultant required for the re-testing program and a fee to the Consultant of USD \$1,500.00 per day.
 - 3. The manufacturer shall provide a minimum of three weeks' notice to the Consultant, Owner Representative, and Architect prior to scheduling the above tests.

3.6 DEMONSTRATION / COMMISSIONING

- A. Upon completion of the equipment installation, a team of competent workers, material, and instruments shall be provided by The Contractor to the Owner or his representative to make the following tests and inspections:
 - 1. Verify workmanship and equipment furnished and installed complies with the specifications.

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2. Conduct speed check with full load on the work platform.
 3. Demonstration, including maneuvering to all individual work locations.
 4. A word-by-word verification of the operation instructions.
 5. Certification from a Registered Professional Engineer in the State of Texas stating the entire FAE installation was successfully load tested as required per OSHA 1910.66, ASME A120, and local codes and standards.
- B. Final acceptance of the entire FAE installation shall be made only after all equipment has successfully passed the aforementioned inspection and tests and the certificate has been issued.
- 3.7 TRAINING
- A. The FAE Contractor shall provide one week of training to the Owner's maintenance team.
 - B. Provide hourly cost for additional training.
- 3.8 MAINTENANCE
- A. The FAE Contractor shall quote a maintenance fee to provide inspection, maintenance, and written report for a minimum of two times a year for a period of five years following the date of the completion certificate for the main contract.
- 3.9 SPARE PARTS
- A. The FAE Contractor shall provide a list of spare parts and consumable items with pricing and availability to the building owner/agent.
 - B. Any proprietary parts must be identified (gears, wire rope terminations, etc.) and stated as to whether or not the vendor will sell directly to the building owner/agent.
 - C. The FAE Contractor to include a recommended spare parts package in bid price.
- 3.10 SERVICE CONTRACT OPTIONS
- A. The FAE Contractor to identify service contract types: Sole Source vs. Open to Other Vendors.
 - B. Requires one-year and five-year maintenance agreements and define what is provided on a monthly, quarterly, and yearly basis.

END OF SECTION