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AR0005770

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Addendum No. 2

Okeechobee Horse Arena Additions  
Okeechobee Agri-Civic Center, Okeechobee County, Florida

The Drawings and Specifications for the above referenced project are hereby modified as itemized below. This addendum supersedes the originally issued Drawings and Specifications, and all previously issued addenda.

Revisions are as follows:

- (1-1) Please refer to specification section 09912 PAINTING which is attached to and made part of this Addendum. This section provides scope of painting plus information regarding color selection.
- (1-2) Reference specification section 04810 CONCRETE MASONRY UNITS, Part 2 PRODUCTS, C.2 revise last sentence to read "*Color of mortar shall match existing.*" Color of split face block shall also match existing.
- (1-3) Bidders are reminded that soils report prepared for existing horse arena facility was issued with Addendum No. 1.
- (1-4) The attention of the Bidders is drawn to structural drawing S-1.0 General Notes and Schedules, subheading **Pre-Engineered Metal Building**. This section defines the roles and responsibilities of the Engineer of Record and the Delegated Professional Engineer. Design intent is for a continuation of the existing structural framing concept of the lean-to construction over the existing restrooms and concessions areas. How this is accomplished by means of the possibility of roof panel and insulation removal is an issue of contractor's means and methods during construction. The capability of the existing columns to receive loading from new lean-to beams has not been verified by Varco Pruden, the supplier of the original horse arena structure. Varco Pruden's as-built drawings were released with Addendum No. 1.
- (1-5) Refer to drawings for size, location and reinforcing for masonry filled cell columns. See sheet S-2.1, Foundation Plan Notes, note #6.
- (1-6) Please procure block from a vendor that does provide matching 6 inch units.

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- (1-7) Sheet A-3.2 Stormwater Management indicates for (1) existing gutters at high roof to remain; (2) new downspouts to be provided from high roof gutters down to the lower lean-to roof; (3) new continuous gutter along north and south roof edges at low roofs, (4) new downspouts at each column location at low roof edge; and (5) connection of entire stormwater management system to existing 15" lines on north and south sides of the facility. It is the intent of the drawings that these improvements are to be furnished for the entire project and not just the four areas of new construction at the corners of the facility.
- (1-8) Bidders are reminded that the Horse Arena is an Assembly-Group A occupancy.
- (1-9) Shop drawings for the fire alarm system originally installed were provided as an attachment in Addendum No. 1. New fire alarm pull stations and strobes will be required in the four quadrants of the building, three new stations per quadrant for a total of 12 stations. The contractor shall be responsible for fire alarm system expansion design, as was the case for the original system.
- (1-10) As a guide and reference the original specification section 16720 FIRE ALARM SYSTEM is attached.

END OF ADDENDUM NO. 2

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# OKEECHOBEE AGRI-CIVIC CENTER HORSE ARENA ADDITIONS

## SECTION 09912 – PAINTING

### PART 1-GENERAL

- 1.1 Scope of painting work includes exposed structural steel and underside of insulation provided under Division 13 Section, Pre-Engineered Buildings.
- 1.2 Scope of painting work includes exposed fire protection system pipe and electrical conduit.
- 1.3 Scope of painting work includes existing vertical fire protection system pipe and fittings at northeast quadrant (reference sheet A-2.1, detail plan 2/A2.1).
- 1.4 Do not paint pre-finished items and labels.
- 1.5 Submittals: Provide a list of required coating materials. Provide manufacturer's technical information including label analysis and instructions for handling, storing, and applying each material. Samples for initial selection: provide 6" square color sample indicating requirement to match existing adjacent surfaces.
- 1.6 Delivery & Project Conditions: Deliver paint materials to project site in manufacturer's original unopened containers bearing manufacturer's name and label. Store materials not used in tightly covered containers in a well-ventilated area at a minimum temperature of 45 degrees F. Remove rags and waste daily. Apply waterborne paints only when temperature of surfaces and surrounding area is between 50 and 90 degrees F. Do not apply paint in rain, fog or mist or when relative humidity exceeds 85 percent.

### PART 2 PRODUCTS

- 2.1 Exterior Semi-Gloss Acrylic Enamel: Factory-formulated semi gloss waterborne acrylic-latex enamel for exterior application. Apply over primers recommended by the manufacturer.  
  
ICI Dulux Paints: 2406-XXXX Dulux Professional Exterior 100 percent Acrylic Semi-Gloss Finish: applied at a dry film thickness of not less than 1.3 mils.  
  
Pittsburgh Paints: 6-900 Series SpeedHide Exterior House & Trim Semi-Gloss Acrylic Latex Paint: Applied at a dry film thickness of not less than 1.5 mils.  
  
Sherwin-Williams: A-100 Latex Gloss A8 Series: Applied at a dry film thickness of not less than 1.3 mils.

### PART 3 EXECUTION

- 3.1 Preparation: Do not paint over rust, scale, grease or dirt. Protect areas in the vicinity of paint that are not to be painted, with tape, paper or other suitable means.
- 3.2 Painting method: combination of roller, spray and brush as required. Apply first coat to surfaces that have been cleaned, pre-treated or otherwise prepared properly to receive paint materials. Do not apply succeeding coats until previous coat has cured as recommend by manufacturer. Om it primer over surfaces that have been shop primed and touch-up painted.
- 3.3 Protect newly painted surfaces from damage. At the end of each work day remove empty cans, rags, and rubbish and other discarded paint materials from the project site.
- 3.4 Colors and application: The underside of new lean-to construction shall be painted blue to match the existing adjacent construction. Paint color for existing fire suppression system risers and equipment to be determined.

END OF SECTION 09912

PAINTING  
09912-1

SECTION 16720 - FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

The general provisions of the Contract and the requirements of Section 16050 apply to the Work specified in this Section.

1.2 SUMMARY:

- A. Provide a stand-alone fire alarm system independent of any other building automation, energy control, lighting, security or other system.
- B. Provide a complete supervised fire alarm system. The entire fire alarm system shall be continuously electrically supervised against interruption or failure of the initiation circuits and the audio path including Notification Appliance Circuits, switches, and electrical contacts. Detect opens, shorts, and grounds in the system. Control shall be microprocessor-based and field-programmable.
- C. Provide 100% addressable initiating devices. All smoke detectors shall be intelligent analog sensors.

1.3 QUALITY ASSURANCE:

A. Authority Having Jurisdiction:

- 1. General: The system shall comply with all applicable Codes, Ordinances and Standards as interpreted and enforced by the local authority having jurisdiction.

B. NFPA:

- 1. General: Comply with applicable requirements of latest NFPA Standards, including the following.
- 2. NFPA 70: National Electrical Code. The system shall comply with NFPA 70, National Electrical Code, 1999, including: 1) Article 760.
- 3. NFPA 72-1996: National Fire Alarm Code
- 4. NFPA 90A

## OKEECHOBEE AGRI-CIVIC CENTER

5. NFPA 101: Life Safety Code

C. UL:

1. General: The entire system shall be UL listed and named in category UOJZ - Control Units System of the UL Fire Protection Equipment Directory, current edition. The control panel and smoke detectors shall have been tested together and listed as a system.

2. UL 268: Smoke Detectors

3. UL 864: Control Units

4. UL 464: Horns

5. UL 1424: Cables

6. UL 1971: Hearing Impaired Signaling Devices

D. IEEE: The fire alarm system includes solid state electronic components. Therefore, the equipment manufacturer shall provide certification that all such equipment is internally protected from, or can withstand, power line surge voltages and currents as specified in Table 3, Location Category A3 High Exposure of ANSI/IEEE Standard C62.41-1991 (formerly IEEE Standard 587).

E. Americans with Disabilities Act (ADA): The system shall comply with ADA Accessibility Guidelines (ADAAG) issued under ADA-Public Law 101-336, 1990.

F. Installer: The installing Contractor shall be a direct sales division of, or the authorized and designated distributor for, a fire alarm system manufacturer. The installing Contractor shall have been actively engaged in the business of selling, installing and servicing fire alarm systems from the manufacturer submitted for at least five consecutive years going back from date of bid. The installing Contractor shall be licensed by the State Fire Marshall to sell, install, and service fire alarm systems, as required by the State Insurance Code. The installing Contractor shall have on its staff an installation superintendent who is licensed by the state Fire Marshall's office and under whose supervision installation will take place as required by the State Insurance Code. Installing Contractor shall maintain a local staff of specialists, including a Fire Alarm Planning Superintendent, for planning, installation, and service.

G. ISO: Fire alarm system manufacturer shall have engineering and manufacturing quality systems certified to ISO 9001.

### 1.4 SUBMITTALS:

## OKEECHOBEE AGRI-CIVIC CENTER

- A. Provide submittals according to Section 16050.
- B. Qualification Data:
  - 1. Provide a complete paragraph-by-paragraph specification review stating compliance or deviation.
  - 2. Submit copy of authorized distributor agreement or other proof showing first date of product representation to verify five year minimum requirement. Documentation shall be on fire alarm system manufacturer letterhead.
- C. Product Data:
  - 1. Duct Detectors: Submit manufacturers published data to show UL listed velocity range and temperature and humidity tolerance ranges. Submit a proposed detail for a typical duct detector mounting arrangement. Submit similar data for open air detectors when proposed for use in open, non-ducted return air streams.
  - 2. Provide functional information and instructions on system operation.
  - 3. Provide copy of U.L. file card or proof that system is listed by U.L.
  - 4. Indicate the U.L. listing, the U.L. classification, and NEC insulation type used for each type of wire to be used in installation of fire alarm and communications system.
  - 5. Provide factory catalog pages, mounting details and specification sheets for all fire alarm system components and rough-in boxes.
  - 6. Detailed procedure of the 100% audit performance. Include description of software testing such as Difference Report, Where-Used Report or other means of testing and documenting system changes.
  - 7. Battery sizing calculations.
  - 8. Wire sizing calculations to prove maximum 3% voltage drop at all ac voltages and maximum 10% voltage drop at all dc voltages. Maximum dc voltage drop may be increased to 15% if recommended by fire alarm manufacturer and dc devices stay within UL-listed voltage tolerances.
  - 9. Submit published test data for each type of speaker and horn. Indicate UL-listed dBA values for each wattage tap available on speaker/horn transformer, based on the proposed alarm system voltage. Speaker dBA values shall be UL-reverberant room test values and not anechoic-chamber test values.

## OKEECHOBEE AGRI-CIVIC CENTER

10. Strobes: Submit manufacturer data to show strobe operating currents, including normal, inrush and peak. Submit candela curves to illustrate compliance with ADA and UL 1971. Certify that strobe maintains minimum flash rate over entire range of strobe listed operating voltage.

### D. Shop Drawings:

1. Only control panels and devices are shown on Contract Drawings. Specific wiring between panels, devices and equipment may not be shown. Submit for review drawings depicting complete system configuration. Show all proposed risers, appliances, components, wiring, conduit, and installed locations of complete system.
2. Provide installation floor plans to locate all devices. Submit wiring diagrams of the complete Fire Alarm System. Wiring diagrams shall include wire and raceway sizes, fire alarm control panels, and associated raceway sizes, appliances and point to point wiring details, connections and terminal identification.
3. Show locations on floor plans for all fire alarm auxiliary relays.
4. Provide manufacturer's drawings showing all dimensions (height, width, and depth) for all cabinets used to house system components.
5. Provide a detailed drawing of the Fire Alarm Control Panels layout indicating the exact arrangement of all annunciators, including expansion capacity.
6. One-line diagram showing location and size of all required line-voltage power branch circuits for entire fire alarm system.

- E. Closeout Submittal: Provide manuals as described in Section 16050. Include a copy of the completed Installation Certificate in each manual.

### 1.5 OWNER'S INSTRUCTION:

Provide a four hour period of instruction to the Owner's designated personnel upon completion of the system installation. Instruction shall include a functional training session on fire alarm control panel operation and system test procedures. Furnish instruction on peripheral device operation, including what are normal and alarm indications and resetting of each type of device. Practice using the intelligent device programmer/tester. The Operations and Maintenance Manual shall be complete and on-site at the time of Owner instruction.

### 1.6 FUNCTIONS:

## OKEECHOBEE AGRI-CIVIC CENTER

- A. Alarm System Automatic Functions:
  - 1. Sound a distinctive evacuation signal throughout the entire building.
  - 2. Simultaneously activate all flashing visual alarm assemblies associated with audible indicators.
  - 3. Activate an alarm contact closure for use with approved central station monitoring service. Owner provides central station connection and maintains that service.
- B. Sprinkler System: Operation of any sprinkler system water flow switch shall activate the sprinkler alarm bell.
- C. All alarm signals shall continue sounding and annunciator(s) shall remain lighted until the alarm acknowledge switch is depressed. The alarm signals shall then stop, but the annunciator shall remain lighted until the system is reset.
- D. Acknowledging of any alarm signal shall not interfere with the re-activating of the alarm signals upon an alarm from another zone.
- E. Alarm Verification:
  - 1. Provide UL listed alarm verification feature.
  - 2. Alarm verification shall be per addressable, open area smoke detector. Alarm verification shall be field programmable on an individual detector basis. Global or system alarm verification will be unacceptable.
  - 3. If an alarm condition is detected by an automatic smoke detector programmed for ALARM VERIFICATION, an alarm verification sequence shall be initiated. Upon receipt of the initial alarm condition, start the verification sequence as prescribed by UL 864. The system shall reset the alarmed zone/device within the U.L. prescribed window of 60 seconds maximum. If the alarm condition does not confirm within 60 seconds of the reset signal, the programmed alarm outputs shall be canceled and the system returned to the normal mode. If the alarm condition re-occurs within the designated verification cycle or a non-verified device or zone activates, the programmed events listed above shall immediately occur for the confirmed alarm condition.
  - 4. Alarm verification shall not be used for any spaces programmed to require two smoke detectors to initiate an alarm response (ex. elevator lobbies), per 1999 NFPA 72 sect. 3-8.3.2.3.3 (3).

### 1.7 INITIATING AND SUPERVISORY ZONES:



## OKEECHOBEE AGRI-CIVIC CENTER

### A. General:

1. Minimum zoning function requirements shall be as outlined below. Provide software programming or additional zoning required to properly accomplish the functions specified in Article FUNCTIONS or required by Codes. The zones specified in this Article apply to the initiating and the supervisory functions. Each initiating zone shall be provided with an associated trouble alarm. In addition, provide separate supervisory zones as indicated. The use of the term "zone" shall be taken to mean an initiating zone unless otherwise identified. Alarm and trouble indicators for all zones (including expansion zones) on each floor shall be conveniently grouped together in the Fire Alarm Control Panel(s). Supervisory zones may be grouped or combined with initiating zones as appropriate to the function.
2. Performance and capacities of Initiating Device Circuits shall comply with Table 3-5 of NFPA 72-1999 (former Table 3-5.1 of NFPA 72-1993; 1990 Table 2-6.1).
3. Performance and capacities of Signaling Line Circuits shall comply with Table 3-6 of NFPA 72-1999 (former Table 3-6.1 of NFPA 72-1993; 1990 Table 2-6.1).

B. Provide 100% addressable devices so that all initiating points are uniquely identified.

### C. Plumbing Fire Protection Systems:

1. General: Provide sprinkler system water flow alarm and supervisory signal service. All signals transmitted shall indicate distinctively for each initiation point described. Provide addressable modules to uniquely identify each sprinkler system monitored point.
2. Building Standpipes: Provide one supervisory zone for each standpipe to indicate closure of riser base gate valve.
3. Wet Pipe Sprinklers: Waterflow initiating devices on each floor shall be a distinct separate zone and shall identify a sprinkler activated alarm condition. In addition, provide one supervisory zone for each sprinkler zone on each floor of the building to indicate closure of the gate valve. Activated supervisory zone circuit shall not prevent receipt of an alarm condition from the sprinkler waterflow devices.

## 1.8 ALARM NOTIFICATION/PUBLIC ADDRESS ZONES:

- A. General: Minimum zoning requirements shall be as outlined below. Provide additional Notification Appliance Circuits (NAC) where required to properly accomplish the functions specified in Article FUNCTIONS or where required by Codes. The zones specified in this Article apply to the alarm notification and public address functions.

## OKEECHOBEE AGRI-CIVIC CENTER

- B. Provide one general alarm zone to notify the entire building for any alarm condition. Horn and strobe coverage shall be provided for corridors, mechanical rooms, and rooms and spaces exceeding 1000 square feet in area. Also provide horn and strobe coverage for other areas shown on plans and as required by LAHJ-Local Authority Having Jurisdiction, local Inspectors, Building Officials and Codes. Appliances shall be sufficient to produce required sound pressure level and associated visual notification. Alarm notification/public address zoning for these spaces shall generally coincide with the set of initiation addresses or points for each area.

### 1.9 EXPANSION:

- A. Notification: Make provisions for future additions of a minimum of four horns and four strobes to every floor. Provide power capacity in the system to handle these appliances, even if they were installed on every notification zone. The floor circuit shall be properly terminated with an end-of-line resistor and marked as point of extension to pick-up additional devices.
- B. Initiating Points: Provide space and capacity in the fire alarm control panel to add at least six addressable points per building floor. Provide a labeled point of expansion in wiring on each floor. Provide power and software capacity and adequate initiation circuits on each floor to handle these future addresses, even if all expansion points are activated.

### 1.10 EXTRA MATERIALS:

- A. General: Provide extra materials for Owner's use. All parts shall be identical to the corresponding components of the installed systems.
- B. Package in suitable cartons. Identify by nameplates, stamping or tagging.
- C. The following spare parts and accessories shall be provided:
  - 5 copies of the reset key for manual pull stations
  - 3 spare fuses for each fuse type in the system
  - 3 spare lamps for each lamp type furnished in the installed systems
  - 2 spare horns
  - 2 spare manual stations
  - 1% spare strobes
  - 1% of installed quantity of automatic detectors, including bases, of each type installed
  - 3 sets of any keys or special tools required

### 1.11 MAINTENANCE THROUGH PROJECT WARRANTY PERIOD:

## OKEECHOBEE AGRI-CIVIC CENTER

- A. General: Provide a one-year maintenance agreement. Reference Section GENERAL INSTRUCTIONS, ELECTRICAL for further information. Provide total fire alarm system inspection, testing and maintenance for one year. Comply with procedures of Chapter 7 Inspection, Testing and Maintenance of 1999 NFPA 72, National Fire Alarm Code. Clean detectors and other components as required. Replace broken, defective or otherwise non-operating components and wiring. Maintain and update system software and point-to-point diagrams to mirror actual device installations, building configuration, schedules, programmed responses and other system functions. Keep permanent records in format similar to forms given in Section 7-5.2 of NFPA 72. Give Owner hardcopy and 3.5" disk or CD with electronic copy of all records quarterly plus annual summary report at end of year.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS:

- A. Autocall/Tyco brand and SimplexGrinnell brand ([www.simplexnet.com](http://www.simplexnet.com)) from Grinnell Fire Protection Systems ([www.grinnellfire.com](http://www.grinnellfire.com)), EST-Edwards Systems Technology, only as furnished by a EST Strategic Partner ([www.est.net](http://www.est.net)), Honeywell International/FCI-Fire Control Instruments, only as furnished by an Engineered Systems Distributor (ESD) [www.firecontrolinstruments.com](http://www.firecontrolinstruments.com), Notifier ([www.notifier.com](http://www.notifier.com)), Siemens Fire Safety [www.cerbpyro.com](http://www.cerbpyro.com) (former Cerberus Pyrotronics), Gamewell ([www.gamewell.com](http://www.gamewell.com))
- B. The entire system shall be furnished by one manufacturer. Only primary product of each manufacturer, bearing that manufacturers nameplate, shall be furnished. Subsidiary companies or other brand-names that may be owned by a given manufacturer shall not be substituted or furnished in place of actual named manufacturer.

#### 2.2 FIRE ALARM CONTROL PANEL:

- A. General: A complete Fire Alarm Control Panel shall be installed in the ground floor electrical room. The panel shall be wall mounted and shall contain -- but not be limited to -- the following basic components and systems:
  1. Fire detection and annunciator panels including supervisory indications.
  2. Notification appliance circuit controls for building evacuation signals.
  3. Sprinkler supervision and display panels furnished as part of the fire alarm system.

## OKEECHOBEE AGRI-CIVIC CENTER

### B. Construction:

1. Modular and of dead front construction.
2. Controller shall be a microprocessor and capable of future expansion.
3. Alarm initiating circuits shall meet the requirements of NFPA 72 for limited energy applications and functions.
4. Control panel functions may be grouped into more than one panel.
5. Panels shall be surface mounted.
6. Provide floor support legs or rack construction if necessary to support equipment load.

C. **Monitoring Integrity:** This system shall be fully electrically supervised. This shall include all initiating, signaling, notification and communication conductors; amplifiers; tone generators; sprinkler monitoring valves; power supplies; batteries and charging system components; switches and electrical contacts; and all other critical parts of the system. Trouble indication shall be given for each system and damaged components shall be taken out of service without affecting the remainder of the system.

### D. Power Sources:

1. **Primary Supply:** The power supply shall supply sufficient power to sound all signals and light all annunciators simultaneously, and shall operate from a two-wire, single phase 120Vac source from the emergency power system. Size power supplies as necessary for both appliance full load and turn-ON inrush currents.
2. **Secondary Supply:** The secondary supply shall automatically supply energy to the system within 30 seconds and without loss of signals, whenever the primary supply is unable to provide the minimum necessary operating voltage. The batteries shall provide operating and supervisory power for a minimum period of 24 hours, and shall then be capable of operating all alarm notification appliances for at least 5 minutes. In addition, the secondary power supply for emergency voice/alarm communications service shall be sized for operating the system under normal maximum operating load for 24 hours and then for fifteen (15) minutes at maximum connected load. The secondary battery system shall be supervised for both overcharging and low battery. The power supply shall include a properly sized automatic battery charger. Charger shall be dual-rate (full and trickle) and temperature compensated.

### E. Alarm Initiating Circuits:

## OKEECHOBEE AGRI-CIVIC CENTER

1. Provide Class B/Style B initiating device circuits (IDC).

### F. Alarm Notification Circuits:

1. **Trouble Signals:** At the fire alarm control panel, trouble shall be indicated by distinctive audible signals. These trouble signals shall be distinctive from alarm signals. Where an audible supervisory signal is used to indicate a trouble condition a trouble silencing switch shall not be permitted to prevent subsequent sounding of supervisory signals.
2. **Distinctive Signals:** Audible signal appliances for a fire alarm system shall produce signals that are distinctive from other similar appliances used for their purposes in the same area. The distinction among signals shall be as follows:
  - a. Fire alarm signals shall be distinctive in sound from other signals and this sound shall not be used for any other purpose.
  - b. Supervisory signals shall be distinctive in sound from other signals and this sound shall not be used for any other purpose except to indicate a trouble condition. When the same sound is used for both supervisory and trouble signals, distinction between signals shall be indicated by visible means.
  - c. Fire alarm, supervisory, and trouble signals shall take precedence over all other signals.
3. **Notification:** Provide Class B/Style Y notification appliance circuits (NAC). Provide separate strobe NAC if operation of the voice, tone or horn signals would impair proper operation of any strobes installed on a common NAC.
4. 1999 NFPA 72, sect. 3-8.4.1.3.6: Evacuation signaling zones are defined to be the same as the "alarm notification zones" served by Notification Appliance Circuits. Multiple evacuation signaling zones shall be arranged consistent with the fire or smoke barriers within the protected premises. Undivided fire areas shall not be divided into multiple evacuation signaling zones. Note that an undivided fire area may have more than one notification appliance circuit to provide adequate voice and strobe coverage into that area.

### G. Distinctive Evacuation Signal:

1. The fire alarm general evacuation signal shall be the ANSI S3.41 "Three-Pulse" temporal pattern using any appropriate sound, or other signal required by the Fire Marshal. Three-pulse temporal pattern shall be used for evacuation as defined in 1999 NFPA 72, 3-8.4.1.2.
2. Provide synchronized horns, synchronized amplifiers or other means to assure that code-3 temporal pattern remains clearly distinguishable in areas where more than

## OKEECHOBEE AGRI-CIVIC CENTER

- one horn are audible.
3. Fire alarm, supervisory and trouble signals shall take precedence over all other signals (NFPA Life Safety Code 101, 7-6.3.10 and 1999 NFPA 72, 3-8.2.5).
  4. Provide non-interfering signal generators and a standby tone module for the alarm tone for the event of primary tone failure.
- H. Non-Lock Walk Test: The system shall include a special non-lock "walk test" mode. The walk test mode can be initiated by loop, software zone, or globally as field selected. The following reports shall be capable of being generated:
1. General results of all walk tested devices.
  2. Report all un-programmed devices installed.
  3. Report all programmed devices not installed.
  4. Report all devices not tested.
- I. Automatic Detector Test: The system shall include a special automatic detector test feature which permits reading and adjustment of the sensitivity of all intelligent detectors from the main control panel. An automatic detector test shall occur automatically each twenty-four hour period or be initiated manually from the FACP as desired. In addition, the automatic test feature shall also permit the functional testing of any "intelligent" detector or addressable interface device individually from the main control panel. Automatic detector test sequencing shall be terminated upon receipt of an actual alarm condition.
- J. Special System Reports: The system shall have the ability to generate and print upon command, multiple system and point status reports. Selection of 'system' read status provides the operator with global system programming information. Selection of 'point' read status provides the operator with selected individual point programming data.
- K. Software and Firmware Control:
1. All software and firmware provided with a fire alarm system shall be listed for use with the fire alarm control unit.
  2. A record of installed software and firmware version numbers shall be maintained at the location of the fire alarm control unit.
  3. All software and firmware shall be protected from unauthorized changes through the use of "access levels".

## OKEECHOBEE AGRI-CIVIC CENTER

4. All changes shall be tested in accordance with NFPA 72 section 7-1.6.2 procedure for Reacceptance Testing.

### L. Field Programming:

1. The system shall be 100% field programmable without the need for PROM programmers, and shall NOT require replacement of memory integrated circuits (IC). Systems requiring factory programming/re-programming or field replacement of memory chips shall not be acceptable.
2. Programming shall be possible only after entering an appropriate and pre-selected password security code.
3. All programs shall be stored in non-volatile electronic memory.
4. Software Compare: Programming software shall include a "compare" feature, also called a "Difference Report". Compare shall test program after any changes and report all changes, both intended and inadvertent. Software shall furnish file for hardcopy printout. Printed report shall show all program steps and identify all changes. Also provide software for "Where-Used Report" that will identify where each device, appliance and control output is used in the system software, i.e. in what lists and in what equations. Include complete descriptions of these and any other software archival and testing programs.

- M. Alarm Verification: The main fire alarm control panel shall have a U.L. Listed alarm verification feature for smoke detection alarm verification circuits. Alarm verification shall be per initiation device, not just for the total system. Alarm verification per U.L. shall apply only to open area (spot-type) smoke detectors, even when other device types are installed on the same initiating circuit. The combined duration of retard period and reset period shall not exceed (40) seconds. Any alarm from the same detector or any other initiating device that occurs during the confirmation period shall result in **immediate** alarm from the control unit. Alarm verification shall NOT apply to heat detectors, linear beam or duct smoke detectors, nor to any "cross-zoned" detection circuits.

## 2.5 MANUAL PULL STATIONS:

- A. General: Provide non-coded, double action, non-break-glass type, semi-recessed manual fire alarm station. Resetting station shall require inserting a key and manually closing the pull station. Each pull station shall have an addressable module programmed to provide a unique address.
- B. Color: Red.

## OKEECHOBEE AGRI-CIVIC CENTER

### 2.6 HORNS:

- A. General: Horns shall be listed for fire protective signal service under U.L. Standard 464 Category (ULSZ) Audible Signal Appliances and meet the requirements of the Life Safety Code. Horns shall be suitable for semi-flush wall or flush ceiling installation. Include mounting plate and back box.
- B. Sound Pressure Level:
  - 1. General: All sound pressure levels shall be measured on the "A" weighted scale at a distance from horn of ten feet on the centerline axis of the horn output distribution pattern.
  - 2. Maximum: 120 dBA.
  - 3. Minimum Differential: 15 dBA greater than average ambient sound level within any given room or space. The average ambient sound level may be taken as 55/55/45/35 dBA as given in NFPA 72-Appendix Ch. 6-3.1 for a assembly/business/educational/residential occupancy.
  - 4. Minimum Output: 75 dBA. Refer to separate specification paragraph for horns in Mechanical Equipment Rooms and Generator Rooms.
  - 5. Code 3 Temporal Pattern: Set horn for 3-pulse temporal pattern. All horns on a single building floor shall be synchronized to all sound together.
- C. Color: Provide white horns. Provide red where indicated on Drawings; otherwise red. Color shall be the solid body color of the high-impact thermoplastic horn.
- D. Type: Similar to Notifier/System Sensor SpectraAlert Series, Gentex Corp. Commander<sup>2</sup> GEH Series electronic horn ([www.gentex.com](http://www.gentex.com) 800-436-8391), Wheelock Multitone Electronic Horn MT Series, or approved equal.

### 2.9 HORN/STROBE ASSEMBLIES:

- A. General: Where indicated on the Drawings as a combination unit, horn and strobe shall be housed together and have a common cover plate. Unit shall include appropriate back box and trim for semi-flush wall mounting.
- B. Horns: As specified above for HORNS.
- C. Strobe: Refer to paragraph STROBES.
- D. Finish: Provide white finish. Provide red where indicated on Drawings.



## OKEECHOBEE AGRI-CIVIC CENTER

- E. Type: Similar to EST Genesis® Series, Gentex Corp. Commander<sup>2</sup> GEC Series electronic horn plus strobe ([www.gentex.com](http://www.gentex.com) 800-436-8391), Notifier/System Sensor SpectraAlert Series or Wheelock NS (2 wire) and NS4 (4 wire) Series.

### 2.11 STROBES:

- A. General: Provide independent strobe without audible device where indicated on the Drawings. Unit shall include appropriate back box and trim suitable for semi-flush wall mounting.
- B. Strobe: Shall be U.L. Listed per Standard 1971. Provide a strobe type visual signal which utilizes a Xenon flash-tube. Strobe shall have a clear lamp cover set in a base imprinted with the word "FIRE" on at least two sides. Lettering shall be arranged appropriately for wall mounting.
- C. Flash Rate: Minimum 1 Hz and maximum 2 Hz. Minimum flash rate and candela intensity shall be maintained over the entire range of strobe operating voltage, with operating voltage defined as that range for which strobe is UL listed. Strobe manufacturer shall guarantee that published strobe current is not exceeded over the entire operating range. Strobe operating voltage shall be 24 Volts dc.
- D. Flash Synchronization:
  - 1. Provide means of synchronizing strobe flashing when more than two strobes are visible in a space. All such strobes shall flash simultaneously. Provide dedicated power supply or other means to assure strobe synchronization. Example: long corridor with more than two strobes; perimeter of an auditorium or other large room; large common area with more than two strobes.
  - 2. Synchronization is not required in rooms 80 ft x 80 ft or greater, where strobes are spaced a minimum of 55 ft from each other (NFPA 6-4.4.1.1 (c)).
- E. Power Supply: Strobe dc power supply shall be filtered and regulated. Power supply with ac input and Full Wave Rectified dc output without filtering and regulation is unacceptable. Size power supplies to accommodate both appliance full load current and turn-ON inrush current.
- F. Effective Intensity:
  - 1. Corridors Up To 20 Feet Wide: Combination 15/75 Candela. ADA minimum 75 candelas on perpendicular axis. NFPA/UL minimum 15 candela in UL-pattern for public mode service.
  - 2. Rooms Not Exceeding 20 Feet Length or Width: Combination 15/75 Candela.

## OKEECHOBEE AGRI-CIVIC CENTER

ADA minimum 75 candelas on perpendicular axis. NFPA/UL minimum 15 candela in UL-pattern for public mode service.

3. Rooms Exceeding 20 Feet Length or Width: Candela and spacing shall be per 1996 NFPA 72 Table 6-4.4.1.1(a) Room Spacing for Wall-Mounted Appliances. Provide one strobe per room, two strobes per room installed on opposite walls, or four strobes per room installed one per wall. Candela shall be highest value of 110, 75, 60 or 30 allowed by NFPA Table in order to install the fewest number of strobes per room.

G. Finish: White.

H. Type:

1. EST Genesis® Series, Gentex Corp. Commander<sup>2</sup> GES Series strobe ([www.gentex.com](http://www.gentex.com) 800-436-8391), System Sensor SPECTRAAlert Series or SS241575ADA Series, Wheelock SPEC1FIRE™ Multi-Candela Series [www.wheelockinc.com](http://www.wheelockinc.com), or approved equal.
2. 177 Cd Strobe: Gentex GXS -120-177 Series or approved equal. Install on 120V branch circuit from emergency panel.
3. Strobe Weatherproof Cover: Provide NEMA 4X Stopper® Dome with Heater by Safety Technology International (STI), Model No. STI-1229HTR, 800-666-7009 [www.sti-usa.com](http://www.sti-usa.com) or [www.stopper.com](http://www.stopper.com) . Cover shall be suitable to protect UL 1971 ADA strobes. Cover shall include continuous duty fan and thermostat-controlled heater. Install with sealing hubs for conduit entry into base of unit.

### 2.12 IONIZATION DETECTORS:

- A. General: Provide intelligent analog initiating products-of-combustion sensors. Detectors shall function properly in the installed location under the subject air movement characteristics.
- B. Standards: Detectors shall be calibrated and adjusted for sensitivity at the manufacturer's factory to UL standards. Units shall be listed in accordance with UL 268 Smoke Detectors for Fire Protective Signaling Systems. All two-wire detectors shall be U.L. listed for use with the particular fire alarm control panel applied.
- C. Features:
  1. Addressable.
  2. Detector shall have twist-lock head and separate base, designed for plug-in

## OKEECHOBEE AGRI-CIVIC CENTER

interchangeable compatibility with photo electronic head.

3. Detectors shall be self-compensating for the effects of air temperature, humidity, and atmospheric pressure.
4. The detector shall have at least one LED indicator. The LED shall have at least two different operating modes. Alarm condition shall be different from normal LED status. Normal, alarm and supervisory conditions shall also indicate at the control panel for the associated zone.
5. Detectors shall have field adjustable sensitivity and on-board test switch. Test without smoke shall activate full detector circuitry. Intelligent detectors shall allow all testing and adjustments to be done from control panel and do not need on-board test switch.
6. Top (back) side of detector shall be sealed to block back pressure air flow. The sensing chamber shall be protected with a fine-mesh screen. Unit shall be designed with access to the screen for field cleaning.

### D. Open Area Protection:

1. Detector shall be properly mounted on a 4" octagon box, with box flush in drop ceilings and surface-mounted in open structure.
2. Where installed in air handling plenum rooms, the detector shall be suitable for the air velocity feet-per-minute.

E. Interlocking: Where required, provide auxiliary relays (or integral contacts) to accomplish special auxiliary functions. The relay may be integral to the detector housing or remotely mounted.

F. Smoke Damper Releasing Service: Spot-type detectors used to initiate smoke dampers shall be listed for releasing service. UL listing shall be OAP/RS, Open Area Protection with Releasing Service. Install plug-in head on intelligent relay base. Relay base shall have ac/dc-rated Form C relay. Example: UBC 713.10 smoke detector associated with damper installed in opening through a fire-resistive assembly.

G. Detectors Located in Inaccessible Locations: Where possible, install detectors in locations that are readily accessible without need of step ladder or removing other building systems. In cases where a detector must be located in an inaccessible area, such as above the ceiling, provide a remote alarm indicating LED in an accessible location. Flush mount indicator in ceiling unless other location shown on Drawings. Label cover plate "SMOKE DETECTOR" and "device address, zone number, or other specific identifier keyed to fire alarm drawings". When the proposed remote indicator location will be visible in a finished area, the location shall be approved by the

## OKEECHOBEE AGRI-CIVIC CENTER

Architect before installation. Comply with NFPA 72 sect. 3-8.3 (1996).

H. Color: Standard white finish.

I. Type: Notifier CPX-751 Series.

### 2.13 AUXILIARY CONTROL RELAYS:

A. Provide SPDT, 8 amp, 120 VAC relays in NEMA 1 enclosures for HVAC fan control, smoke damper and fire/smoke damper activation and other required control functions. Relays shall be similar to Notifier MR-101/C.

B. Addressable: Similar to Notifier CMX-2 Control Module.

### 2.14 DOOR HOLDERS:

A. Features:

1. Similar to Notifier FM Series electromagnetic door holders.
2. 24 V dc.
3. Fail-safe; interruption of power shall release door to close.
4. Flush mount for concealed wiring.

### 2.15 REMOTE LCD ANNUNCIATORS:

A. Provide where indicated on the Drawings, a Notifier LCD-80 remote Liquid Crystal Display (LCD) alpha-numeric annunciator to announce all system events and duplicate the displayed status at the main FACP. The annunciator shall be a backlit eighty character LCD display and operate via the system RS485 or RS232 serial output terminal from the main FACP. The LCD display shall automatically illuminate upon receipt of an alarm or trouble condition. The unit shall operate on 24VDC power and function during system power failure via standby batteries. The remote LCD annunciator shall include:

Integral time-date clock	System reset
Time-date select switch	System silence
Time-date/contrast adjust	System acknowledge
Display/step switch	Integral trouble buzzer

## OKEECHOBEE AGRI-CIVIC CENTER

- B. Annunciator shall upon command display the first system alarm, last alarm, and system alarm count. The unit shall be equipped with an integral lamp test feature. The unit shall be (flush)(surface) mounted where shown.

### 2.16 FIRE ALARM MC CABLE:

- A. Fire alarm wiring that is required to be in raceway shall be installed in one of the following methods:
  - 1. rigid galvanized steel conduit,
  - 2. EMT or
  - 3. fire alarm MC cable.
- B. Refer to Section 16110 for steel conduit and EMT requirements.

## PART 3 - EXECUTION

### 3.1 INSTALLATION:

- A. General: All components shall be completely wired. System shall be fully operable when main power service has failed and the Emergency Generator has assumed emergency system loads. This shall require that any devices which required 120 volt power shall receive supply from an emergency 120 volt source.
- B. Main Power Circuit:
  - 1. Provide dedicated 20-amp, 120 Volt, 2 wire plus green grounding conductor circuit(s) to the Fire Alarm Control Panel from an emergency source. All panelboard directories and circuit disconnecting means shall be clearly labeled "FIRE ALARM CIRCUIT CONTROL". Provide handle lock-on devices on all circuit breakers.
  - 2. The location of the circuit breakers for all branch circuits serving fire alarm control panels, video monitors, printers and other line voltage accessories shall be permanently identified at the main fire alarm control panel (NFPA 72 section 1-5.2.5.2).
  - 3. Provide secondary surge arresters at emergency source panelboard(s) serving main power circuit(s). Provide two Square D Class 6671 SDSA 1175, or approved equal, connected for 208Y/120V, 3 phase, 4 wire grounded service protection at

## OKEECHOBEE AGRI-CIVIC CENTER

each panel.

4. Division 16 shall provide all line voltage power required, including a 120V circuit breaker and branch circuit from a generator panelboard to each pre-action and/or dry-pipe sprinkler system air compressor(s).

### C. Raceway:

1. Provide dedicated raceway for all fire alarm system wiring in accordance with the Section RACEWAY SYSTEMS, except no raceway shall be required for power-limited low voltage circuits in the following areas:
  - a. Power-limited fire protective signaling circuits in accessible air handling ceiling cavities as described in NEC-300-22 (c), where cable is used that is U.L. Listed as having adequate fire-resistant and low-smoke producing characteristics per U.L. Subject 910. Refer to paragraph titled "U.L." in this section for additional requirements.
  - b. Accessible, non-air handling (static) ceiling cavities with same cable as for air handling ceiling cavities.
2. Provide raceway in walls even when it is not required in ceiling cavities as outlined above.
3. Provide raceway for all main trunk cable risers and any riser extending through two or more floors.
4. Provide raceway for all fire alarm wiring to devices in Mechanical Equipment Rooms.
5. Install wiring to duct detectors in flexible steel raceway.
6. Provide raceway above accessible ceiling when ceiling is higher than 11'-0" above finished floor.
7. All initiating, indicating and auxiliary control devices shall be mounted on UL listed outlet boxes.
8. Raceway for fire alarm wiring shall not contain any other wiring.
9. YELLOW: Spray paint all junction boxes for fire alarm system wiring with yellow paint. Label each box "Fire Alarm".

### D. Cable:

1. Conductor: 98% conductivity, solid copper or stranded copper with maximum of

OKEECHOBEE AGRI-CIVIC CENTER

7 strands. If stranded conductors are used, then a compression lug shall be installed at every end. Wrapping twisted strands at terminal block screw is not acceptable. As an acceptable equivalent, stranded conductors without crimp-on lugs may be terminated into terminal strips of box-lug connectors.

2. Insulation: A type approved by NEC for the application. All cable shall be U.L. Listed for fire-protective signaling application. Communication, Class 3 or Multi-Purpose cables shall not be substituted for FP cable types.
3. Size: All conductors shall be sized as prescribed by the system manufacturer, with following minimums.
  - a. Initiating Circuits, Hard-Wired Devices: AWG #18.
  - b. Initiating Circuits, Addressable Devices: AWG #18, shielded twisted pair.
  - c. Notification (Indicating) Appliance Circuits, Voice Alarm/Public Address: AWG #18, shielded twisted pair.
  - d. Notification (Indicating) Appliance Circuits, Horns and Bells: AWG #14.
  - e. Notification (Indicating) Appliance Circuits, ADA Strobes: AWG #14, shielded twisted pair.
  - f. Signaling Line Circuits (SLC): AWG #16, shielded twisted pair.
  - g. Telephone Circuits: AWG #18, shielded twisted pair.
  - h. Provide AWG #16, AWG #14 or larger conductors where required to maintain voltage drop or signal strength within acceptable limits.
4. Color Coded:
  - a. Wiring shall be color coded in accordance with the following scheme without color change in any wire run. Alternate colors or wire markers or designation on wire may be proposed for approval.

Initiating Circuits, General	Red (+)/White (-)
Initiating Circuits, Smoke Only	Violet (+)/Gray (-)
Alarm Notification Appliance Circuits	Blue (+)/Black (-)
Mechanical Equipment Shutdown Circuits	Yellow
Door Control Circuits	Orange
Elevator Capture Circuits	Brown
  - b. Wire color codes shall be maintained through the entire fire alarm system.
  - c. Permanent wire materials shall be used to identify all splices and terminations for each circuit
5. U.L.:
  - a. General: Fire-protective signaling cable shall be U.L. listed as non-power limited or power limited as needed to match the output of the fire alarm

- equipment
  - b. Non-Power Limited: Fire protective signaling circuits classified as non-power limited shall use cable listed under U.L. Electrical Construction Materials Directory. Category HNHT, "NON-POWER LIMITED FIRE-PROTECTIVE SIGNALING CABLE". All such cable shall have fire resistance, listing and markings as described in NEC 760-15. Minimum cable marking shall be NPLF as described in UL Category HNHT.
  - c. Power Limited: Fire protective signaling circuits classified as power limited shall use cable listed under U.L. Category HNIR, "POWER LIMITED FIRE-PROTECTIVE SIGNALING CABLE". All such circuits shall be durably marked where plainly visible at terminations to indicate that it is a power-limited fire protective signaling circuit. Refer to paragraph titled "Fire Resistance of Cables" for additional requirements.
  - d. Fire Resistance of Cables: Power-limited fire-protective signaling circuit cables shall be U.L. Listed as described in NEC 760-71. All such cable shall bear a cable marking that includes a Type designation as given in NEC Table 760-61. Provide Type FPL except riser cables shall be labeled Type FPLR and plenum cables shall be labeled Type FPLP.
- 6. Fire Alarm Circuits Extending Beyond One Building: Comply with NEC 760-7.
- 7. Manufacturers: See Section ELECTRICAL WIRING.
- E. Connections of Installation Wiring:
  - 1. Connections to Equipment: In accordance with NFPA for monitoring integrity and with the equipment manufacturer's instructions.
  - 2. Connections of installation wiring to alarm initiating devices and alarm indicating appliances shall be monitored for integrity.
  - 3. Interconnecting means shall be arranged so that a single break or single ground fault will not cause an alarm signal.
  - 4. There shall be no wire-to-wire splices. Wire nuts, wing nuts, taped splices, and twisted wires are prohibited from the work for this Project. Terminate all wiring onto screw terminals of appliances, panels or terminal strips in wiring cabinets. Apply a compression lug, similar to T&B Sta-Kon Terminal, to all stranded conductors at terminations or use box-lug terminal strips.
  - 5. All wiring shall be continuous and uncut between control panel, appliances and terminal blocks.
  - 6. Permanently label every wire termination at terminal blocks, fire alarm wiring



cabinets and fire alarm control panels.

- F. **Rated Enclosures:** All vertical fire alarm wiring shall be routed in rated enclosures. In addition, all horizontal wiring serving devices located on floors other than where that wiring exits rated vertical enclosure shall be routed in 2-inch concrete encasement, suitable rated building construction, or 2-hour wrap application enclosure approved by local authority having jurisdiction.
- G. **Auxiliary Control Relays:**
1. An auxiliary fire alarm relay used to initiate control of fire safety functions shall be located within 3 ft. of the controlled device (NFPA 72 sect. 3-9.2.1). The installation wiring between the fire alarm control panel and the auxiliary fire alarm relay shall be monitored for integrity. Examples: motor controller for smoke control fan, controller for smoke control dampers, power supply for door hold-open devices, power supply for door unlocking devices, etc.
  2. Control devices that operate on loss of power (fail-safe) or on loss of power to the auxiliary relay shall be considered self-monitoring for integrity. Smoke dampers that are fail-safe upon loss of power and are wired in parallel on a common power circuit for their motor drives may be controlled with a single relay that interrupts the common power circuit.
- H. **Strobe Notification Appliance Circuits (NAC):**
1. Provide separate strobe NAC if operation of the horn or tone signals, such as a three-pulse temporal fire alarm signal, would impair proper operation of any strobes installed on a shared, single NAC.
  2. Provide separate strobe NAC for all strobes required to be synchronized.
  3. Install first strobe in each corridor no more than 15 feet from the end of the corridor. Interruptions to the concentrated viewing path of eye-to-strobe caused by doors, elevation changes, or other obstructions shall constitute the end of a corridor (NFPA 72, 6-4.4.2.2).
  4. Corridors are defined to be those pathways up to 20 feet maximum in width (NFPA 72, 6-4.4.2.1).
  5. **Mounting Height:** Install strobes so that entire lens is at least 80" above finish floor.
  6. Install strobe in every office occupied by two or more persons.

## OKEECHOBEE AGRI-CIVIC CENTER

### 3.2 NOTIFICATION APPLIANCES:

- A. Provide speakers, horns and visual appliances as required for proper alarm notification. Install devices in locations where shown on Drawings, as specified and as required by LAHJ-Local Authority Having Jurisdiction, field Inspectors for code-enforcement authority, Building Officials and Codes.
- B. Sprinkler System Electric Alarm Bell: Provide 120V, 20A branch circuit and connection to the controller for the sprinkler system electric alarm bell. Branch circuit shall come from an emergency power lighting class panelboard. Sprinkler alarm bell and controller furnished and installed by Division 15.

### 3.3 PROTECTION OF FIRE ALARM CONTROL UNITS

- A. Provide photoelectric smoke detector at the location of each fire alarm control unit installed in an area that is not continuously occupied, per NFPA 72 section 1-5.6.

END OF SECTION 16720

