

## DOOR ACCESS CONTROL SYSTEM STANDARD

### PART 1 - GENERAL

A. The conditions of the General Contractor (General, Supplementary and other Conditions) and the General Requirements are made part of this section. The complete installation shall conform to the requirements set forth by the National Electrical Code, all State and Local Building Codes as required by the "Authority Having Jurisdiction" and the requirements of the owner.

B. Case requires at a minimum that all exterior doors be equipped with card access or electronic door position monitoring.

C. All equipment and materials provided shall be new and unused and of the most current model or revision. All components of this system shall be installed in a workmanlike manner, following security industry "best practices" and in strict adherence to the manufacturer's specifications and applicable codes. Wire and conduit shall be installed consistent with Case building standards. [#1 - Door Detail #2 - Typical ACS Layout #3 - Installation Standards](#)

D. The Security System Vendor shall be responsible for all costs associated with the installation of this equipment.

### 1.2 WORK INCLUDES

A. Furnish and install all equipment, accessories and materials in accordance with these specifications and drawings to provide a complete and operating Door Access Control System.

B. The scope of work for the Electrical Contractor shall include, but not be limited to providing the following:

- 1 Raceway systems required for complete rough-in.
- 2 Communication field wiring outside the SER (Satellite Equipment Room).
- 3 120 volt emergency power, grounding, wire management raceways and fire resistant backboards located in the SER.

C. The scope of work for the Security System Subcontractor shall include, but not be limited to providing the following:

1. Local control panels within the SER.
2. Card readers.
3. Exit motion sensors.
4. Magnetic door locks.

5. Door monitor contacts.
6. Request-to-exit devices.
7. Sounders and key-switches.
8. Panic buttons
9. Termination of all field wiring including the card readers.
10. Termination of communication field wiring within the SER.
11. Testing and programming of local system.
12. Reprogramming of existing host computer.
13. Interface with ADA door operators where applicable.

D. Any material and/or equipment necessary for the proper operation of the access control system not specified or described herein shall be deemed part of this specification.

### **1.3 ACCEPTABLE MANUFACTURERS**

A. Acceptable representatives:

- Ken Minard, Resource One 1159 Dublin Rd Columbus Ohio Phone: (614) 485-4811 Cell (614) 425-1810 Fax: (614) 485-4848 kminard@rocs.com
- Martin Jeric, Doan Pyramid 5055 Corbin Drive Bedford Heights 44128 216-518-3813

B. All access control hardware and software shall be of a single manufacturer including controller panels, and input and output terminal modules.

C. All published specifications of the system manufacturer shall be considered as being a part of this specification, even though they have not been written in complete detail.

D. The base bid shall be based on the products specified. Any substituted product and/or system shall not be accepted without prior approval from the Owner within 10 days of bid date.

## **1.4 RELATED WORK SPECIFIED ELSEWHERE**

- A. Electrical General Provisions
- B. Basic Materials and Methods
- C. Fire-Stopping
- D. Door, door frame and door hardware shall be coordinated with Architect and Owner. All doors that are monitored or provided with access control devices shall be provided with mechanical panic hardware that has the ability to be manually locked in the event of failure by the Access Control System.

## **1.5 SUBMITTALS**

- A. Submittals shall include installation and wiring diagrams and instructions for installation, operation and maintenance, to be suitable for inclusion in the Maintenance Manuals.
- B. Submittals shall include a complete Bill of Material, identifying each component, counts, manufacturer, model number, and unit price, extended price per unit, materials and labor. Case Western Reserve University will review and must approve all submittals and the Bill of Material before equipment is ordered. Costs for shipping, handling, etc. shall be clearly defined as a separate line item.
- C. Submittals shall include descriptive literature for all system components, size and type of recommended conduit and wiring, and sequence of system operation.
- D. Submittals shall include testing and commissioning procedures for the specified system, including report forms that will be provided in a final commissioning report.
- E. Provide final commission report specified in 1.5 D.
- F. Submittals shall include battery calculations.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL PROVISIONS**

- A. Wiring tag requirements: all wiring throughout this project will be tagged using a numerical numbering system and be recorded in an Excel spreadsheet listing cable number, location, wire type, and function. A legend of wiring numbering scheme will accompany this spreadsheet. This document will be provided in both hard copy and electronically as an Excel spreadsheet.
- B. All low voltage control, data, and other cables will be terminated using terminal strips, with crimp type lugs, no "b style crimp connectors" or wire nuts will be allowed.

### **2.2 SYSTEM DESCRIPTION**

- A. The system shall allow for access to the facility by use of card readers at the locations

indicated on the Drawings.

- B. The system shall allow for monitoring of doors indicated on the Drawings.
- C. The system shall provide for computer based configuration so as to allow the greatest control of access both during configuration and ongoing operation.
- D. All Access Control System local control panels shall be located within the SER.

## **2.3 OPERATION REQUIREMENTS**

- A. The Access Control System (ACS) shall be capable of integrating multiple building functions including access control, alarm management and intrusion detection.
- B. The system shall be listed by Underwriters Laboratories for UL 294 Access Control Systems and shall carry the UL labels as required.
- C. Control circuits shall be low-voltage Class 2 type only.
- D. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of control panels, card readers, sensors, etc.
- E. The system shall incorporate the necessary hardware, software, and firmware to collect, transmit, and process alarm, tamper and trouble conditions, access requests, and advisories in accordance with the security procedures of the facility. The system shall control the flow of authorized personnel traffic through the secured areas of the facility.
- F. The user interface at the host computer (server) and at the operator workstation terminal computers shall be existing to remain.
- G. ACS shall interface with the building fire alarm system as supplied by others. This interface is to interconnect to the electromagnetic locking hardware power supplies to remove power from all electromagnetic locking hardware in the event of a fire alarm. This permits free egress from the facility on the event of a fire alarm.
- H. ACS shall interface with electric doors utilized for ADA access. This interface is to interconnect to the electric door contact in its respective control panel to provide opening of door when card reader is utilized.
- I. Installed ACS must interconnect with the request to exit devices and emergency exit devices as may be required by local code provided by the locking hardware supplier.
- J. Installed ACS must be capable of interconnection to the owner provided dedicated Ethernet LAN/WAN network for connection to remote building Main and/or Terminal Controllers.
- K. Where more than two door leaves are within a bank of exit doors, only two shall be provided with access control as specified herein. The balance of the door leaves shall be provided with magnetic door locks and door monitor switches only.

## **2.4 APPLICATION SOFTWARE REPROGRAMMING**

A. The existing application software in the host computer shall be reprogrammed to accommodate the local subsystem installed under this Contract.

B. The software reprogramming shall be Owner defined and shall include, but not be limited to the following:

1. Event Viewer, Event Archiving.
2. Time Zones.
3. Holidays
4. Door Access Group Privilege Levels.
5. Assigning Access Group Levels.
6. Door and Reader Configuration.
7. Request-to-Exit Input and Output Configuration.
8. Device Configuration.
10. Operator Interface, Alarm Handling and Overrides.
11. Facility Maps & Graphics.
12. Card Holder Database Configuration.
13. Personal Identification Numbers.
14. Duress Code.
15. Operator Privilege Levels.
16. Reports, Personnel Report, Event Archived History Reports.
17. Operator On-line Help.
18. Query Status of System Components.
19. Filter and Use of Filters.
20. Backup and Restoration.
21. On-line Maintenance.

## 2.5 HARDWARE REQUIREMENTS

A. Intelligent System Controller: [#4 - LNL-1000 cut sheet](#)

1. Lenel #LNL-1000 Intelligent System Controller (ISC) shall serve as the local access control CPU. Multiple combinations of Input Control Modules, Output Control Modules, and Card Reader Interface Modules shall be served by the ISC with operational characteristics as follows:

- AC input: 12 VAC+/- 15%, 600mA RMS; DC input: 12VDC+/- 15%, 350mA.
- 3-volt lithium battery back-up, type BR2325.
- Operating temperature range: 0° to 70° C.
- Operating humidity range: 0% to 95%, non-condensing.
- Flash memory for real-time program updates.
- Up to 32,000 access levels.
- 255 Holidays with grouping.
- 255 Time Zones, each with 6 time intervals.
- Enhanced Anti-Passback capabilities.
- Elevator Control; support for 64 floors.
- Individual extended held open and strike times (ADA required).
- Alarm masking.
- Up to 6-digit PIN codes.
- Status LED's for heartbeat, upstream and downstream communication.
- UL 294 listed and labeled.

2. The ISC on-board memory shall be 4.0 MB, capable of storage for 350,000 cardholders and two million events online. Provide #LNL-1001MK expansion kit as required. Memory shall be expandable to 4.0 MB.

3. Each ISC shall be provided with built-in hardware to support hard-wired communications between ISC(s) of up to 4000 feet.

The ISC shall communicate upstream at 38.4 kbps via RS-232/RS-485 multi-dropped configurations, modem dial-up communications, Ethernet TCP/IP or Token Ring type networks.

Each ISC shall have four downstream 2-wire RS-485 channels or two 4-wire RS-485 channels.

Communications between the ISC and the Host Server shall be via Ethernet TCP/IP at 100Mbps.

4. A single ISC shall serve up to 64 readers or 32 devices. Each control module (#LNL-1100 or #LNL-1320) shall use one device address.

5. Provide a minimum of #18 AWG wiring for the power supply.

B. Input Control Module: [#5 - LNL-1100 cut sheet](#)

1. Lenel #LNL-1100 Input Control Module (ICM) shall provide high-speed acknowledgement of critical alarm points in monitored areas with operational characteristics as follows:

- AC input: 12 VAC+/- 15%, 350mA RMS; DC input: 12VDC+/- 15%, 500mA.
- 3-volt lithium battery back-up, type BR2325.
- Operating temperature range: 0° to 70° C.
- Operating humidity range: 0% to 95%, non-condensing.
- Grade B, A, and AA Line Supervision.
- Elevator Control; support for 64 floors.
- Status LED's for heartbeat and host communications.
- UL 294 listed and labeled.

2. The ICM shall have 16 configurable input control points and 2 output control relays. It shall support normally open, normally closed, supervised and non-supervised circuits. The input circuits shall be scanned using an analog to digital converter. The digitized input status signal shall be software monitored and controlled, so that each input point can be programmed as a supervised or non-supervised alarm point. The output relays shall be configured for fail-safe or fail-secure operation.

- Alarm Inputs: Two non-supervised inputs (normally closed contacts) for cabinet tamper and power fault monitoring. are. The inputs shall be shorted if they are not used.
- Alarm Outputs: Two Form-C relay contacts, 5A 30VDC or 125VAC, resistive.
- For Supervised Inputs, end-of-line (EOL) resistors shall be 1000 ohm, 1% tolerance. [#6 - EOL resistor diagram](#)

1 The ICM shall communicate directly with ICS either by 2-wire or 4-wire RS-485 communication. Provide Belden #9841 or equivalent for RS-485 (2-wire) communication and Belden #9842 or equivalent for RS-485 (4-wire) communication. Each ICM module shall be individually addressed for increased reporting capabilities from software applications.

2 Provide a minimum of #18 AWG wiring for the power supply.

C. Dual Reader Interface: [#7 - LNL-1320 cut sheet](#)

1. Lenel #LNL-3200 Dual Reader Interface (DRI) shall provide support for up to 64 access control card readers, keypads, or readers with keypads that use standard Wiegand Data1/Data0 or Clock/Data communications with operational characteristics as follows:

AC input: 12 VAC+/- 15%, 600mA RMS; DC input: 12VDC+/- 15%, 450mA.

3-volt lithium battery back-up, type BR2325.

Operating temperature range: 0° to 70° C.

Operating humidity range: 0% to 95%, non-condensing.

Status LED's for heartbeat and host communications.

UL 294 listed and labeled.

1 Lock, unlock, and facility code offline access modes shall be supported on all readers connected to the DRI. Each DRI shall support up to eight different card formats as well as issue codes for both magnetic and Wiegand card formats.

2 DRI shall interface with electric doors utilized for ADA access. This interface is to interconnect to the electric door contact in its respective control panel from a contact closure on the DRI.

3 As many as 32 DRI modules shall be capable of being multi-dropped up to 4,000 feet away from the ISC. The ICM shall communicate directly with ICS either by 2-wire or 4-wire RS-485 communication. Provide Belden #9841 or equivalent for RS485 (2-wire) communication and Belden #9842 or equivalent for RS-485 (4-wire) communication. Each DRI module shall be individually addressed for increased reporting capabilities from software applications.

4 The DRI shall include eight inputs that support normally open, normally closed, supervised, and non-supervised circuits. In addition, six output relays support fail-safe or fail-secure operation. [#8 - Typical 1320 Wiring](#)

a. Alarm Inputs: Two non-supervised inputs (normally closed contacts) for cabinet tamper and power fault monitoring. Eight supervised inputs to be used for Request-to-Exit and door status. Two programmable auxiliary inputs. The

inputs shall be shorted if they are not used.

b. Alarm Outputs: Six Form-C relay contacts, 5A 30VDC or 125VAC, resistive.

- 1 Provide a minimum of #18 AWG wiring for the power supply.
- 2 Contact protection circuits shall be used to prevent premature contact failure. Arrangement shall be per the manufacturer's recommendation.

D. Output Control Module: [#9 - LNL-1200 cut sheet](#)

1. Lenel #LNL-1200 Output Control Module (OCM) shall provide high-speed device control via relay operation with operational characteristics as follows:

a. AC input: 12 VAC+/- 15%, 350mA RMS; DC input: 12VDC+/- 15%, 500mA.

3-volt lithium battery back-up, type BR2325.

Operating temperature range: 0° to 70° C.

Operating humidity range: 0% to 95%, non-condensing.

Grade B, A, and AA Line Supervision.

Elevator Control; support for 64 floors.

Status LED's for heartbeat and host communications.

UL 294 listed and labeled.

1 The OCM shall have 16 programmable Form-C 5 A, 30 VDC contacts for load switching that can be configured for fail-safe or fail-secure operation. Each relay supports "On," "Off," and "Pulse" Lenel OnGuard software commands.

2 The OCM shall communicate directly with ICS either by 2-wire or 4-wire RS-485 communication. Provide Belden #9841 or equivalent for RS-485 (2-wire) communication and Belden #9842 or equivalent for RS-485 (4-wire) communication. Each ICM module shall be individually addressed for increased reporting capabilities from software applications.

3 Provide a minimum of #18 AWG wiring for the power supply.

E. Fire Door Release:

1 Power distribution to mag locks shall be via an Altronix MOM-5 PDM.

2 The Altronix MOM-5 shall also serve as the interface to the fire panel and is to be wired according to the attached drawing. [#10 - Fire panel interface](#)

F. Power Supplies:

1. Power Supply shall be Altronix ULX series and shall be rated 12 VDC with required output continuous supply current; 120 VAC input. Power Supply shall be UL listed.
2. The sum of the total device current requirements shall not exceed 80% of the power supplies continuous current output rating.
3. Provide enclosure with lock to house open frame transformer, power supply and UPS and UPS batteries.
4. Batteries shall be rechargeable sealed lead-acid type rated @ 12 VDC.
5. Provide sufficient batteries to back-up system for: 16 hours at academic and administration buildings.  
24 hours at residence buildings.
6. Provide separate Power Supply at each SER installation for:  
Local control panels and modules.  
Field devices.

G. Enclosures:

1. System logic boards shall be mounted in a LNL – CTX-6. [#11 - LNL-CTX6](#)

## 2.6 CARDS AND CARD READERS

- A. Cards shall be furnished and programmed by the Owner.
- B. Magnetic Card Access Readers: [#12 - LNL-2010 cut sheet](#)
  1. Provide Lenel #LNL-2010W-OH Card Access Reader shall be the bi-directional magnetic swipe only type with operational characteristics as follows:  
  
12 VDC, Track 2 magnetic readers that shall accept low and high coercivity magnetic stripe cards.  
  
Operating temperature range: -40° to 75° C.  
  
Operating humidity range: 0% to 95%, non-condensing; 100% standard.  
  
Extended Wear Read Head rated at over 1 million passes.

Fully weatherized metal casing shell; provide with weather hood on all exterior mounted readers #LNL-WS10.

Device shall be provided with an anti-corrosion primer and then finished with a abrasion resistant, textured finish; Color shall be beige or black as selected by the Architect or Owner.

UL 294 listed and labeled.

- 1 All readers shall be configured with the reader electronics mounted separately, on the "secure" side of the door such that only the reader head is mounted in the reader housing on the "entry" side of the door.
- 2 The reader shall communicate with the ISC through the #LNL-1320 DRI and shall interpret the Wiegand communication (Data 1/Data 0 or Clock and Data) from the reader and sends the signal back to the ISC via RS-485 communication.
- 3 The reader shall be provided with a tamper switch.
- 4 The reader shall be located no more than 500 feet away from the DRI.

#### C. Prox Readers

1. HID MiniProx [http://www.prox.com/prod\\_detail.php?prod\\_id=3](http://www.prox.com/prod_detail.php?prod_id=3)
2. HID Prox Pro [http://www.prox.com/prod\\_detail.php?prod\\_id=7](http://www.prox.com/prod_detail.php?prod_id=7)

#### **2.7 REQUEST-TO-EXIT DEVICE - PRIMARY**

- A. Provide an exit motion sensor which employs passive infrared technology to initiate door release. The device shall have an adjustable detector face to allow for precise pattern configuration and adjustment.
- B. The exit motion sensor shall operate at 12 VDC and shall have a SPDT relay for shunting alarm or access control wiring. The relay shall operate 50 milliseconds before the magnetic lock control device to suppress false alarms.
- C. Provide Securitron #XMS. [#15 - XMS Motion Sensor](#)

#### **2.8 REQUEST-TO-EXIT DEVICE - SECONDARY**

- A. Provide a hand operated request to exit device. Device type shall be specified by door by the Case security coordinator.
- B. Activating the device shall release a magnetic door lock and send a request to exit signal through a relay output. The release of a magnetic door lock shall be facilitated by breaking 12 VDC power within the security junction box as shown on the Drawings. The relay shall be DPDT, rated 1 amp at 24VDC.

- C. Provide Securitron #SP-1. [#13 - SP1 Touchpad](#) or Alarm Controls #PS2-111 [#14 - RTE Push Button](#)

## 2.9 MAGNETIC DOOR LOCK

- A. Provide 12 VDC electromagnetic door locks with 1600 lbs. of holding force.
- B. Locks shall not exceed 0.67 amps of current draw with residual magnetism within one second of 4 LBF, and inductive kick-back not to exceed 53 volts peak.
- C. Where required, locks shall include filler plates, angle brackets or glass door brackets as required for door and frame assembly as recommended by manufacturer. Coordinate installation with General Contractor and Architect.
- D. Provide Locknetics #390 Series. [#16 - Locknetics 390 Mag Lock](#)

## 2.10 DOOR MONITOR SWITCH

- A. Provide ¾ inch diameter recessed door switch set for door monitoring.
- B. Door switch shall be of solid construction with 12 inch #22 AWG leads.
- C. Color shall be white or mahogany as selected by the Architect or Owner. Coordinate installation with General Contractor and Architect.
- D. Provide Sentrol 1078. [#17 - Recessed Door Contact](#)

## 2.11 PIEZO SOUNDER

- A. Provide electronic piezo sounder at doors as indicated on Drawings.
- B. Sounder shall be 3 to 28 VDC and provide sound power output of 93dBA at 1 meter.
- C. Sounder shall be installed within a flush two-gang outlet box along with key switch to silence sounder. Provide #304 stainless steel coverplate and mount each device in ½ inch diameter knockout.
- D. Provide AMSCO #PAL-328N with Black Finish. [#18 - PAL-328 piezo](#)

## 2.12 SILENCE KEY SWITCH

- A. Provide key switch to silence piezo sounder. [#19 - Piezo & Key Switch Wiring](#)
- B. Switch shall be keyed for A126 key. Coordinate exact key requirements with Case security coordinator.
- C. Switch shall be installed within a flush two-gang outlet box along with sounder; see requirements above.

D. Provide C & K # Y100AA2C203NQ.  
<http://www.alliedelec.com/Search/ProductDetail.asp?SKU=676-4235&SEARCH=y100aa2c203nq&ID=&DESC=Y100AA2C203NQ>.

### **2.13 PANIC BUTTON**

- A. Provide panic button complete with keyed reset feature where indicated on the plans.
- B. Switch shall be installed within a flush one-gang outlet box. Switch shall be provided with a stainless steel backplate.
- C. Switch shall be provided with blue operator and "EMERGENCY" lettering.
- D. Provide STI #SS2400E. [#21 - Panic Button](#)

### **2.14 ELECTRICAL MATERIALS**

- A. Conduits and boxes shall be concealed and flush mounted. Interconnecting conduit and necessary pullboxes shall be run throughout the building in accordance with the NEC.
- B. Conduits shall be 3/4" trade size, minimum, unless otherwise noted on the Drawings or within these Specifications. Where sizes are not shown, conduits shall be as required to accommodate the number and type of conductors in accordance with the National Electrical Code wiring tables, but shall not be smaller than 3/4".
- C. Panel Backboards:
  - 1 Where indicated on the Drawings, mount equipment within the SER Room on a panel backboard. Backboards shall be 4 feet wide x 8 feet high x 3/4 inches thick AC plywood, painted with two (2) coats of fire retardant gray paint on both sides prior to installation.
  - 2 Backboard shall be mounted six inches above the finished floor with outlet boxes mounted at 18 inches above finished floor.

### **2.15 WIRE AND CABLE**

- A. Control wire for security device interconnections shall be multi-conductor cables, shielded stranded copper type with PVC jacket, UL type CMR. Provide West Penn or equal by Belden with sizes and color-coding as indicated below.
  - 1. To Card Reader: 8-conductor #22 AWG w/shield
  - 2. To Door Junction Box for field devices: 12-conductor #22 AWG
  - 3. To Magnetic Lock: 4-conductor #18 AWG

4. Between Fire Alarm Panel and ACS Panel: 4-conductor #18 AWG

[#22 - Wiring Color Codes](#)

Red/Black – Alarm Indication  
Green/White – Trouble Indication

## **PART 3 - EXECUTION**

### **3.1 ELECTRICAL MATERIALS AND METHODS**

#### **A. Wire and**

##### **Cable:**

Leave 8 inches free wire at all outlet boxes for wiring device connection.

Contractor shall provide ten (10) feet of extra ACS control cable at the ACS panel within the SER.

#### **B. ACS Control**

##### **Grounding:**

ACS control cable shall not be run with other system wiring in a common raceway. ACS

##### **Drawings:**

Connect all network system power supplies

### **3.2 TRAINING AND INSTRUCTION**

#### **A. Provide three (3)**

complete printed operational manuals in a format as provided by the equipment manufacturer. Instructions shall be simplified to permit operation of the system by non-technical personnel.

### **3.3 MOUNTING HEIGHTS**

#### **A. Drawings:**

The equipment height shall be as noted on the Drawings. Care must be taken to ensure that mounting heights set forth by the Americans with Disability Act (ADA) for said all control and communication items are met.

### **3.4 COMMISSIONING**

#### **A. equal:**

After all Work is completed, and prior to requesting the commissioning report specified in 1.5 D, here after known as the Acceptance Test, Contractor shall conduct a final inspection, and pre-test all equipment and system features required for project. Contractor shall correct any deficiencies discovered as the result of the inspection and

pre-test.

B. Contractor shall submit a request for the Acceptance Test in writing to the Owner's Project Manager, no less than fourteen days prior to the requested test date. The request for Acceptance Test shall be accompanied by a certification from Contractor that all work is complete and has been pre-tested, and that all corrections have been made.

C. During Acceptance Test, Contractor shall demonstrate all equipment and system features to the security systems coordinator. Contractor shall remove covers, open wiring connections, operate equipment, and perform other reasonable work as requested by the coordinator.

D. Any portions of the work found to be deficient or not in compliance with the Drawings and Specifications will be rejected. The security systems coordinator will prepare a list of any such deficiencies observed during the Acceptance Test. Contractor shall promptly correct all deficiencies. Upon correction of deficiencies, Contractor shall submit a request in writing to Owner's Project Manager for another Acceptance Test.

### **3.5 WARRANTY**

A. The Contractor shall guarantee this system in its entirety to be free from mechanical and electrical defects for a period of one (1) year from the date of the completed and owner approved acceptance test.

B. The Equipment Supplier shall make available to the Owner a maintenance contract proposal.

C. The Contractor's guarantee shall cover all costs associated with the troubleshooting, repair, and replacement of defective work, including costs of labor, transportation, lodging, materials, and equipment.

D. The Guarantee shall not cover any damage to material or equipment caused by accident, misuse, or unauthorized modification or repair by the Owner.

### **3.6 SERVICE CONTRACT PROPOSAL**

A. The bidder shall include an optional service contract proposal at the time of bid. The proposal shall include:

- 1 Respond to emergency service requests on-site, if required.
- 2 Replace or repair defective components as required.
- 3 Manufacturer's recommended preventive maintenance.
- 4 Second year and five year maintenance contract with the price shown for each year and all payment terms and conditions.
- 5 The service contract shall be optional and the Owner shall have the right to accept

or reject the contract, and accept only the warranty service as described above, at no additional cost.