December 22, 2015
BOARD OF COUNTY COMMISSIONERS
ORANGE COUNTY, FLORIDA
Addendum No. 4, IFB Y16-710-CC
ORANGE COUNTY FIRE RESCUE LOGISTICS WAREHOUSE HVAC REPLACEMENT

Bid Opening Date: January 12, 2016 at 2:00p.m.

This addendum is hereby incorporated into the bid documents of the project referenced above. The following items are clarifications, corrections, additions, deletions and/or revisions to, and shall take precedence over, the original documents. Underlining indicates additions, deletions are indicated by ~~strikethrough~~.

A. The Bid Opening Date is January 12, 2016 at 2:00 p.m.

B. In Part D of the IFB, delete page D-2 of the Official Bid Form in its entirety and replace with the attached **REVISED PAGE D-2**.

Failure of a bidder to submit their bid using the attached revised bid form, page D-2 shall result in their bid being found non-responsive.

C. Attached with this addendum are new and revised specification sections and table of contents. Those specification sections included with this addendum are the following:

1. SPECIFICATION SECTION 00010 – TABLE OF CONTENTS
   A. Add Specification Section 07212 - Open Cell Foam-In-Place Insulation.
   B. Delete Specification Section 07213 - Closed Cell Wall Foam Insulation.
   C. Delete Specification Section 15950 – Sequence of Operations.

2. SPECIFICATION SECTION 01010 – SUMMARY OF WORK
   A. Revise par 1.03 Scope of Work.

3. SPECIFICATION SECTION 01030 – BID ADDITIVES
   A. Revise par 3.1.A Bid Additive Schedule.

4. SPECIFICATION SECTION 07212 – OPEN CELL FORMED-IN-PLACE INSULATION
   A. Add new specification section in its entirety.

5. SPECIFICATION SECTION 07213 – CLOSED CELL WALL FOAM INSULATION
   A. Delete specification section in its entirety.

6. SPECIFICATION SECTION 15010 – MECHANICAL GENERAL PROVISIONS
   A. Code Edition Updates (refer to attached Section 15010.)

7. SPECIFICATION SECTION 15900 – BUILDING AUTOMATION SYSTEM
   A. Revise Specification Section 15900 in its entirety.

8. SPECIFICATION SECTION 15950 – SEQUENCE OF OPERATIONS
   A. Delete Specification Section 15950 in its entirety.

9. SPECIFICATION SECTION 16014 – REFERENCE STANDARDS AND REGULATORY REQUIREMENTS
   A. Code Edition Updates (refer to attached Section 16014.)

10. SPECIFICATION SECTION 16721 – ADDRESSABLE FIRE ALARM DETECTION SYSTEM (EXTENSION OF EXISTING)
    A. Code Edition Updates (refer to attached Section 16721.)

D. Attached with this addendum are changes to the architectural, mechanical and electrical drawings. Those changes included with this addendum are the following:

1. ARCHITECTURAL DRAWING SHEET NO A-101 – OVERALL RENOVATION
   A. Bid Additive: The Bid Additive shall include the acoustical ceiling replacement of the Lobby 101, Clerical 102, Climate Controlled Medical Storage 103, and both Toilets R100A and 100B.
   B. Existing Overhead Doors – Provide a garage door bottom seal similar and equivalent to North Shore Commercial Door Ultra Rubber Garage Door weather seal replacement kit for a 2” thick overhead door. Secure to existing overhead door per manufacturer’s installation recommendations. The existing overhead doors are 14’-0” x 14’-0”.

2. MECHANICAL DRAWING SHEET NO. M101 – FLOOR PLAN – RENOVATION MECHANICAL
   A. Add the following at the end of Hex Note #5: “PROVIDE FIRE DAMPER WITHIN DUCT AT RATED CEILING.”

3. MECHANICAL DRAWING SHEET NO. M701 – DETAILS - MECHANICAL
   A. Add “Horizontal Fire Damper Through Rated Ceiling Assembly Detail”. (Refer to revised attached Sheet M701)

4. DRAWING SHEET NO. ED-101 – FLOOR PLAN – ELECTRICAL DEMOLITION
   A. Add Hex Note #5 regarding electrical notes for the relocation of existing conduits and electrical equipment for the installation of the 2 hour fire rated shaft wall against the existing masonry wall. Refer to revised attached Sheet ED-101.

E. CLARIFICATIONS:

1. Clarification: In order to install the two (2) hour enclosure around the existing washer and dryers, the existing electrical conduits will need to be moved, relocated or adjusted for the new walls. Refer to revised sheet ED-101 for notes regarding this scope of work.

2. Clarification: Since the major ductwork is being done in the front offices, we have included the replacement of the suspended acoustical ceilings as a bid additive. Refer to the revised specification section 01030.

3. Clarification: The Contractor shall be responsible for moving the supplies from the shelves and storing the supplies onsite in a secure, safe, and dry place out of the weather. The Contractor must provide the Owner with access to the stored supplies. The Contractor shall be responsible for re-shelving the supplies.

4. Clarification: The Contractor shall be responsible for moving the shelving and disassembly and re-assembly of the shelving as needed to perform work. The Contractor shall be responsible for repositioning the shelving back into its original location.

5. Clarification: The Contractor must protect all other items in the warehouse and office areas from damage while work is being performed.

6. Clarification: All exposed flex conduits, junction boxes, disconnect switches and any other electrical devices to remain in service that are located on walls receiving new insulation shall be taped up with high-strength duct tape to make them air-tight and to prevent spray insulation entering the enclosures during application.

7. Clarification: The Company that provides fire alarm monitoring and maintenance at the Orange County Fire Rescue Logistics Warehouse is Signature Systems of Florida, 150 Wilshire Boulevard, Casselberry, Fl 32707. Contact Signature Systems of Florida at 407-644-8990.

8. Clarification: The new plywood and gypsum wall board surfaces are not to be painted.

9. Clarification: All existing loose wiring, conduit, outlets, disconnects, junction boxes, and all other electrical devices or accessories or utilities located on existing walls impacted by the insulation and wall board installation shall be moved, relocated, removed and or adjusted for the new plywood and or gypsum wall boards.

10. Clarification: The hours of operation for the Orange County Fire Rescue Logistics Warehouse are Monday through Friday 7:00a.m. to 4:00p.m. They are closed on Saturday and Sunday.

11. Clarification: All electrical found to be inoperable shall be removed back to the panel. All electrical shall not be abandoned in place.

F. QUESTIONS AND ANSWERS:

1. **Question:** Provide a specification for the rubber gasket to be applied to the existing roll up doors.
Response: Garage Door Bottom Seal is similar to North Shore Commercial Door Ultra Rubber Garage Door bottom weather seal replacement kit for 2" thick doors. This seal has an integral aluminum angle to secure the door seal to the existing doors. Refer to www.northshorecommercialdoor.com/ungadobowese1.html.

2. **Question:** Do the frames for the curbs of IV 1-1,2, & 3 needed to be welded to the existing structure? If so, can a detail be provided?
Response: A detail has already been provided on Sheet M702 regarding attaching the new curb to the existing structure.

3. **Question:** The Spray Insulation should be changed to an "open cell" foam. There have been discussions on the storage material movement and space for scaffolding.
Response: Refer to updated specification section 07212 for new "open cell" foam insulation. The spray insulation has been replaced.

4. **Question:** The specs reference a phase 1 with Johnson Controls as the HVAC controls manufacturer, but doesn't state if it is the Johnson Branch Controls or Johnson FX controls. Can you please clarify?
Response: Refer to new Specification Section 15900 included with this addendum. There is no "phase 1" with Johnson Controls within this building.

5. **Question:** HVAC scope indicates removing (4) existing systems where there is an existing 2 old systems will come out and 2 old systems will remain. Please confirm.
Response: The drawings show correct scope of work. The 01010 Summary of Work section has been revised with this addendum.

6. **Question:** Sheet M101 Gen-Note 12 calls for temporary cooling. We are only going to supply spot coolers for the areas being served by systems 2 & 4.
Response: Correct – temporary cooling during construction is only required for areas within scope of work that are currently air-conditioned.

7. **Question:** Please provide the dimension of the existing roller up doors as it's not indicated on the plans.
Response: The existing overhead doors are 14'-0" x 14'-0".

8. **Question:** During the spray insulation application, there will be a restriction occupying the space due to safety reasons. Please advise if working during the weekend or second shift is acceptable.
Response: The spray insulation work shall only be scheduled for the weekend. It shall not be scheduled for the weekdays Monday through Friday. The spray insulation work shall be coordinated and scheduled in writing with the County Project Manager.

9. **Question:** There are a lot of free wiring, conduits and boxes that has to be removed and reinstalled after the spray insulation application. Please confirm that this work will be part of the scope of work of the contract?
Response: Yes, it is part of the scope of work for the Contractor.

10. **Question:** As per sheet A-101, it was indicated to construct a new dry wall partition under the existing steel beam, as per the walk through, there are existing speakers, free wiring, conduits, and boxes that will be in the way of constructing the new wall, please confirm that removing and rerouting all the previous utilities at the mentioned area will be part of the scope of work?
Response: Yes, it is part of the scope of work. The Contractor shall move existing wiring, speakers, conduit, outlets, junction boxes and all other electrical devices or electrical accessories for the installation of the new wall and retain them in their present location and seal around the penetrations.

11. **Question:** Sheet A-102, states to insulate the void between the beam and the roof deck with batt insulation or spray insulation, during the walkthrough we found that the mentioned space is already insulated with fiberglass rolls; please advise whether the intent is to remove the existing insulation and apply the batt insulation, or just seal where the roof penetration will occur.
Response: The design intent is to provide an air conditioned envelop and the additional insulation is to seal this space. The existing roof insulation is to remain, but provide additional insulation to seal this space.

12. **Question:** Sheet A-402, details #3, 34 and #5 indicate to install the new 2-hour rated shaft wall next to the existing CMU wall, as per the walkthrough, we found that the existing dryer's vent, heater's water lines, conduits are mounted on the mentioned CMU wall, where building the new wall as per shown in the drawings cannot be done without removing and relocating all the previously identified utilities; please advise?
Response: In order to install the 2-hour enclosure around the existing washer and dryers, all electrical, utilities, dryer vent heater water lines, conduits and other items impacted by this work shall be moved or removed, relocated or adjusted for the construction of the new walls.

13. **Question:** Sheet A-401 detail #3 states to install the new plywood panels; Please advise if the mentioned panels are to be fire rated. Please advise if the panels are to be painted. If the intent is to paint the panels, please provide the specifications.
Response: Fire rated plywood is not required. All plywood and gypsum wall board surfaces are not to be painted.

14. **Question:** Sheet A-102 detail #2 shows a 2-hour rated ceiling assembly matching the existing adjacent roof's elevation; as per the walk through it was mentioned that the existing washer and dryers will be operable during construction where it will be too tight to frame and sheet rock the new ceiling; please advise if raising the ceiling height as well as the walls will be acceptable so we can have enough room to install the mentioned new ceiling?
Response: The elevation of the laundry room ceiling can be raised to facilitate the existing equipment and conditions.

15. **Question:** During the walk through, we found a lot of free wiring and conduits on top of the existing lounge and captain's rooms roof. Please advise if securing the loose conduits and wiring as well as cleaning above the roof will be part of the scope?
Response: Yes, it is part of the scope of work.

G. ACKNOWLEDGEMENT OF ADDENDA

1. The Bidder shall acknowledge receipt of this addendum by completing the applicable section in the solicitation or by completion of the acknowledgement information on the addendum. Either form of acknowledgement must be completed and returned not later than the date and time for receipt of the bid.
2. All other terms and conditions of the IFB remain the same.
3. **Receipt acknowledged by:**

_____ _____
Authorized Signature Date Signed

_____

Title

_____
Name of Firm

To the Board of County Commissioners
Orange County, Florida

The Undersigned, hereinafter called "Bidder", having visited the site of the proposed project and familiarized himself with the local conditions, nature and extent of the work, and having examined carefully the Contract Form, General Conditions, Supplementary Conditions, Plans and Specifications and other Contract Documents, with the Bond requirements herein, proposes to furnish all labor, materials, equipment and other items, facilities and services for the proper execution and completion of: **ORANGE COUNTY FIRE RESCUE LOGISTICS WAREHOUSE HVAC REPLACEMENT** in full accordance with the drawings and specifications prepared in accordance with the Contract Documents and, if awarded the Contract, to complete the said work within the time limits specified for the following LUMP SUM .

BASE BID:

_____DOLLARS
(In Words)

$_____

ADDITIVE BID ITEM 001: All work required for the removal of existing suspended ceilings grid and ceilings tiles in the Captain's Office 111, Men's Toilet R100C, Women's Toilet R100D, ~~and~~ Lounge 115, Lobby 101, Clerical 102, Climate Controlled Medical Storage 103, and both Toilets R100A and 100B. Provide new suspended ceiling grid, wall angles, and acoustical tiles as specified in Section 09510 Acoustical Panel Ceiling.

$_____

In the event the Contract is awarded to this Bidder, he/she will enter into a formal written agreement with the County in accordance with the accepted bid within ten (10) calendar days after said Contract is submitted to him/her and will furnish to the County a Contract Payment and Performance Bond with good and sufficient sureties, satisfactory to the County, in the amount of 100% of the accepted bid. The Bidder further agrees that in the event of the Bidder's default or breach of any of the agreements of this proposal, the said bid deposit shall be forfeited as liquidated damages.

Failure of the Bidder to provide pricing for all unit priced items and/or the Base Bid and ALL requested additive/deductive bid items, or alternate bids shall be cause for rejection of the bid as non-responsive.

REVISED D-2

ORANGE COUNTY
FIRE LOGISTICS WAREHOUSE
HVAC RENOVATION

Division 12 – Furnishings – NOT USED

Division 13 – Special Construction – NOT USED

Division 14– Conveying Systems – NOT USED

Division 15 – Mechanical

15010	Mechanical General Provisions
15020	HVAC Demolition
15050	Basic Materials and Methods
15051	Adjusting, Balancing and System Testing
15055	Motors
15057	AFDs
15090	Supports, Hangers, Anchors and Sleeves
15133	Refrigeration Specialties
15210	Vibration Isolation
15250	Insulation
15780	Packaged Split Systems
15840	Shop Fabricated Ductwork
15846	Prefabricated Ductwork
15860	Sheet Metal Specialties
15870	Grilles, Registers and Diffusers
15880	Filters
15900	Building Automation Systems
~~15950~~	~~Sequence of Operations~~

Division 16 - Electrical

16010	Basic Electrical Requirements
16012	Submittals
16013	Substitutions
16014	Reference Standards and Regulatory Requirements
16015	Electrical Symbols and Abbreviations
16060	Minor Electrical Demolition for Remodeling
16061	Investigation of Existing Electrical Systems
16090	Tests and Performance Verification of Electrical System
16095	Demonstration of Completed Electrical Systems
16098	Operation and Maintenance Manuals
16111	Conduit
16123	Building Wire and Cable
16131	Outlet Boxes
16133	Pull and Junction Boxes
16141	Wiring Devices
16160	Cabinets and Enclosures
16170	Grounding and Bonding
16180	Equipment Wiring Systems
16190	Hangers and Supports
16195	Identification for Electrical Systems
16441	Enclosed Disconnect Switches
16471	Panelboards
16721	Addressable Fire Alarm/Detection System (Extension of Existing)

ORANGE COUNTY
FIRE LOGISTICS WAREHOUSE – HVAC RENOVATION

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

B. When the titles such as Engineer, Project Engineer, or Owner are used throughout this specification, this implies Orange County as property owner and/or an officially appointed County Representative.

1.02 PROJECT DESCRIPTION

A. Performance of all tasks specified in the contract documents shall be the responsibility of the contractor unless specified otherwise.

1.03 SCOPE OF WORK

A. The Engineering work shall include the following:
1. Replace existing ~~four (4)~~ DX split systems serving the currently–conditioned spaces of the warehouse as shown on drawings.
2. Add two (2) new DX split systems to condition warehouse bays not previously conditioned.
3. Replace all toilet ceiling cabinet exhaust fans.
4. For newly-conditioned spaces, abandon and seal existing louvers and fans in the walls and roof.

B. The Architectural work shall include the following:

1. Install ~~spray~~ **open-cell** foam insulation on exterior walls of newly conditioned areas.
2. Install framing and plywood to 8'-0" to protect foam insulation from damage.
3. Correct existing penetrations in the exterior wall if located in newly conditioned areas.
4. Box out existing ridge vents on exterior with a galvanized sheet metal closure panel mechanically fastened to framing and set in continuous bed of sealant.
5. Insulate interior side of ridge vents with faced rigid insulation.
6. Box out interior side of existing exhaust fans with sheet metal enclosure mechanically fastened to fan frame; set perimeter in sealant.
7. Install weather stripping at overhead door track and door bottoms.
8. Install a rated enclosure with rated doors around gas-fired laundry equipment.
9. Install a metal frame gypsum wallboard partition with an accessible door to separate conditioned laundry space from adjacent non-conditioned warehouse area.

C. Bid Additive: Additive No. 1: All work required for the removal of existing suspended ceiling grid and ceiling tiles in the Captain's Office 111, Men's Toilet R100C, Women's Toilet R100D, Lounge 115, **Lobby 101, Clerical 102, Climate Controlled Medical Storage 103, and both Toilets R100A and 100B**. Provide new suspended ceiling grid, wall angles, and acoustical tiles as specified in Section 09510 Acoustical Panel Ceiling.

1.04 CONTRACTOR RESPONSIBILITIES

A. General:

1. The contractor shall have all submittals approved by the Engineer and accepted by the Owner prior to the start of active construction.
2. The contractor shall have all equipment and material onsite prior to the start of active construction.
3. The contractor shall submit to the Owner prior to the project pre-construction meeting the following:

   - Schedule of Values
   - Construction Schedule
   - Submittal Schedule
   - Emergency Telephone List including subcontractors and suppliers

4. The contractor shall field verify existing conditions of construction prior to start of active construction.
5. The contractor shall coordinate with the Owner on the operation of the existing fire alarm system prior to the start of active construction. There shall be an action plan for the operation of the fire alarm system during construction submitted by the contractor to the Owner for acceptance. This action plan shall be in place prior to the start of active construction. Any false fire alarms that occur during construction and deemed by the Owner to be the fault of the contractor, the contractor shall pay all costs incurred from the local fire department for responding to a false alarm.
6. The contractor is responsible for moving furniture and or equipment if necessary to perform the work included in the contract. The contractor is responsible for placing the furniture and or equipment back in its original location. The contractor is responsible for any damages to furniture, equipment, etc., which occur during construction. The contractor shall provide protection for floors, walls, furniture, equipment and any other items that may be subject to damage during the construction periods.
7. The contractor shall videotape or take pictures of pre-existing conditions of the interior and exterior of the building prior to the start of active construction. Failure to provide photographs or videotape prior to start of construction, places the responsibility on the Contractor to complete the necessary replacement, repairs, and or cleaning as determined by the Owner at no additional cost to the Owner. One set of photographs (in a three-ring binder) or videotape of the site existing conditions shall be submitted to the Owner.
8. The contractor shall at all times maintain daily cleanup of construction areas. Work areas that are not cleaned by the contractor, and cleaned by the Owner, those costs shall be charged back to the contractor via change order.
9. The contractor shall provide a construction schedule to the Owner's Project Manager prior to the pre-construction meeting. The contractor shall update the construction schedule weekly and submit it to the Owner's Project Manager for review.

1.05 WORK UNDER OTHER CONTRACTS

A. Separate contracts may be issued to perform certain construction operations at the site. The contractor of this project will allow reasonable access and coordination to the other contractor/s.

1.06 WORK SEQUENCE

A. The facility shall remain occupied and operational while work is in progress. All work shall be performed during normal business houses. Normal business hours are defined as 7:00 a.m. to 4:00 p.m. Monday through Friday. Material and equipment deliveries shall be made during normal business hours.

1.07 CONTRACTOR USE OF PREMISES

A. General: During the construction period, the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.

B. General: Limited use of the premises to construction activities in areas indicated within the limit of the premises. The Contractor may use any portion of the site for storage or work areas or any legal purpose.

1. Confine operations to areas within Contract limits indicated on the Drawings. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

2. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

3. Burial of Waste Materials: Do not dispose of organic and hazardous material on site, either by burial or by burning.

4. Where appropriate, maintain the existing building in a watertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

5. Confine construction operations to the areas permitted by the contract documents and other Owner directives.

6. Provide protection and safekeeping of material and equipment stored on premises.

7. Contractor will move any stored material and equipment, which interfere with operations of the Owner or other contractors at no additional cost to the Owner.

8. Comply with Owner's requirements for ingress and egress procedures, prohibitions against firearms, procedures for transportation of workers, safety and fire prevention requirements and all applicable pollution control requirements. Refer to the following reference requirements:

   a) Orange County Safety and Health Manual
   http://www.orangecountyfl.net/VendorServices/OrangeCountySafetyandHealthManual.aspx

   b) Orange County Policy Manual page 96 regarding Firearms
   http://www.orangecountyfl.net/portals/0/resource%20library/employment%20-%20volunteerism/Policy%20Manual.pdf

9. Contractor to require all employees and subcontractors to wear non-objectionable clothing; prohibit revealing clothing and articles of clothing with offensive writings displayed. The contractor shall require offending personnel to leave the premises until such clothing is changed.

10. Contractor employees and subcontractors will not fraternize with County employees or the general public during the entire construction period.

11. Use of sound equipment (such as boom boxes, stereos, radios, etc.) is not allowed.

12. Contractor and their personnel shall abide to Orange County Tobacco free policy while on any Orange County Convention Center property. This policy shall apply to building, parking lots, parks, break areas and worksites. Tobacco is defined as tobacco products, including but not limited to: Cigars, cigarettes, pipes, chewing tobacco and snuff. Failure to abide by the policy may result in civil penalties levied

under Chapter 386, Florida Statutes and/or Contract enforcement remedies. Refer to the following documents:

a) Orange County Smoking Policy: http://www.orangecountyfl.net/Portals/0/resource%20library/employment%20-%20volunteerism/Employee%20Handbook.pdf

13. Conduct that is disrespectful, abusive or otherwise objectionable to the Owners' employees or general public will not be allowed at any time during the construction period. Repetitive complaints and violations of the requirements listed above will be cause for dismissal and or permanent removal of offending personnel from the project.

14. Contractor to coordinate with the Owner the site location for storage of equipment, machinery, materials, tools and a construction waste dumpster.

15. Contractor shall at all times keep the premises free of all waste or surplus materials, rubbish and debris, which is caused by contractor employees or subcontractors resulting from their work. Contractor shall maintain a safe work environment to all building occupants during the construction period.

1.08 SECURITY AND IDENTIFICATION

A. The building shall be secured from unwarranted entry at the end of each workday.

B. All costs for background investigations will be Contractor's responsibility. The County shall have the right to request any additional investigative background information including, but limited to, the employment record, Right-To-Know records, E-Verify system records (if the Contractor uses this service as a means to determine employment eligibility, available through www.uscis.gov), training records, payroll records, position for which hired including site location of any personnel assigned to perform the services. The Contractor shall furnish, in writing, such information to the extent allowed by law, prior to commencement of services. The County reserves the right to conduct its own investigation of any employee of the Contractor.

C. Background Checks for the contractor's staff must be approved by Orange County's Security team prior to working in any County facility. Contractors are responsible for obtaining the necessary forms for background checks for work at Orange County. All contractor's staff background checks will be sent to the Orange County Project Manager for approval.

D. For security purposes and to maintain privacy, please submit a FDLE Background Checks via e-mail the subject line of the email must contain the following ***EXEMPT***

E. Orange County will inform the contractor of their Background Check results. Upon Background Check approval, the contractor's staff shall arrange an appointment with the Orange County staff to obtain a Orange County photo ID badge. An affidavit of Identity form (issued by the contractor) and a State of Florida ID or Drivers License will be required.

F. Contractor's employees will not be allowed in Orange County facilities without completed and approved background investigations.

G. Work hours will be scheduled around business activity. Business activity is considered to be Orange County office/administrative staff located in or adjacent to construction/renovation site or Orange County Clients renting convention space located in or adjacent to construction/renovation site.

1.09 OWNER OCCUPANCY

A. Owner Occupancy: The Owner will be occupying the building during construction. Normal occupancy hours are 7:00 am to 4:00 pm Monday through Friday. Prior to beginning of each

business day, each area where work is done after normal business hours shall be fully operational and back in original condition. Such placing of equipment and partial occupancy shall not constitute acceptance of the total work.

1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Owner occupancy.
2. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
3. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

1.10 DISTRIBUTION OF RELATED DOCUMENTS

A. The Contractor is solely responsible for the distribution of ALL related documents/drawings to ALL appropriate vendors/subcontractors to ensure proper coordination of all aspects of the project and its related parts during bidding and construction.

1.11 CONTRACT DOCUMENT FILE

A. Copies of the Contract Documents, Plans, Specifications, Addenda, Change Orders, Engineers Supplemental Instructions, approved Shop Drawings, Substitution Acceptances, etc. shall be placed and maintained at the project site by the Contractor throughout the entire contract period. These said documents shall be filed in a manner that allows for ease of retrieval. Documents shall be made available to the Engineer and the County's representatives throughout this same period.

PART 2 - PRODUCTS

2.01 ASBESTOS FREE MATERIAL

A. Contractor shall provide a written and notarized statement on company letterhead(s) to certify and warrant that ONLY ASBESTOS FREE MATERIALS AND PRODUCTS were provided as required by the Engineer in Section 01400, QUALITY CONTROL. Such statement shall be submitted with the final payment request. Final payment shall not be made until such statement is submitted. Contractor agrees that if materials containing asbestos are subsequently discovered at any future time to have been included in the construction, the Contractor shall be liable for all costs related to the redesign or modification of the construction of the project so that materials containing asbestos are removed from the facility. If construction has begun or has been completed pursuant to a design that includes asbestos containing materials, the Contractor shall also be liable for all costs related to the abatement of such asbestos.

PART 3 EXECUTION (Not applicable).

END OF SECTION 01010

SECTION 01030
BID ADDITIVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

B. Refer to Specification Section 09510 – Acoustical Panel Ceiling.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing Additive.

1.3 DEFINITIONS

A. Definition: An Additive is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost for each additive is the net addition to/from the Contract Price to incorporate the Additive into the Work. No other adjustments are made to the Contract Price.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely and fully integrate that work into the Project.

1. Include as part of each additive, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Additive.

B. Notification: The Owner will notify each party involved, in writing, if additives have been accepted, rejected, or deferred for later consideration.

C. Schedule: A schedule of additives is included in the Bid Form. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each additive.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF ADDITIVES

A. Additive No. 1: All work required for the removal of existing suspended ceiling grid and ceiling tiles in the Captain's Office 111, Men's Toilet R100C, Women's Toilet R100D, Lounge 115, **Lobby 101, Clerical 102, Climate Controlled Medical Storage 103, and both Toilets R100A and 100B**. Provide new suspended ceiling grid, wall angles, and acoustical tiles as specified in Section 09510 Acoustical Panel Ceiling.

END OF SECTION 01030

SECTION 07212
OPEN CELL FORMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, tools and equipment necessary for the application of sprayed in place, water blown, polyurethane open cell foam insulation for application in interior perimeter stud wall cavities as detailed.

1.2 RELATED WORK

A. Section 06100 – Rough Carpentry

B. Section 09260 – Gypsum Drywall

C. Division 15 – Mechanical

D. Division 16 – Electrical

1.3 QUALITY ASSURANCE

A. All work shall be performed by applicators skilled in the application of polyurethane foam systems. Applicators shall have completed 5 similar projects over the last 5 years and shall provide a list of these projects to the Owner or Owner's representative upon request.

B. Health and safety concerns

1. Consult with manufacturer for specific health and safety procedures for handling and application of this product.

1.4 SUBMITTALS

A. Current data sheets on all materials intended for use on the project.

B. Manufacturer's application and installation instructions.

C. Safety and handling instructions for storage, handling and use of the materials including Material Safety Data Sheets (MSDS) on each product intended for use.

D. Field Quality control Procedures to be utilized by the contractor/applicator to insure proper installation of the specified sprayed in place insulation.

1.5 MATERIALS, DELIVERY AND STORAGE

A. Materials shall be delivered in the manufacturers original, tightly sealed containers or unopened packages clearly labeled with the manufacturer's name, product identification, safety information, UL approvals, and batch or lot numbers where applicable.

B. Containers shall be stored out of the weather and away from direct sunlight at temperatures within the limits specified by the materials manufacturer.

C. All materials shall be stored in compliance with local fire and safety codes.

1.6 ENVIRONMENTAL CONDITIONS

A. Do not apply the sprayed in place insulation below the temperature specified in the product manufacturer data sheets (or within 5 degrees of the dew point)or as approved by the manufacturer technical personnel.

B. Apply thermal barriers and vapor retarder (if required) in accordance with local building code requirements.

1.7 SEQUENCE OF SCHEDULING

A. Install the insulation system when the preparation of the interior perimeter walls to in place and in coordination with other building trades.

1.8 SAFETY REQUIREMENTS

A. All non-essential personnel are restricted from access to the areas where sprayed in place insulation is applied.

1. Review MSDS and be familiar with chemicals and their hazards.

2. Post warning signs at all work area entrances to restrict entry by unauthorized personnel.

3. No welding or open flame.

4. Ground equipment to prevent sparking.

5. Seal off work area from adjacent rooms and ventilation ducts.

6. Restrict access of non-application personnel including other trades.

7. Do not eat, drink, or smoke in work area.

8. Use engineering controls to ventilate the area if possible.

9. Wear breathing, body, glove, and eye protection during application and for the 24 hours following application for the sprayer and any necessary spectators.

10. Provide ventilation as needed. Contact your supplier as necessary for guidance on ventilation time and re-occupancy for the formulation you are using.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Icynene LD-C-50 spray foam insulation.

B. Type: Low-density, water-blown, open cell, conforming to the following:

1. Thermal Resistance (R-Value/inch @ 75 deg F): ASTM C 518; 3.7 hr/sq ft/degree F/BTU

a. Heat Flow Reduction:

1. Through 1 inch: 75 percent
2. Through 3.5 inches 93 percent
3. Through 5.5 inches 95 percent
4. Through 10.5 inches 98 percent

2. Air Permeance (for 2 inches of material): ASTM E 283; <0.02 L/S.m^2 @ 75 Pa

3. Air Permeance (for 5.5 inches of material): ASTM E 2178; <0.02 L/S.m^2 @ 75 Pa

4. Water Vapor Transmission (for 5.5 inches of material): ASTM E 96; 11 perms [627 ng/(Pa.s.m^2)]

5. Flame Spread and Smoke Developed Rating: ASTM E 84

   a. Flame Spread: Less than 20

   b. Smoke Development: Less than 400

   c. Oxygen Index 23 percent

6. Bacterial and Fungal Growth and Food Value: Texas Tech. University; not a source of food for mold (no growth)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.

1. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 200 deg F per ASTM C 411 or in accordance with authorities having jurisdiction.

3.2 PREPARATION

A. Clean substrates and cavities of loose materials capable of interfering with insulation placement.

3.3 APPLICATION

A. Site mix liquid components manufactured by Icynene and supplied by Independent Icynene Licensed Dealer.

B. Apply insulation to substrates in compliance with manufacturer's written instructions.

C. Apply insulation to produce thickness required for indicated R Value.

1. R-13 is achieved at 3 ½ inches

2. R-20 is achieved at 5 ½ inches

D. Extend insulation in thickness indicated to envelop entire area to be insulated.

E. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

3.4 REPAIRS

A. Any repairs must be effected by an Icynene Licensed Dealer.

3.5 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse.

END OF SECTION 07212

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SECTION 15010
MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

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

B. Each Section within Division 15, Mechanical, shall conform to the requirements of the General Conditions of the Contract, including Supplementary General Conditions, Special Conditions, and all requirements of Division 1.

C. Each Section within Division 15, Mechanical, shall conform to the additional requirements of this Section, Mechanical General Provisions.

1.2 ARTICLES INCLUDED

A. Definitions.

B. Permits, Fees and Notices.

C. Applicable Publications.

D. Code Compliance.

E. Scope of Work.

F. Record Drawings.

G. Intent of Drawings and Specifications.

H. Quality Assurance

I. Submittals.

J. Product Requirements, Equals and Substitutions.

K. Manufacturers Instructions.

L. Transportation and Handling.

M. Storage and Protection.

N. Cutting, Patching and Demolition.

O. Cleaning Up/Removal of Debris.

P. Starting of Mechanical Systems.

Q. Operating and Maintenance Manuals.

R. Training of Owners Operators.

S. Guarantee of Work.

T. System Testing.

1.3 ARTICLES

A. Definitions:

1. The term "As indicated" means as shown on drawings by notes, graphics or schedules, or written into other portions of contract documents. Terms such as "shown", "noted", "scheduled" and "specified" have same meaning as "indicated", and are used to assist the reader in locating particular information.
2. The term "Provide", means furnish and install as part of the work covered in Division 15.
3. The term "Furnish" means furnish only, for installation, as part of this contract, by other Divisions.
4. The term "Install only" means to install under the work of Division 15 equipment furnished by other Divisions, or by the Owner.
5. The term "Owner's Representative" when referenced herein shall be the Architect or the Engineer acting as his designated representative unless otherwise noted.
6. The term "design" as it pertains to the work of this division shall describe the basic intent, component sizing, component relationships and overall architecture of the HVAC, plumbing and fire protection system. The design is generally schematic in nature and will require specific detailing after the accepted products are determined.
7. The term "detail" as it pertains to the work of this division shall describe the work required by the contractor to assure a fully coordinated installation of the material and equipment supplied. When requested, the contractor shall produce detailed shop drawings or sketches indicating the actual placement of the equipment or material supplied; also including how the equipment or material interfaces with work of other sections or divisions within the contract documents.
8. The term "workman-like manner" as it pertains to the work of this division shall describe a neat well organized high quality installation system (duct, pipe, control wire or tube, conduit, etc.). Routing shall be well thought out providing adequate service clearance and maximum use of space. Equipment placement shall exhibit proper clearances for service. All lines (duct, pipe, control wire or tube, conduit, etc.) shall be run straight and true, parallel or perpendicular to building structure neatly supported.
9. For additional definitions refer to the General Conditions.

B. Permits, Fees and Notices: Comply with the General Conditions.

C. Applicable Publications:

1. Publications listed in each Section form a part of that Section to the extent referenced.
2. When a standard is specified by reference, comply with requirements of that standard, except when requirements are modified by the Contract Documents, or applicable codes establish stricter standards.
3. The Publication or Standard is the publication in effect as of the bid date, except when a specific date is listed.

D. Code Compliance:

1. **2012** ~~2006~~ Life Safety Code - NFPA 101
2. **2014** ~~2010~~ The Florida Building Code **5th Edition**

3. **2014** ~~2010~~ The Florida Accessibility Code for Building Construction
4. **2011** ~~2008~~ National Electric Code (NEC)
5. **2014** ~~2010~~ The Florida Building Code **5th Edition** – Mechanical
6. **2012** ~~2009~~ NFPA Standards

E. Scope of Work: The work to be performed under this Division consists of the satisfactory completion of all HEATING, VENTILATING, AIR CONDITIONING, as indicated in the Contract Documents.

F. Record Drawings: Comply with the General Conditions.

G. Intent of Drawings and Specifications:

1. The intent of the drawings and specifications is to establish minimum acceptable quality standards for materials, equipment and workmanship, and to provide operable mechanical systems complete in every respect.
2. Existing conditions, dimensions, etcetera, depicted on the drawings are taken from the "as-built" drawings of the original construction supplemented by field observation. The contractor is cautioned to field verify all existing conditions, dimensions, etcetera, notifying the Owner's Representative of any discrepancies other than those minor in nature, for direction, prior to ordering or fabricating equipment or materials. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawing and specifications, the more stringent shall govern, unless the discrepancy conflicts with applicable codes, wherein the code shall govern.
3. The drawings are diagrammatic, intending to show general arrangement, capacity and location of system components, and are not intended to be rigid in detail. Final placement of equipment, other system components, and coordination of all related trades shall be the contractor's responsibility.
4. Due to the small scale of the drawings, and to unforeseen job conditions, all required offsets and fittings may not be shown but shall be provided at no additional change in contract cost.
5. In the event of a conflict, the Owner's Representative will render an interpretation in accordance with the General Conditions.

H. Quality Assurance:

1. All equipment furnished under this Division shall be listed and labeled by U.L., ETL or a nationally recognized testing laboratory (NRTL).
2. Material furnished under this Division shall be standard catalogued products of recognized manufacturers regularly engaged in the production of such material and shall be the latest design.
3. Materials shall be the best of their respective kinds. Materials shall be new except where the specifications permit reuse of certain existing materials.
4. Work provided for in these specifications shall be constructed and finished in every part in a workmanlike manner.
5. All items necessary for the completion of the work and the successful operation of a product shall be provided even though not fully specified or indicated on the drawings.
6. All work to be performed by qualified and experienced personnel specifically trained in their respective field.
7. All work of this division shall be carefully interfaced with the work of other divisions to assure a complete, functioning system or systems.

I. Submittals: Comply with the General Conditions.

J. Product Requirements, Equals and Substitutions: Comply with the General Conditions.

K. Manufacturer's Instructions:

1. Installation of work shall comply with manufacturer's printed instructions.
2. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Owner's Representative for clarification. Do not proceed with work without clear instructions.

L. Transportation and Handling: Comply with General Conditions.

M. Storage and Protection:

1. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
2. Store products to prevent damage by the elements. Space temperature shall be controlled as required to prevent condensation and metal corrosion or damage to electrical or electronic parts are the result of condensation.
3. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
4. Provide protection as necessary to prevent damage after installation.
5. Products which suffer damage due to improper storage shall not be installed and if found in place, shall be removed and replaced at the contractors expense.

N. Cutting and Patching: Comply with the General Conditions.

O. Cleaning Up/Removal of Debris:

1. Comply with the General Conditions.
2. Maintain a clean work area. Construction debris shall be immediately removed from all newly erected work.

P. Starting of Mechanical Systems:

1. Provide material and labor to perform start-up of each respective item of equipment and system prior to beginning of test, adjust and balance procedures.
2. Provide labor to assist the Owner's Representative in acceptance review.
3. Provide point by point system check-out. Submit results in tabulated form by system. Include this data as part of Operation and Maintenance Manuals.
4. Provide information and assistance and cooperate with test, adjust and balance services.
5. Comply strictly with manufacturer's recommended procedures in starting up mechanical systems.
6. Provide such periodic continuing adjustment services as necessary to ensure proper functioning of mechanical systems until acceptance and up to 1 full year after date of Owner acceptance.

Q. Operating and Maintenance Manuals: Comply with the General Conditions.

R. Training of Owners Operators:

1. The owners shall be given comprehensive training in the understanding of the systems and the operation and maintenance of each major piece of equipment.

2. The contractor shall be responsible for scheduling the training which shall start with classroom sessions followed by hands on training on each piece of equipment. Hands on training shall include start-up, operation in all modes possible, shut-down and any emergency procedures.
3. Training shall be conducted in a minimum of three sectors. The first, or orientation portion, shall be scheduled prior to system start-up. The second, or equipment portion, shall be scheduled as soon as possible after start-up of the equipment and the third portion, or the TAB and commissioning portion, shall be conducted after completion of this work.
4. Classroom sessions shall include the use of overhead projections, slides, video and audio taped material as might be appropriate.
5. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual.
6. The manufacturer's representative shall provide the instructions on each major piece of equipment. These sessions shall use the printed installation, operation and maintenance instruction material included in the O&M manuals and shall emphasize safe and proper operating requirements and preventative maintenance.
7. The contractor shall attend all sessions and shall add to each session any special information relating to the details of installation of the equipment as it might impact the operation and maintenance.
8. The building controls system contractor shall attend all sessions and be prepared to conduct the controls portion of the training as it relates to each equipment section.
9. The building controls system contractor shall conduct the training session on the controls system hardware and software.
10. The piping, insulation and sheet metal sub-contractors shall conduct sessions on their respective trades with emphasis on any peculiarities of the systems, pressure limitations and maintenance requirements.
11. The TAB sub-contractor shall conduct a training session reviewing the procedures and methods used in the TAB process, shall review the TAB data and shall demonstrate use of test equipment which may have been turned over to the owner and shall point out the locations of all pitot traverse locations for the owner's future use.

S. Guarantee of Work:

1. Comply with the General Conditions.
2. Where applicable, furnish manufacturer's written warranty for materials and equipment.
3. Insert warranties in appropriate locations in operating and maintenance manuals.
4. Materials and equipment having seasonal operation limitations, shall be guaranteed for a minimum of one year from date of seasonally appropriate test, and acceptance in writing by the Owner, unless specific Division 15 specifications specify a longer period.

T. System Testing:

1. Provide all necessary labor, materials and equipment to successfully complete all system testing necessary for building occupancy and owner acceptance.
2. Provide all necessary labor, materials and equipment to assist contractors of other division to complete system testing necessary for building occupancy and owner acceptance, wherever an inter-relationship between Division 15 and the work of other divisions exists.
3. Tests shall be repeated as necessary until all occupancy and operation permits are granted and the owner accepts the project.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 15010

SECTION 15900
BUILDING AUTOMATION SYSTEM

PART 1 - GENERAL

1.1 General

A. **All work of this Division shall be coordinated and provided by the single Building Automation System (BAS) Contractor.**

B. **The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades. Reference the Division 15 Sections for details.**

C. **The work of this Division shall be as required by the Specifications, Point Schedules and Drawings.**

D. **If the BAS Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the design team.**

E. **Refer to attached requirements from the Orange County Information Systems and Services (ISS) division for all Orange County hardware, software, and network requirements.**

1.2 BAS Description

A. **The Building Automation System (BAS) shall be a complete system designed for use with the enterprise IT systems. This functionality shall extend into the equipment rooms. Devices residing on the automation network located in equipment rooms and similar shall be fully IT compatible devices that mount and communicate directly on the IT infrastructure in the facility. Contractor shall be responsible for coordination with the owner's IT staff to ensure that the BAS will perform in the owner's environment without disruption to any of the other activities taking place on that LAN.**

B. **All points of user interface shall be on standard PCs that do not require the purchase of any special software from the BAS manufacturer for use as a building operations terminal. The primary point of interface on these PCs will be a standard Web Browser.**

C. **The work of the single BAS Contractor shall be as defined individually and collectively in all Sections of this Division specifications together with the associated Point Sheets and Drawings and the associated interfacing work as referenced in the related documents.**

D. **The BAS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned BAS.**

E. **Provide a complete, neat and workmanlike installation. Use only manufacturer employees who are skilled, experienced, trained, and familiar with the specific equipment, software, standards and configurations to be provided for this Project.**

F. **Manage and coordinate the BAS work in a timely manner in consideration of the Project schedules. Coordinate with the associated work of other trades so as to not impede or delay the work of associated trades.**

G. **The BAS as provided shall incorporate, at minimum, the following integrated features, functions and services:**

1. **Operator information, alarm management and control functions.**
2. **Enterprise-level information and control access.**
3. **Information management including monitoring, transmission, archiving, retrieval, and reporting functions.**
4. **Diagnostic monitoring and reporting of BAS functions.**
5. **Offsite monitoring and management access.**
6. **Energy management**
7. **Standard applications for terminal HVAC systems.**

H. **Acceptable Manufacturers (NO SUBSTITUTIONS)**

1. **Reliable Controls**
2. **Honeywell**
3. **Johnson Controls**
4. **Automated Logic Controls**
5. **The Trane Company**

1.3 Quality Assurance

A. **General**

1. **The Building Automation System Contractor shall be the primary manufacturer-owned branch office or primary installer of said manufacturer that is regularly engaged in the engineering, programming, installation and service of total integrated Building Automation Systems.**
2. **The BAS Contractor shall be a recognized national installer and service provider of BAS.**
3. **The BAS Contractor shall have a branch facility within a 3-hour response time of the job site supplying complete maintenance and support services on a 24 hour, 7-day-a-week basis.**
4. **As evidence and assurance of the contractor's ability to support the Owner's system with service and parts, the contractor must have been in the BAS business for at least the last six (6) years and have successfully completed total projects of at least 10 times the value of this contract in each of the preceding five years.**
5. **The Building Automation System architecture shall consist of the products of a manufacturer regularly engaged in the production of Building Automation Systems, and shall be the manufacturer's latest standard of design at the time of bid.**
6. **Single source responsibility of supplier shall be the complete installation and proper operation of the BAS and control system and shall include debugging and proper calibration of each component in the entire system both existing and new.**
7. **The Building Automation System contractor shall provide the Owner with 24 months of future software system upgrades as part of their package. The upgrade period shall begin once the final completion has been signed off by the engineer of record for each project.**

B. Workplace Safety And Hazardous Materials

1. Provide a safety program in compliance with the Contract Documents.

2. The BAS Contractor shall have a corporately certified comprehensive Safety Certification Manual and a designated Safety Supervisor for the Project.

3. The Contractor and its employees and subtrades shall comply with federal, state and local safety regulations.

4. The Contractor shall ensure that all subcontractors and employees have written safety programs in place that covers their scope of work, and that their employees receive the training required by the OSHA have jurisdiction for at least each topic listed in the Safety Certification Manual.

5. Hazards created by the Contractor or its subcontractors shall be eliminated before any further work proceeds.

6. Hazards observed but not created by the Contractor or its subcontractors shall be reported to either the General Contractor or the Owner within the same day. The Contractor shall be required to avoid the hazard area until the hazard has been eliminated.

7. The Contractor shall sign and date a safety certification form prior to any work being performed, stating that the Contractors' company is in full compliance with the Project safety requirements.

8. The Contractor's safety program shall include written policy and arrangements for the handling, storage and management of all hazardous materials to be used in the work in compliance with the requirements of the AHJ at the Project site.

9. The Contractor's employees and subcontractor's staff shall have received training as applicable in the use of hazardous materials and shall govern their actions accordingly.

C. Quality Management Program

1. Designate a competent and experienced employee to provide BAS Project Management. The designated Project Manger shall be empowered to make technical, scheduling and related decisions on behalf of the BAS Contractor. At a minimum, the Project Manager shall:

   a. Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
   b. Manage the financial aspects of the BAS Contract.
   c. Coordinate as necessary with other trades.
   d. Be responsible for the work and actions of the BAS workforce on site.

1.4 Work By Others

A. The demarcation of work and responsibilities between the BAS Contractor and other related trades shall be as outlined in the BAS RESPONSIBILITY MATRIX

BAS RESPONSIBILITY MATRIX				
WORK	FURNISH	INSTALL	Low Volt. WIRING/TUBE	LINE POWER
BAS low voltage and communication wiring	BAS	BAS	BAS	N/A
BAS conduits and raceway	BAS	BAS	BAS	BAS
Automatic dampers	BAS	15	N/A	N/A
BAS Current Switches.	BAS	BAS	BAS	N/A
BAS Control Relays	BAS	BAS	BAS	N/A
All BAS Nodes, equipment, housings, enclosures and panels.	BAS	BAS	BAS	BAS
Smoke Detectors	16	16	16	16
Fire/Smoke Dampers	15	15	16	16
Fire Dampers	15	15	N/A	N/A
Fire Alarm shutdown relay interlock wiring	16	16	16	16
Fire Alarm smoke control relay interlock wiring	16	16	BAS	16
Fan Coil Unit controls	BAS	BAS	BAS	16
Unit Heater controls	BAS	BAS	BAS	16
Packaged RTU space mounted controls	15*	BAS	BAS	16
Packaged RTU factory-mounted controls	15*	15	BAS	16
Packaged RTU field-mounted controls	BAS	BAS	BAS	16
Starters, HOA switches	16	16	N/A	16
Control damper actuators	BAS	BAS	BAS	16

1.5 Submittals

A. Shop Drawings, Product Data, and Samples

1. Refer to Division 1 for submittal requirements.
2. The BAS contractor shall submit its qualifications to the Orange County's Representative after bidding has been completed but prior to the submittal of shop drawings. These qualifications shall be submitted within 15 days of contract award.
3. Once the BAS contractor receives approval from the Owner for their qualifications, the BAS contractor shall submit a list of all shop drawings with submittals dates within 45 days of contract award.
4. Submittals shall be in defined packages. Each package shall be complete and shall only reference itself and previously submitted packages. The packages shall be as approved by the Architect and Engineer for Contract compliance.
5. Allow 15 working days for the review of each package by the Architect and Engineer in the scheduling of the total BAS work.
6. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the BAS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.
7. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.

8. The BAS Contractor shall correct any errors or omissions noted in the first review.

9. At a minimum, submit the following:

   a. BAS network architecture diagrams including all nodes and interconnections.
   b. Systems schematics, sequences and flow diagrams.
   c. Points schedule for each point in the BAS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
   d. Samples of Graphic Display screen types and associated menus.
   e. Detailed Bill of Material list for each system or application, identifying quantities, part numbers, descriptions, and optional features.
   f. Control Damper Schedule including a separate line for each damper provided under this section and a column for each of the damper attributes, including: Code Number, Fail Position, Damper Type, Damper Operator, Duct Size, Damper Size, Mounting, and Actuator Type.
   g. Control Valve Schedules including a separate line for each valve provided under this section and a column for each of the valve attributes: Code Number, Configuration, Fail Position, Pipe Size, Valve Size, Body Configuration, Close off Pressure, Capacity, Valve CV, Design Pressure, and Actuator Type.
   h. Room Schedule including a separate line for each VAV box and/or terminal unit indicating location and address
   i. Details of all BAS interfaces and connections to the work of other trades.
   j. Product data sheets or marked catalog pages including part number, photo and description for all products including software.

1.8 Record Documentation

A. Operation and Maintenance Manuals – Refer to Division 1 for submittal requirements.

1.9 Warranty

A. Standard Material and Labor Warranty:

1. Provide a two-year labor and material warranty on the BAS.
2. If within twenty-four (24) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the cost of the BAS Contractor.
3. Maintain an adequate supply of materials within 50 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during BAS Contractor's normal business hours.

2. PART 2 - PRODUCTS

2.1 Network Area Controllers (NAC)

A. The Network Area Controller (NAC) shall provide a thin-client, Graphical User Interface (GUI) to the Building Automation System (BAS).

1. **Local Access. The NAC shall be installed upon the owner's Local Area Network (LAN) and shall support local operator access using standard web browsers including at a minimum Microsoft Internet Explorer 8.**

2. **Remote Access. A high-speed connection from the NAC to the Wide Area Network (WAN) shall be provided and maintained by the owner to facilitate remote operator access to the BAS using the standard web browsers including at a minimum Microsoft Internet Explorer 8.**

B. **The NAC(s) shall meet or exceed the requirements of a BACnet® Operator Workstation (B-OWS) and a BACnet® Building Controller (B-BC).**

C. **The NAC(s) shall not require any hardware, software or firmware licensing agreements.**

D. **The NAC(s) shall support the following hardware characteristics as a minimum:**

1. **One (1) ISO-8802.3 Ethernet Port – 10/100 Mbps**

2. **One EIA-232 Port – 115.2 Kbps maximum**

3. **Two EIA-485 Ports – 76.8 Kbps maximum**

4. **Local onboard and/or expandable hardware inputs/outputs (I/O)**

   a. **Expandable to a minimum of 96 Inputs and 64 Outputs**

5. **8 MB operating RAM**

6. **1 MB non-volatile RAM**

7. **128 MB Flash EEPROM**

E. **The NAC(s) shall support the following communication protocols at a minimum:**

1. **ASHRAE 135-2008 BACnet®**

   a. **Point-to-Point (PTP)**

   b. **Master Slave/Token Passing (MS/TP)**

   c. **Ethernet**

   d. **BACnet® IP (B/IP)**

2. **Modbus**

   a. **RTU (master or slave)**

   b. **TCP (master or slave)**

3. **Simple Mail Transfer Protocol (SMTP)**

4. **Simple Network Management Protocol (SNMP)**

5. Hyper Text Transfer Protocol (HTTP)

6. Short Message Service (SMS) – for GSM / GPRS modems

F. The NAC database and all necessary Graphical User Interface (GUI) resources including animations are to be stored on the NAC. Web-enabled applications that require system graphics to be stored on the client machines will not be acceptable.

G. The NAC shall support unlimited access by five (5) simultaneous clients

H. Multiple NAC devices shall be capable of being installed on the same BACnet® internetwork without any separate server applications, separate network management or additional licensing.

1. Browser clients shall have the ability to access any NAC on the internetwork directly

I. The NAC shall provide native BACnet® communications directly with all BACnet® devices on the BACnet® internetwork. Applications that require translation of data, gateways, or mapping of any kind shall not be acceptable.

1. The NAC shall provide BACnet® client and server functionality on all data links without any additional modules or licensing

J. Real-time values displayed on the web browser shall update automatically without requiring a manual "refresh" of the web page.

K. HTML programming shall not be required to create or display system graphics or data on a web page.

L. A new point displayed on a B-OWS graphic screen shall appear automatically on the identical graphic screen served by the NAC with no further programming or file transfer required.

M. The NAC shall be capable of automatically uploading any changes to existing GUI images or animations.

N. The NAC shall support operator interface via the web browser the following at a minimum:

1. Password Protection

a. Multiple-level password access protection shall be provided.

b. Passwords may be exactly the same for all software applications provided to communicate with the internetwork including the web-based browser interface. Passwords and access credentials shall be able to be imported from the B-OWS to the NAC.

c. A minimum of three (3) levels of access shall be supported with a configurable matrix of operator actions allowed for each access level, broken down into at least 20 possible operator actions

d. A minimum of 128 passwords shall be supported at each NAC

e. Operators will be able to perform only those commands available for their respective passwords.

f. User-definable, automatic log-off timers of from 1 to 60 minutes shall be provided to prevent operators from inadvertently leaving an NAC browser interface in an unsupervised logged-in state.

g. The NAC shall be configurable to provide read-only access without requiring log-on

h. Unencrypted passwords shall not be transmitted between the NAC and the client browser

2. Alarming and Event Notification

a. NAC shall be capable of generating configurable automatic and dynamic alarm notification that is presented on-top of any current browsing screens in the form of a pop-up message

b. NAC shall be capable of e-mail and telephonic test message notification of system alarms configurable to include notification class, recipient, inclusive and exclusive times and days as well as transition states (to alarm, to fault, return to normal). Systems that use e-mail and/or text message as the exclusive means of annunciating alarms are not acceptable.

c. System shall provide log of notification messages.

d. Alarm messages shall be in user-definable text and shall be entered either at the B-OWS terminal or via remote communication

e. An alarm summary shall be available to show all alarms including but not limited to whether or not they have been acknowledged

f. System shall provide ability to prioritize and differentiate communications for at least 255 different levels of alarms

g. Alarm messages shall be fully customizable in size, content, behavior and sound.

3. Weekly, Annual and Special Event Exception Scheduling

a. Provide ability to view and modify the schedule for the calendar week and up to 255 special events in a graphical format. Each calendar day and special event shall provide at least six time/value entries per day.

b. Provide the ability for the operator to select scheduling for binary, analog, or multi-state object values.

c. Provide the ability for the operator to designate days, date ranges, or repeating date patterns as exception schedules.

d. Provide the capability for the operator to define special or holiday schedules and to link the BACnet schedule to a BACnet calendar,

thereby over-riding weekly schedule programming on holidays defined in the BACnet calendar.

e. There shall be a provision with proper password access to manually override each schedule.

f. Provide the capability to designate any exception schedule to be "Executed Once" then automatically cleared.

g. Provide the ability to name each exception schedule with a user defined term to describe each special event.

4. Trend Log Graphing

a. All data points (both hardware and software) system-wide shall be assignable to a historical trending program by gathering configurable historical samples of object data stored in the local controller (B-BC, B-AAC, B-ASC).

b. All trend log information shall be displayable in text or graphic format. All information shall be able to be printed in black & white or color and exported directly to a Microsoft Excel Spreadsheet.

5. Runtime Log Information

a. B-OWS Software shall be capable of displaying Runtime and On/Off Cycle data of all Binary data points (both hardware and software) system-wide. Runtime logs shall provide the following at a minimum:

1) Total Accumulated Runtime

2) Accumulated Starts Today

3) Total Accumulated Starts

4) Timestamp each Start/Stop and duration of each on/off cycle

5) Monitor equipment status and generate maintenance messages based upon user designated run time

6. Ability to Manually Override any Database point

a. All hardware and software points may be temporarily overridden for a user adjustable configured time period

7. Custom navigation file tree

8. Color Graphical User Interface (GUI)

a. All color graphic displays shall be dynamic with current point data automatically updated from the BACnet internetwork to the browser without operator intervention. Manual operator intervention shall use the same methodology as on the B-OWS application.

b. Depending upon configured access level; the operator shall be able to manually adjust digital, analog or calculated values in the system, adjust values of control loops, override points or release points to automatic mode.

O. The NAC shall provide the capability to create individual user (as determined by the log-on user identification) home pages. Provide the ability to limit a specific user to a defined home page. From the home page, links to other views, or pages in the system shall be possible, if allowed by the system administrator.

P. The NAC shall include an Audit Trail feature that automatically records the time, date, and user, and action associated with all user changes made via Web Browser clients.

Q. The NAC shall store complete help files describing system configuration, and use of the browser interface, the help files shall be served on-line as part of the browser interface.

1. The web browser interface shall include tool tips to describe the functionality of the interface.

2.2 Advanced Applications Controllers (AAC)

A. General

1. Provide a micro-processor based, networkable, custom programmed, BACnet® Advanced Application Controller for each heat pump, packaged rooftop unit, etc, wall-mounted where shown on floor-plans. Each AAC shall include an LCD user interface and all input/output points required to monitor and control each unit as a stand-alone system, according to the specified sequence of operation. In addition AAC's shall allow monitoring and remote control via a supervisory network (BACnet) with a WEB-Based Browser-accessible front end.

2. Provide a 5 year standard manufacturer's warranty for the AAC

B. Network Protocol and Operator Connections

1. The AAC's shall allow direct connection to a host network using BACnet® MS/TP (EIA-485) protocol. The network communication speed shall be operator selectable up to 76.8 kbps.

2. Each AAC shall be BTL tested, and listed to meet the B-AAC Standard Device Profile including BIBBs for this level of device. A Protocol Implementation Conformance statement for the AAC proposed shall be submitted along with shop drawings. Network points to be viewable on each AAC are listed in the sequence of operation, however provide a minimum of 32 Read/Write objects per AAC.

3. Each AAC shall include an externally mounted port allowing operators to connect a laptop computer directly to the AAC for network configuration, custom programming, and trouble-shooting.

C. Hardware Components

1. Provide the following hardware input points at minimum in each AAC:
   a. Room temperature sensor, local or remote 10K thermistor with an accuracy of +/- 0.1 Deg C
   b. User set-point adjustment control with programmable set-point limits
   c. On-board room humidity sensor, with replaceable CMOSense element, overall accuracy of +/- 1.8 % over 10 – 90 % range
   d. On-board room passive infra-red occupancy sensor, with a maximum detection distance of 5m (16.4 ft), and 64 detection zones
   e. In addition to the above, provide 4 user-definable universal inputs capable of accepting 0 -5 VDC, 4 – 20 mA, 10K thermistor, or dry contacts. Refer to the sequence of operation for specific input point requirements.

2. Provide hardware analog and digital output points as required by the sequence of operation, however include the following point types at minimum to allow for future expansion:
   a. Six universal outputs, user-definable as analog or digital
   b. Two additional digital output points
   c. Digital output points shall be dry contacts capable of switching 0.5 Amps at 24 VAC.

3. Provide a large LCD screen for display and adjustment of AAC points and mapped network points. Security codes MUST be provided to prevent unauthorized access from the local LCD screen. Minimum LCD size shall be 128 x 64 pixels. The screen shall be back-lit, however the light may be configured to shut off after a programmable inactive time.

4. Provide push-buttons on the panel face to facilitate navigation, point adjustment, data entry, and switching of operational modes (password protected).

5. AAC memory shall include a minimum 64 Kb RAM for logs and temporary data, and 512 kb flash EEPROM for non-volatile storage of firmware configuration and custom database. Provide a 24 hour clock and 365 day calendar on-board. Clock accuracy shall be +/- 1 second over 24 hours, and system time shall be retained during power outages exceeding 7 years.

6. Provide a software configurable buzzer which shall be set-up to trigger on the occurrence of selected alarms, and shall be audible and acknowledgeable either to all users, or only to those users with sufficient password authority.

7. AAC's shall be capable of monitoring and controlling at least 4 networked, remote temperature sensors, each with adjustable set-point and outputs for zone controls. These networked sensors shall not consume input/output points in the AAC.

D. Custom Configuration

1. Each AAC shall allow custom setup of the primary user interface screen; definition of all points to be monitored, controlled and displayed; alarms; schedules; trends; password access; and programmed sequence of operation as required to optimize the AAC for the specific requirements of this project, and also to allow future modification by the owner. AAC's using canned programs for pre-determined HVAC applications are not acceptable.

2. **Each AAC shall allow the following custom set-up at minimum:**
   a. **Primary User Interface screen set-up, including display of time, system mode, fan mode, primary temperature display, and display of up to 3 additional operator-defined AAC or network points.**
   b. **ALL physical Inputs AND Outputs of the controller MUST be able to be overridden at the LCD screen for technician checkout of the system locally.**
   c. **Seven additional user defined point groups, each including up to six AAC or network points per group, to be displayed and adjusted by system users with sufficient password authority. Each group, and each individual point shall be defined to allow/disallow editing and manual override by users, and the password level required. Point definition shall also determine if units are to be displayed, and whether point names are displayed as text, or alternatively using an icon chosen from an on-board list of industry standard symbols.**
   d. **custom programs of 2000 bytes each, using a BASIC control language, with source code stored on board.**
   e. **The AAC may be defined with full access by all users without password protection, or with three levels of password protected access. Each level of access shall be enabled by entering a 4 digit password via the front panel keys. AAC's that require removal of the faceplate to unlock the keyboard are not acceptable.**
   f. **Alarm states shall be defined using AAC custom programming, with the definition including the password level required to acknowledge, reset, and clear alarms. When an AAC alarm condition exists, an alarm icon shall be displayed on all screens.**
   g. **48 user-definable program-driven variables, with selectable ranges and standard or custom units.**
   h. **user-definable PID controls loops**
   i. **user-definable trend logs, each with 150 samples of 6 points each, and programmable sampling times**
   j. **8 user-definable runtime logs to accumulate the run-times of selected digital points, and record the time and date of the last 100 changes of state**
   k. **2 user-definable system groups, 50 points per group, allowing related points to be grouped together on one display for use in network graphics**
   l. **1 user-definable weekly schedule, including 4 on/off pairs for each weekday, and two additional daily schedules triggered by the annual schedule or by custom programming**
   m. **Override of the unoccupied schedule for a programmed period of time shall be triggered via a front panel button**
   n. **1 annual schedule, allowing pre-programming of holidays 365 days in advance**

2.3 Input Devices

A. General Requirements

1. **Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.**
2. **Outside Air Sensors**
   a. **Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield.**

b. **Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element.**

c. **Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.**

3. **Duct Mount Sensors**

a. **Duct mount sensors shall mount in an electrical box through a hole in the duct, and be positioned so as to be easily accessible for repair or replacement.**

b. **Duct sensors shall be insertion type and constructed as a complete assembly, including lock nut and mounting plate.**

c. **For outdoor air duct applications, a weatherproof mounting box with weatherproof cover and gasket shall be used.**

4. **Averaging Sensors**

a. **For ductwork greater in any dimension that 48 inches and/or where air temperature stratification exists, an averaging sensor with multiple sensing points shall be used.**

b. **For plenum applications, such as mixed air temperature measurements, a string of sensors mounted across the plenum shall be used to account for stratification and/or air turbulence. The averaging string shall have a minimum of 4 sensing points per 12-foot long segment.**

c. **Capillary supports at the sides of the duct shall be provided to support the sensing string.**

5. **Acceptable Manufacturers: Setra or approved equal.**

B. **Humidity Sensors**

1. **The sensor shall be a solid-state type, relative humidity sensor of the Bulk Polymer Design. The sensor element shall resist service contamination.**

2. **The humidity transmitter shall be equipped with non-interactive span and zero adjustments, a 2-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.**

3. **The humidity transmitter shall meet the following overall accuracy, including lead loss and Analog to Digital conversion. 3% between 20% and 80% RH @ 77 Deg F unless specified elsewhere.**

4. **Outside air relative humidity sensors shall be installed with a rain proof, perforated cover. The transmitter shall be installed in a NEMA 3R enclosure with sealtite fittings and stainless steel bushings.**

5. **A single point humidity calibrator shall be provided, if required, for field calibration. Transmitters shall be shipped factory pre-calibrated.**

6. **Duct type sensing probes shall be constructed of 304 stainless steel, and shall be equipped with a neoprene grommet, bushings, and a mounting bracket.**

7. **Acceptable Manufacturers: Veris Industries, and Mamac.**

C. **Differential Pressure Transmitters**

1. **General Air and Water Pressure Transmitter Requirements:**

a. **Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.**

b. **Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.**

c. **Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.**

d. **A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.**

2. **Building Differential Air Pressure Applications (-1" to +1" w.c.)**

a. **The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.**

b. **The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:**

- ◊ **-1.00 to +1.00 w.c. input differential pressure ranges. (Select range appropriate for system application)**
- ◊ **4-20 mA output.**
- ◊ **Maintain accuracy up to 20 to 1 ratio turndown.**
- ◊ **Reference Accuracy: +0.2% of full span.**

c. **Acceptable Manufacturers: Setra or approved equal.**

3. **Low Differential Air Pressure Applications (0" to 5" w.c.)**

a. **The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.**

b. **The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:**

- ◊ **(0.00 - 1.00" to 5.00") w.c. input differential pressure ranges. (Select range appropriate for system application.)**
- ◊ **4-20 mA output.**
- ◊ **Maintain accuracy up to 20 to 1 ratio turndown.**
- ◊ **Reference Accuracy: +0.2% of full span.**

c. **Acceptable Manufacturers: Setra or approved equal.**

4. **Medium Differential Air Pressure Applications (5" to 21" w.c.)**

a. **The pressure transmitter shall be similar to the Low Air Pressure Transmitter, except that the performance specifications are not as severe. Differential pressure transmitters shall be provided that meet the following performance requirements:**

- ◊ **Zero & span: (c/o F.S./Deg. F): .04% including linearity, hysteresis and repeatability.**
- ◊ **Accuracy: 1% F.S. (best straight line) Static Pressure Effect: 0.5% F.S. (to 100 PSIG.**
- ◊ **Thermal Effects: <+.033 F.S./Deg. F. over 40°F. to 100°F. (calibrated at 70°F.).**

b. **Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.**

c. **Acceptable manufacturers: Setra or approved equal.**

D. **Flow Monitoring**

1. **Air Flow Monitoring**

a. **Duct Air Flow Measuring Stations**

- ◊ **Each device shall be designed and built to comply with, and provide results in accordance with, accepted practice as defined for system testing in the ASHRAE Handbook of fundamentals, as well as in the Industrial Ventilation Handbook.**
- ◊ **Airflow measuring stations shall be fabricated of 14-gauge galvanized steel welded casing with 90 Deg. connecting flanges in configuration and size equal to that of the duct into which it is mounted. Each station shall be complete with an air directionalizer and parallel cell profile suppressor (3/4" maximum cell) across the entering air stream and mechanically fastened to the casing in such a way to withstand velocities up to 6000 feet per minute. This air directionalizer and parallel cell honeycomb suppressor shall provide 98% free area, equalize the velocity profile, and eliminate turbulent and rotational flow from the air stream prior to the measuring point.**
- ◊ **The total pressure measurement side (high side) will be designed and spaced to the Industrial Ventilation Manual 16th Edition, Page 9-5. The self-averaging manifolding will be manufactured of brass and copper components.**
- ◊ **The static pressure sensing probes (low side) shall be bullet-nosed shaped, per detailed radius, as illustrated in Industrial Ventilation Manual 16th Edition, Page 9-5.**
- ◊ **The main take-off point from both the total pressure and the static pressure manifolds must be symmetrical.**
- ◊ **Total and static pressure manifolds shall terminate with external ports for connection to control tubing. An identification label shall be placed on each unit casing, listing model number, size, area, and specified airflow capacity.**
- ◊ **Installation Considerations**

  (i) **The maximum allowable pressure loss through the Flow and Static Pressure elements shall not exceed .065" w.c. at 1000 feet per minute, or .23" w.c. at 2000 feet per minute. Each unit shall measure the airflow rate within an accuracy of plus 2% as determined by U.S. – GSA certification tests, and shall contain a minimum of one total pressure sensor per 36 square inches of unit measuring area.**

  (ii) **The units shall have a self-generated sound rating of less than NC40, and the sound level within the duct shall not be amplified nor shall additional sound be generated.**

  (iii) **Where the stations are installed in insulated ducts, the airflow passage of the station shall be the same size as the inside airflow dimension of the duct. Station flanges shall be two inch to three inch to facilitate matching connecting ductwork.**

(iv) Where control dampers are shown as part of the airflow measuring station, opposed blade precision controlled volume dampers integral to the station and complete with actuator, pilot positioner, and linkage shall be provided.

(v) Stations shall be installed in strict accordance with the manufacturer's published requirements, and in accordance with ASME Guidelines affecting non-standard approach conditions.

◊ Acceptable manufacturers: Air Monitor Corp., Tek-Air, Ebtron, and Dietrich Standard.

b. Static Pressure Traverse Probe

◊ Duct static traverse probes shall be provided where required to monitor duct static pressure. The probe shall contain multiple static pressure sensors located along exterior surface of the cylindrical probe.

◊ Acceptable manufacturers: Cleveland Controls

c. Shielded Static Air Probe

◊ A shielded static pressure probe shall be provided at each end of the building. The probe shall have multiple sensing ports, an impulse suppression chamber, and airflow shielding. A suitable probe for indoor and outdoor locations shall be provided.

E. Power Monitoring Devices

1. Current Measurement (Amps)

a. Current measurement shall be by a combination current transformer and a current transducer. The current transformer shall be sized to reduce the full amperage of the monitored circuit to a maximum 5 Amp signal, which will be converted to a 4-20 mA DDC compatible signal for use by the Facility Management System.

b. Current Transformer – A split core current transformer shall be provided to monitor motor amps.

◊ Operating frequency – 50 - 400 Hz.

◊ Insulation – 0.6 Kv class 10Kv BIL.

◊ UL recognized.

◊ Five amp secondary.

◊ Select current ration as appropriate for application.

◊ Acceptable manufacturers: Veris Industries

c. Current Transducer – A current to voltage or current to mA transducer shall be provided. The current transducer shall include:

◊ 6X input over amp rating for AC inrushes of up to 120 amps.

◊ Manufactured to UL 1244.

◊ Accuracy: +.5%, Ripple +1%.

◊ Minimum load resistance 30kOhm.

◊ Input 0-20 Amps.

◊ Output 4-20 mA.

◊ Transducer shall be powered by a 24VDC regulated power supply (24 VDC +5%).

◊ Acceptable manufacturers: Veris Industries or approved equal.

F. Status and Safety Switches

1. **General Requirements**
   a. **Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the BAS when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.**
2. **Current Sensing Switches**
   a. **The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.**
   b. **Current sensing switches shall be used for run status for fans, pumps, and other miscellaneous motor loads.**
   c. **Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.**
   d. **Acceptable manufacturers: Veris Industries or approved equal.**
3. **Air Filter Status Switches**
   a. **Differential pressure switches used to monitor air filter status shall be of the automatic reset type with SPDT contacts rated for 2 amps at 120VAC.**
   b. **A complete installation kit shall be provided, including: static pressure tops, tubing, fittings, and air filters.**
   c. **Provide appropriate scale range and differential adjustment for intended service.**
   d. **Acceptable manufacturers: Cleveland Controls or approved equal.**
4. **Air Flow Switches**
   a. **Differential pressure flow switches shall be snap acting micro-switches with appropriate scale range and differential adjustment for intended service.**
   b. **Acceptable manufacturers: Cleveland Controls or approved equal.**
5. **Air Pressure Safety Switches**
   a. **Air pressure safety switches shall be of the manual reset type with SPDT contacts rated for 2 amps at 120VAC.**
   b. **Pressure range shall be adjustable with appropriate scale range and differential adjustment for intended service.**
   c. **Acceptable manufacturers: Cleveland Controls or approved equal.**
6. **Low Temperature Limit Switches**
   a. **The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.**
   b. **The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be mounted horizontally across duct in accordance with manufacturers recommended installation procedures.**

c. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.

2.4 Output Devices

A. Actuators

1. General Requirements
   a. Damper and valve actuators shall be electronic as specified in the System Description section.
2. Electronic Damper Actuators
   a. Electronic damper actuators shall be direct shaft mount.
   b. Modulating and two-position actuators shall be provided as required by the sequence of operations. Damper sections shall be sized Based on actuator manufacturer's recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction, and a gear release to allow manual positioning.
   c. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication. The feedback signal of one damper actuator for each separately controlled damper shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
   d. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Isolation, smoke, exhaust fan, and other dampers, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop associated fan. Two-position actuators, as specified in sequences of operations as "quick acting," shall move full stroke within 20 seconds. All smoke damper actuators shall be quick acting.
   e. Acceptable manufacturers: Belimo or approved equal.

B. Control Dampers

1. The BAS Contractor shall furnish all automatic dampers. All automatic dampers shall be sized for the application by the BAS Contractor or as specifically indicated on the Drawings.
2. All dampers used for throttling airflow shall be of the opposed blade type arranged for normally open or normally closed operation, as required. The damper is to be sized so that, when wide open, the pressure drop is a sufficient amount of its close-off pressure drop to shift the characteristic curve to near linear.
3. All dampers used for two-position, open/close control shall be parallel blade type arranged for normally open or closed operation, as required.

4. Damper frames and blades shall be constructed of either galvanized steel or aluminum. Maximum blade length in any section shall be 60". Damper blades shall be 16-gauge minimum and shall not exceed eight (8) inches in width. Damper frames shall be 16-gauge minimum hat channel type with corner bracing. All damper bearings shall be made of reinforced nylon, stainless steel or oil-impregnated bronze. Dampers shall be tight closing, low leakage type, with synthetic elastomer seals on the blade edges and flexible stainless steel side seals. Dampers of 48"x48" size shall not leak in excess of 8.0 cfm per square foot when closed against 4" w.g. static pressure when tested in accordance with AMCA Std. 500.

5. Airfoil blade dampers of double skin construction with linkage out of the air stream shall be used whenever the damper face velocity exceeds 1500 FPM or system pressure exceeds 2.5" w.g., but no more than 4000 FPM or 6" w.g. Acceptable manufacturers are Ruskin CD50 and Vent Products 5650.

6. One piece rolled blade dampers with exposed or concealed linkage may be used with face velocities of 1500 FPM or below. Acceptable manufacturers are: Ruskin CD36 and Vent Products 5800.

7. Multiple section dampers may be jack-shafted to allow mounting of direct connect electronic actuators. Each end of the jackshaft shall receive at least one actuator to reduce jackshaft twist.

C. Control Relays

1. Control Pilot Relays

a. Control pilot relays shall be of a modular plug-in design with retaining springs or clips.
b. Mounting Bases shall be snap-mount.
c. DPDT, 3PDT, or 4PDT relays shall be provided, as appropriate for application.
d. Contacts shall be rated for 10 amps at 120VAC.
e. Relays shall have an integral indicator light and check button.
f. Acceptable manufacturers: Lectro or approved equal.

2. Lighting Control Relays

a. Lighting control relays shall be latching with integral status contacts.
b. Contacts shall be rated for 20 amps at 277 VAC.
c. The coil shall be a split low-voltage coil that moves the line voltage contact armature to the ON or OFF latched position.
d. Lighting control relays shall be controlled by:
   ◊ Pulsed Tri-state Output – Preferred method.
   ◊ Pulsed Paired Binary Outputs.
   ◊ A Binary Input to the Facility Management System shall monitor integral status contacts on the lighting control relay. Relay status contacts shall be of the "dry-contact" type.
e. The relay shall be designed so that power outages do not result in a change-of-state, and so that multiple same state commands will simply maintain the commanded state. Example: Multiple OFF command pulses shall simply keep the contacts in the OFF position.

D. Electronic Signal Isolation Transducers

1. A signal isolation transducer shall be provided whenever an analog output signal from the BAS is to be connected to an external control system as an

input (such as a chiller control panel), or is to receive as an input signal from a remote system.

2. The signal isolation transducer shall provide ground plane isolation between systems.

3. Signals shall provide optical isolation between systems.

4. Acceptable manufacturers: Advanced Control Technologies or approved equal.

E. External Manual Override Stations

1. External manual override stations shall provide the following:

a. An integral HAND/OFF/AUTO switch shall override the controlled device pilot relay.

b. A status input to the Facility Management System shall indicate whenever the switch is not in the automatic position.

c. A Status LED shall illuminate whenever the output is ON.

d. An Override LED shall illuminate whenever the HOA switch is in either the HAND or OFF position.

e. Contacts shall be rated for a minimum of 1 amp at 24 VAC.

2.5 Miscellaneous Devices

A. Power Supplies

1. DC power supplies shall be sized for the connected device load. Total rated load shall not exceed 75% of the rated capacity of the power supply.

2. Input: 120 VAC +10%, 60Hz.

3. Output: 24 VDC.

4. Line Regulation: +0.05% for 10% line change.

5. Load Regulation: +0.05% for 50% load change.

6. Ripple and Noise: 1 mV rms, 5 mV peak to peak.

7. An appropriately sized fuse and fuse block shall be provided and located next to the power supply.

8. A power disconnect switch shall be provided next to the power supply.

3. PART 3 – EXECUTION

3.1 BAS Specific Requirements

A. Graphic Displays

1. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.

2. User shall access the various system schematics via a graphical penetration scheme and/or menu selection. .

B. Custom Reports:

1. Provide custom reports as required for this project:

C. Actuation / Control Type

1. Primary Equipment

a. **Controls shall be provided by equipment manufacturer as specified herein.**
b. **All damper and valve actuation shall be electric.**

2. **Air Handling Equipment**
   a. **All air handlers shall be controlled with a HVAC-DDC Controller**
   b. **All damper and valve actuation shall be electric.**
3. **Terminal Equipment:**
   a. **Terminal Units (VAV, UV, etc.) shall have electric damper and valve actuation.**
   b. **All Terminal Units shall be controlled with HVAC-DDC Controller)**

3.2 Installation Practices

A. BAS Wiring

1. **All conduit, wiring, accessories and wiring connections required for the installation of the Building Automation System, as herein specified, shall be provided by the BAS Contractor unless specifically shown on the Electrical Drawings under Division 16 Electrical. All wiring shall comply with the requirements of applicable portions of Division 16 and all local and national electric codes, unless specified otherwise in this section.**
2. **All BAS wiring materials and installation methods shall comply with BAS manufacturer recommendations.**
3. **The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the BAS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the BAS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.**
4. **Class 2 Wiring**
   a. **All Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.**
   b. **Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5' from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.**
5. **Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.**
6. **Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.**

B. BAS Line Voltage Power Source

1. **120-volt AC circuits used for the Building Automation System shall be taken from panel boards and circuit breakers provided by Division 16.**
2. **Circuits used for the BAS shall be dedicated to the BAS and shall not be used for any other purposes.**
3. **DDC terminal unit controllers may use AC power from motor power circuits.**

C. BAS Raceway

1. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 1/2".
2. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Architect.
3. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.
4. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.

D. Penetrations

1. Provide fire stopping for all penetrations used by dedicated BAS conduits and raceways.
2. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.
3. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.
4. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.

E. BAS Identification Standards

1. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.

   Cable types specified in Item A shall be color coded for easy identification and troubleshooting.

F. BAS Panel Installation

1. The BAS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer's recommendations.
2. The BAS contractor shall be responsible for coordinating panel locations with other trades and electrical and mechanical contractors.

G. Input Devices

1. All Input devices shall be installed per the manufacturer recommendation
2. Locate components of the BAS in accessible local control panels wherever possible.

H. HVAC Input Devices – Genera1

1. All Input devices shall be installed per the manufacturer recommendation
2. Locate components of the BAS in accessible local control panels wherever possible.
3. The mechanical contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.

4. **Input Flow Measuring Devices shall be installed in strict compliance with ASME guidelines affecting non-standard approach conditions.**

5. **Outside Air Sensors**
   a. **Sensors shall be mounted on the North wall to minimize solar radiant heat impact or located in a continuous intake flow adequate to monitor outside air conditions accurately.**
   b. **Sensors shall be installed with a rain proof, perforated cover.**

6. **Medium to High Differential Water Pressure Applications (Over 21" w.c.):**
   a. **Air bleed units, bypass valves and compression fittings shall be provided.**

7. **Building Differential Air Pressure Applications (-1" to +1" w.c.):**
   a. **Transmitters exterior sensing tip shall be installed with a shielded static air probe to reduce pressure fluctuations caused by wind.**
   b. **The interior tip shall be inconspicuous and located as shown on the drawings.**

8. **Air Flow Measuring Stations:**
   a. **Where the stations are installed in insulated ducts, the airflow passage of the station shall be the same size as the inside airflow dimension of the duct.**
   b. **Station flanges shall be two inch to three inch to facilitate matching connecting ductwork.**

9. **Duct Temperature Sensors:**
   a. **Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.**
   b. **The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.**
   c. **For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor.**
   d. **The sensor shall be mounted to suitable supports using factory approved element holders.**

10. **Space Sensors:**
    a. **Shall be mounted per ADA requirements.**
    b. **Provide lockable tamper-proof covers in public areas and/or where indicated on the plans.**

11. **Low Temperature Limit Switches:**
    a. **Install on the discharge side of the first water or steam coil in the air stream.**
    b. **Mount element horizontally across duct in a serpentine pattern insuring each square foot of coil is protected by 1 foot of sensor.**
    c. **For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.**

12. **Air Differential Pressure Status Switches:**
    a. **Install with static pressure tips, tubing, fittings, and air filter.**

I. **HVAC Output Devices**

1. **All output devices shall be installed per the manufacturers recommendation. The mechanical contractor shall install all in-line devices such as control valves, dampers, airflow stations, pressure wells, etc.**

2. **Actuators: All control actuators shall be sized capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke.**

3. **Control Dampers: Shall be opposed blade for modulating control of airflow. Parallel blade dampers shall be installed for two position applications.**

4. **Electronic Signal Isolation Transducers: Whenever an analog output signal from the Building Automation System is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input a signal from a remote system, provide a signal isolation transducer. Signal isolation transducer shall provide ground plane isolation between systems. Signals shall provide optical isolation between systems**

3.3 Training

A. **The BAS contractor shall provide the following training services:**

1. **A minimum of one and a half days (12 hours total) of on-site orientation by a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the BAS software layout and naming conventions, and a walk through of the facility to identify panel and device locations.**

2. **Operational training of the BAS shall include at a minimum: changing set points, overrides, starting and stopping equipment, log in to field controllers when the server or PC is down. The BAS contractor shall be required to develop a training outline for this procedure. The training outline, including the lesson plans and course materials, shall be reviewed and approved by the engineer of record through the submittal process.**

3.4 Sequence of Operations

A. **Refer to the drawings for the Sequence of Operations.**

ATTACHMENT I
DMZ SECURITY STANDARD

1.0 Purpose - The purpose of this document is to establish requirements that will better manage and secure all platforms within the Orange County Government Board of County Commissioners (OCGBCC). The DMZ is a secure environment with limited access to the OCGBCC internal network.

2.0 Scope - The scope of this document applies to all platforms located within the OCGBCC DMZ.

3.0 Policies

3.1 Activity - Any and all activity within and through the OCGBCC DMZ shall require direct involvement and documented approval by the Information Systems and Service Enterprise Security unit (ISS-ESU).

3.2 Web Servers - All internal ISS-ESU policies apply to the OCGBCC DMZ and are augmented by the DMZ Security Standard. The following differences are noted:

3.2.1 Microsoft Internet Information Server (IIS) version 5.0 or higher shall be the only platform within the OCGBCC DMZ to run as a Web or FTP server.
3.2.2 All platforms within the OCGBCC DMZ shall be patched immediately upon the release and testing by the ISS-ESU.

3.3 Administrative Rights - ISS-ESU shall be the only group with administrative rights to servers in the DMZ.

3.4 Production Servers - The OCGBCC DMZ shall host production servers only.

3.5 Remote Access - Remote Access to the OCGBCC DMZ shall be allowed only using Microsoft Terminal Services or Microsoft Remote Desktop protocols.

3.6 Traffic

3.6.1 Internet Activity - HTTP/HTTPS/FTP/SMTP/IMAPS are the only protocols allowed from the Internet into the DMZ.
3.6.2 Internal Activity - Traffic using the following protocols from the DMZ to the internal network shall not be allowed: Kerberos, NetBIOS, Microsoft-DS, Microsoft's Well Known Ports (88, 135, 137, 138, 139, 389, 445, 464, 530, 543, 544, 636, 749, 3389), LDAP, RPC, SMB, RDP, HTTP, HTTPS, DNS, JOLT.
3.6.3 Routing

3.6.3.1 All approved access from the DMZ to the internal network shall be routed through a proxy server residing in the DMZ.
3.6.3.2 The Enterprise DMZ proxy server shall only use firewall conduits to access approved resources within the OCGBCC network.

3.7 Data

3.7.1 Any data accessible within the OCGBCC DMZ or directly accessible from it should be encrypted.
3.7.2 Any data accessible within the OCGBCC DMZ or directly accessible from it meeting the following criteria shall be encrypted: Name, addresses, phone numbers, email addresses, birthdates, federal/state/local document

numbers, account numbers, race or religious information, employee identification numbers and all HIPAA information.

3.7.3 The OCGBCC DMZ shall not have access to data containing bank information.

3.7.4 The OCGBCC DMZ shall not have access to social security information.

3.7.5 The OCGBCC DMZ shall have read only access to live data, if such data is also used by applications residing in the internal OCGBCC network.

4.0 Guidelines

4.1 Should databases in policy 3.7.4 need to receive updates by the OCGBCC DMZ, the write operations should be made to a physically separate "staging" data repository. This separate data repository should contain only updates for the specific records being changed. An application server within the internal network should be used to apply the changes in the staging data repository to the live database.

4.2 The DMZ should access data repositories in the internal OCGBCC network using SQL database calls.

5.0 Enforcement - Any server found within the OCGBCC DMZ that does not met the above criteria shall be immediately disconnected from the OCGBCC DMZ. Any employee found to have violated this policy may be subject to disciplinary action, up to and including termination of employment.

6.0 Definitions

Term	Definition
Bank Information	Checking account numbers, credit card numbers, or any unique number from a bank institution.
HTTP	HyperText Transfer Protocol – The underlying protocol used by the World Wide Web. HTTP defines how messages are formatted and transmitted, and what actions web servers and browsers should take in response to various commands.
HTTPS	HyperText Transfer Protocol over Secure Socket Layer (SSL) – By convention, URLs that require an SSL connection start with https: instead of just http:.
FTP	File Transfer Protocol – The protocol for exchanging files over the Internet. FTP works in the same way as HTTP for transferring web pages from a server to a user's browser and SMTP for transferring electronic mail across the Internet in that, like these technologies, FTP uses the Internet's TCP/IP protocols to enable data transfer. FTP is most commonly used to download a file from a server using the Internet or to upload a file to a server.
SMTP	Simple Mail Transfer Protocol – A protocol for sending e-mail messages between servers. In addition, SMTP is generally used to send messages from a mail client to a mail server.
IMAPS	Internet Message Access Protocol – A protocol for retrieving e-mail messages. With IMAP4, you can search through your e-mail messages for keywords while the messages are still on mail server and, then, choose which messages to download to your machine.

LDAP	**Lightweight Directory Access Protocol – A set of protocols for accessing information directories.**
DNS	**Domain Name System (or Service or Server) – An Internet service that translates domain names into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on numeric IP addresses. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address.**
SQL	**Structured query language – SQL is a standardized query language for requesting information from a database.**
DMZ	**Demilitarized Zone – A computer term used for a protected network that sits between the Internet and the corporate network.**
SSL	**Secure Sockets Layer – A protocol for transmitting private documents via the Internet. SSL uses a cryptographic system that uses two keys to encrypt data - a public key known to everyone and a private or secret key known only to the recipient of the message.**

ATTACHMENT II
ENCRYPTION AND CERTIFICATION AUTHORITIES

1.0 Purpose - The purpose of this document is to ensure that all Orange County Government Board of County Commissioner's (OCGBCC) sensitive data is secured by using strong encryption algorithms that have received substantial public review and have been proven to work effectively. Orange County Information Systems and Services Enterprise Security unit (ISS-ESU) provides access to a variety of Encryption Services and Enterprise Certification Authorities (CA).

2.0 Scope - This document applies to all data transmitted and stored within the OCGBCC information systems. It applies to all OCGBCC employees, consultants, and all other affiliated third parties operating within the OCGBCC information systems and networks.

3.0 Policies

3.1 Activity

3.1.1 Any and all activity within and through the OCGBCC information systems involving encryption shall require direct involvement and documented approval by the Information Systems and Service Enterprise Security unit (ISS-ESU).

3.1.2 The ISS-ESU shall approve the storage and transfer of any data containing personal information and/or residing in the DMZ.

3.2 Encryption Algorithms

3.2.1 One of the following standard encryption ciphers shall be used to encrypt data. The key length for these algorithms shall be no less than 128bits:

- **Triple-DES (3DES)**
- **Rijndael (AES)**
- **RSA**
- **Blowfish**
- **Twofish**
- **CAST**

3.2.2 PGP is an approved encryption standard provided that the PGP private key used to encrypt and /or sign data has been generated using a cipher meeting the requirements in section 3.2.1.

3.3 Data Hashing - The following standard data hashing algorithms shall be used to hash data. The key length for the algorithms shall be no less than 128bits.

- **MD5**
- **SHA-1**
- **SHA-2**

3.4 SSL Certificates - Web Server, SSH, IMAPS, SMTPS SSL certificates should have key lengths of no less than 128bits.

3.5 Sensitive Data - Any data containing sensitive information, including, but not limited to: name, addresses, phone numbers, email addresses, birthdates, federal/state/local document numbers, account numbers, race or religious information, employee identification numbers and all HIPAA information, should be encrypted when stored and during network transfers.

3.6 DMZ

3.6.1 Any and all activity within and through the OCGBCC DMZ shall require direct involvement and documented approval by the Information Systems and Service Enterprise Security unit (ISS-ESU).

3.6.2 Any data accessible within the OCGBCC DMZ or directly accessible from it should be encrypted.

3.6.3 Any data accessible within the OCGBCC DMZ or directly accessible from it meeting the following criteria shall be encrypted: name, addresses, phone numbers, email addresses, birthdates, federal/state/local document numbers, account numbers, race or religious information, employee identification numbers and all HIPAA information.

3.7 Data Backups

3.7.1 Any backup of OCGBCC should be encrypted. Sensitive data as listed in 3.5 of this document shall be backed up using encryption algorithm standards found in 3.2.

3.8 Laptops and Removal Devices

3.8.1 All laptop hard drives should be encrypted.

3.8.2 Any sensitive data (see section 3.5 of this document) stored on laptops and removable devices shall be encrypted.

3.8.3 All individuals who work with sensitive data (see section 3.5 of this document) shall have their laptop hard drives encrypted.

4.0 Guidelines

4.1 SSL certificates issued to servers and applications used by internet users should be provided by commercial CA authorities (i.e. Verisign, Thawte) to avoid security warnings from being presented to the end users.

4.2 SSL certificates issued to servers and applications used by internal OCGBCC resources should be issued by OCGBCC's Certification Authority.

5.0 Enforcement - Any employee found to have violated these policies may be subject to disciplinary action, up to and including termination of employment.

6.0 Definitions

Term	Definition
Encryption	Transforming understandable data into a form that is incomprehensible and that looks like random noise.
Hashing	An algorithm that takes an entire message and, through process of shuffling, manipulating, and processing the bytes using logical operations, generates a small message digest of the data.
DMZ	De-Militarized Zone – A computer term used for a protected network that sits between the Internet and the corporate network.

Certification Authority (CA) In cryptography, a certificate authority or certification authority (CA) is an entity which issues digital certificates for use by other parties.

ATTACHMENT III
ANTIVIRUS STANDARDS

1.0 Purpose - The purpose of this document is to establish requirements which must be met by all computers connected to the Orange County Government Board of County Commissioners (OCGBCC) network to ensure effective virus detection and prevention.

2.0 Scope - This document applies to all OCGBCC computers running any version of the Microsoft Windows Operating Systems. This includes, but is not limited to, all servers, desktop computers, laptop computers, PC-based printers and appliances.

3.0 Policy

3.1 Virus Software – Servers
Trend Micro Server Protect or Trend Micro OfficeScan shall be installed and enabled on all OCGBCC computers running any server version of the Microsoft Windows Operating Systems.

3.2 Virus Software – Workstations
Trend Micro OfficeScan shall be installed and enabled on all OCGBCC computers running any non-server version of the Microsoft Windows Operating Systems.

3.3 Virus Software – Exchange Servers
Trend Micro ScanMail shall be installed and enabled on all OCGBCC computers running Microsoft Exchange Server.

3.4 Virus Software – Internet Mail
All incoming and outgoing internet email shall be scanned by Trend Micro Interscan Messaging Security Suite before being delivered.

3.5 Virus scanning - Antivirus software shall be running at all times on the computers on which it is installed. Real-time scanning of incoming and outgoing files shall be enabled at all times. Antivirus scans of servers shall be executed on a weekly basis in accordance with the schedules set in Trend Micro Server Protect. Antivirus scans of workstations shall be executed on a weekly basis in accordance with the schedules set in Trend Micro OfficeScan.

4.0 Guidelines

- When employees receive unwanted and unsolicited emails, they should be deleted and should avoid replying to the sender. These messages should not be forwarded.
- Employees should never open any files or macros attached to an email from an unknown, suspicious or untrustworthy source. These attachments should be deleted immediately. These messages should not be forwarded.
- Employees should never download files from unknown or suspicious sources.

5.0 Enforcement - Trend Micro's antivirus products are installed on all servers and workstations during the initial installation of the operating systems, and are continuously monitored to ensure they are running. Any employee or temporary found to have willfully stopped and/or paused these programs will be considered to be violating these policies and may be subject to disciplinary action, up to and including termination of employment.

6.0 Definitions

Term	Definition
Virus	A program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes. Viruses can also replicate themselves. All computer viruses are manmade. A simple virus that can make a copy of its self over and over again is relatively easy to produce. Even such a simple virus is dangerous because it will quickly use all available memory and bring the system to a halt. An even more dangerous type of

virus is one capable of transmitting itself across networks and bypassing security systems.

ATTACHMENT IV
WEB SECURITY STANDARD

1.0 Purpose - The purpose of this document is to establish requirements that will better manage and secure all web server platforms within the Orange County Government Board of County Commissioners (OCGBCC).

2.0 Scope - The scope of this document applies to all web server platforms located within the OCGBCC.

3.0 Policies

3.1 Activity - Any and all web server installations, removals or modifications shall require the direct involvement and documented approval by the Information Systems and Service Enterprise Security unit (ISS-ESU).

3.2 Hardware

3.2.1 All hardware platforms operating as a web server shall abide by all standards, policies and guidelines of the OCGBCC Enterprise Systems unit.

3.2.2 All hardware platforms operating as a web server shall reside on server hardware. Any exception shall require a documented wavier by the Information Systems and Services Enterprise Security unit (ISS-ESU).

3.3 Software

3.3.1 Web Server Platforms

3.3.1.1 Microsoft - Microsoft's Internet Information Server (IIS) is the approved, supported web server platform for OCGBCC.

3.3.1.2 Apache Software Foundation - Apache Software Foundation's HTTP Server (Apache) is approved but is unsupported. Any production use of (Apache) shall include an appropriate support model that is approved by the ISS-ESU.

3.3.1.3 Other - Other web server platforms may qualify for use, but shall require an evaluation, approval and a documented wavier by the ISS-ESU.

3.3.2 Databases

3.3.2.1 Location - A database server shall not reside on the same hardware platform as a web server.

3.4 Security

3.4.1 General - All web servers shall comply with all other documented ISS-ESU standards to include, but not limited to: virus, patch and account management.

3.4.2 Account Management

3.4.2.1 Local Account Access - Only accounts with local administrator privileges shall be allowed to log on locally to a web server.

3.4.2.2 Process/Application Accounts - All web server processes and applications shall run only under a low privilege local account. Web server processes shall not run under an account with domain, power user or a local administrator privileges.

3.4.2.3 Web Server Anonymous Accounts - Web server anonymous accounts shall only have read and execute permissions to folders/files within the web server directories. Change and delete permissions to folders/files that are directly accessible via a web browser shall not be granted to web server anonymous accounts.

3.4.3 Permissions

3.4.3.1 Operating System Permissions - ISS-ESU shall secure the operating system's file/folder permissions and security policies of all web servers. These permissions are to be modified solely by ISS-ESU.

3.4.3.2 Vendor/Third Party Access - Local administrator privileges on web servers are for authorized personnel only. Access to vendors and any other third party shall be provided solely on a temporarily, case-by-case basis through ISS-ESU.

3.4.3.3 Developer Access - Developer access to web server content directories shall be available by WebDav or FrontPage server extensions only. Developers shall be granted "Author Pages" rights with the FrontPage Server Extensions

3.4.4 Java Server Engines - Java server engines are approved but are not supported. Any production use of a Java server engine shall include an appropriate support model that is approved by (ISS-ESU).

3.4.5 FTP - Web servers that also run an FTP server shall not map FTP directories to directories accessible via a web browser.

3.4.6 IIS Virtual Directories, Application Pools, Settings - Any and all creations, removals or modifications to IIS Settings, Virtual Directories, Application Directories, and Application Pools shall require the direct involvement and documented approval by the Information Systems and Service Enterprise Security unit (ISS-ESU).

3.4.7 Other

- **Shares are not allowed on any directory accessible via web browser.**
- **Microsoft Windows web servers and any web application shall not be installed on the same drive as the host operating system.**
- **Executable files (.exe, .com, .bat, .dll, etc) shall not be placed into directories accessible via a web browser without the direct involvement and documented approval by the Information Systems and Service Enterprise Security unit (ISSESU).**

4.0 Guidelines - It is recommended that all web applications use the enterprise FTP and SMTP servers for all FTP/SMTP traffic.

5.0 **Enforcement - Any web server not meeting the above criteria may be immediately disconnected from the OCGBCC network. Any employee found to have violated these policies may be subject to disciplinary action, up to and including termination of employment.**

6.0 Definitions

Term	Definition
FTP	File Transfer Protocol – The protocol for exchanging files over the Internet. FTP works in the same way as HTTP for transferring Web pages from a server to a user's browser and SMTP for transferring electronic mail across the Internet in that, like these technologies, FTP uses the Internet's TCP/IP protocols to enable data transfer. FTP is most commonly used to download a file from a server using the Internet or to upload a file to a server.
WebDav	Web-based Distributed Authoring and Versioning – Extensions to HTTP that allows users to collaboratively edit and manage files on remote Web servers.
Front Page Extensions	A series of scripts that can be employed using Microsoft FrontPage, a visual HTML editor.
SMTP	Simple Mail Transfer Protocol – A protocol for sending e-mail messages between servers. In addition, SMTP is generally used to send messages from a mail client to a mail server.

ATTACHMENT V
STANDARDS SUMMARY

The following is a summary of key points in the Orange County Government Board of County Commissioners (OCGBCC) security standards. It is necessary for vendors to completely understand and follow these requirements in order for products or services to be considered for placement within the OCGBCC environment. Complete details about these standards can be found in the Orange County Government Standards and Guidelines packet.

WEB SERVERS

Web and Database Placement
A database server shall not reside on the same hardware platform as a web server.

Anonymous Accounts
Web server anonymous accounts shall only have read and execute permissions to folders/files within the web server directories. Change and delete permissions to folders/files that are directly accessible via a web browser shall not be granted to web server anonymous accounts.

DMZ

Web Server Platforms
Microsoft Internet Information Server (IIS) version 5.0 or higher shall be the only platform within the OCGBCC DMZ to run as a Web or FTP server.

Services and Protocols
Traffic using the following protocols from the OCGBCC DMZ to the internal network shall not be allowed: Kerberos, NetBIOS, Microsoft-DS, Microsoft's Well Known Ports, LDAP, RPC, SMB, RDP, HTTP, HTTPS, DNS, JOLT.

Encrypted Data
Any data accessible within the OCGBCC DMZ or directly accessible from it meeting the following criteria shall be encrypted: Name, addresses, phone numbers, email addresses, birthdates, federal/state/local document numbers, account numbers, race or religious information, employee identification numbers and all HIPAA information. The OCGBCC DMZ shall not have access to data containing bank information. The OCGBCC DMZ shall not have access to social security information.

Data Access
The OCGBCC DMZ shall have read only access to live data, if such data is also used by applications residing in the internal OCGBCC network.

ANTIVIRUS

Virus scanning
Antivirus software shall be running at all times on the computers on which it is installed.

MICROSOFT SECURITY PATCHES

Patch Installation
MS Security patches may be applied immediately upon release by Microsoft. All vendors must support their applications in this environment.

ATTACHMENT VI
DESKTOP COMPUTING STANDARDS

AUTHORIZED PRODUCTS

1: HARDWARE

Dell Desktop minitower and small form factor (SFF) PC

- **Dell GX960**
  - **Energy Smart system enabled**
  - **Intel Core 2 Duo processor or better**
  - **Minimum 2 Gb of Memory**
  - **Maximum 4 Gb Memory**
  - **USB Keyboard and Mouse**
  - **160 GB SATA Hard drive**
  - **DVD+/- RW**
  - **4 Year Basic Limited Warranty and 4 year Onsite Service**
  - **Intel vPro enabled**

Dell Laptop

- **Dell Latitude e6510**
  - **Intel Core 2 Duo processor or better**
  - **Minimum 2 Gb of Memory**
  - **Maximum 4 Gb of memory**
  - **CD-RW/DVD**
  - **80 GB Hard Drive**
  - **4 Year Limited Warranty and 4 year Onsite Service**
  - **Intel vPro enabled**
- **Dell Latitude e4300**
  - **Intel Centrino Core 2 Duo processor**
  - **Minimum 2 Gb memory**
  - **Maximum 4 Gb memory**
  - **CD-RW/DVD**
  - **80 Gb Hard Drive**
  - **4 Year Limited Warranty**
  - **Intel vPro enabled**
    - ***All PCs with 4yr limited warranty***

- **PDAs- Blackberry Devices Only**

2: OPERATING SYSTEMS and PROTOCOLS

Desktop/Laptop

- **Microsoft Windows 7 Professional with IE 8 (for new PCs)**
- **Microsoft Windows XP Service Pack 3 (for existing PCs)**
- **Internet Explorer 8.0- *IE8 is current County Standard included with Windows 7. IE7 is available for backwards compatibility.***
- ***Application software may specifically require a certain Internet Explorer version. Contact ISS for assistance as needed. ServiceCenter@ocfl.net***
- **Microsoft Office 2003 or greater (Standard or Professional Suite)**

Portable Devices

- **Blackberry OS**

Network Connectivity

- **Cisco Wireless Access Points, Cisco 802.11 LAN Card**
- **TCP/IP**

- **Sprint Wireless AirCard**

3: **CLIENT DATABASES**

Desktop/Workstations Only, Single User Only

- **Microsoft Access (user databases not supported)**
- **Oracle Client**
- **SQL Server Client**

4: **PERIPHERALS and ACCESSORIES**

- **HP LaserJet series**
  - **Black and White LaserJet**
    - **P1606dn < 4 users**
    - **P3015dn (supports secure printing – PIN)**
    - **P4015dn 8+ users (supports secure printing – PIN)**
  - **Color LaserJet**
    - **CP2025dn**
    - **CP4525dn 7+ users (supports secure printing – PIN)**
    - **5550dn 15+ users (supports secure printing – PIN)**
- ***Desktop Copier and combo unit purchases directly connected to the PC must be reviewed and approved by ISS. Contact ServiceCenter@ocfl.net for more information and assistance.***

UNSUPPORTED PRODUCTS

1: **HARDWARE**

- **Pre-Pentium class desktop systems**
- **Non-Dell PCs**
- **Non-Blackberry Smartphones**

2: **OPERATING SYSTEMS AND PROTOCOLS**

- **Microsoft Windows 2000**
- **Microsoft Windows NT 4.0**
- **Microsoft Windows 3.x, Windows 95 and 98**
- **MAC OS**

3: **CLIENT DATABASES**

- **Dbase**
- **RBASE**
- **Paradox**
- **FOXPRO**

4: **DESKTOP APPLICATIONS**

Desktop/Workstation

- **MS Office platforms prior to Office 2000**
- **ProComm**
- **Microsoft Internet Explorer, 4.x, 5.x**
- **McAfee Viruscan** ****Trend Micro is OCGOV standard***
- **WordPerfect**
- **Quattro**
- **Hotmetal**
- **Freelance**
- **Harvard Graphics**
- **Lotus Suite**
- **Netscape, Opera, Firefox Browsers**

- Rumba
- LAN Workplace
- Exceed
- Visio 3.x and older
- SHL Vision & Vision Express, WIN9x/WINNT/UNIX
- McAfee Remote Desktop32
- Reflection version 9 or lower
- PC Anywhere

5: PERIPHERALS AND ACCESSORIES
- HP LaserJet Series 4 and older printers
- Inkjet printers

PROHIBITED PRODUCTS

1: HARDWARE
- Personal (non-County) PCs
- Any network (voice or data) device not operated, administered or expressly approved by Orange County ISS.
- Any internet access device not operated, administered or expressly approved by Orange County ISS.

2: OPERATING SYSTEM AND PROTOCOLS
- Windows 9x
- Windows Vista
- 64 bit operating systems

Network Protocols
- NETBUI
- AppleTalk
- Token Ring
- Any network (voice or data) software or service not operated, administered or expressly approved by Orange County ISS.
- Any internet access service not operated, administered or expressly approved by Orange County ISS.

3: APPLICATIONS
- Any Alpha/Beta Software not operated, administered or expressly approved by Orange County ISS
- Anti-virus products other than Trend Micro
- Personal firewall products
- Network scanning tools
- Remote access software other than ISS authorized VPN
- User installed screen savers
- Games
- 3rd Party Desktops
- Disk Compression
- Non-Static BITMAP Backgrounds or screen savers
- iTunes (or other content sharing applications)
- P2P software

4: PERIPHERALS AND ACCESSORIES
- Portable music devices
- Personal (non-County) mass storage devices (hard drives, thumb drives, etc)
- Webcams

END OF SECTION 15900

ORANGE COUNTY
FIRE LOGISTICS WAREHOUSE – HVAC RENOVATION

SECTION 16014
REFERENCE STANDARDS AND REGULATORY REQUIREMENTS

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Reference Standards and Regulatory Requirements specifically applicable to Division 16 sections.

1.3 REFERENCES

A. The following references may be referenced within these specifications:

ADA	Americans with Disabilities Act
AHERA	Asbestos Hazard Emergency Response Act
AIA	American Institute of Architects
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	ASME International American Society of Mechanical Engineers International
ASTM	ASTM International American Society for Testing and Materials International
BICSI	BICSI, Inc.
BOCC	Board of County Commissioners Orange County
COO	City of Orlando
COOBC	City of Orlando Building Code
DMS/DOC	Department of Management Services Division of Communications
DOCA or DCA	State of Florida Department of Community Affairs
EIA/TIA	Electronics Industries Alliance/Telecommunications Industry Association
EJCDC	Engineers Joint Contract Documents Committee American Consulting Engineers Council
FAC	Florida Administrative Code

FBC	Florida Building Code
FCC	Federal Communications Commission
FFPC	Florida Fire Prevention Code
FLA	State of Florida
FMC	Florida Building Code (Mechanical)
FS	Florida Statutes
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers, Inc
ICPEA	International Power Cable Engineer's Association
LTCR	Local Telephone Company Requirements
NECPA	National Energy Conservation Policy Act
NESC	National Electrical Safety Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFSRS	Uniform Fire Safety Rules and Standards of Insurance Division of State Fire Marshal
UL	Underwriters Laboratories, Inc.
NEC	National Electrical Code

1.4 REGULATORY REQUIREMENTS

A. Conform to all the applicable requirements of the following codes, standards, guidelines, etc.. If there should be conflicting requirements between these codes, standards, guidelines, etc., the more or most stringent requirement shall apply that does not violate any codes or laws.

1. Standards and Miscellaneous Codes/Requirements (Comply with latest edition or notice available unless otherwise adopted by Authority Having Jurisdiction):

a) Americans with Disabilities Act of 1990, as amended
b) ADA Standards for Accessible Design, 2010
c) American National Standards Institute
d) American Society of Heating, Refrigerating and Air Conditioning Engineers
e) American Society of Mechanical Engineers
f) American Society for Testing and Materials
g) Concrete Reinforcing Steel Institute
h) Department of Community Affairs

i) Electronics Industries Association/Telecommunications Industry Association
j) Florida Building Code, ~~2010~~ **5th edition (2014)**
k) Florida Fire Prevention Code, **5th edition (2014)**
l) Institute of Electrical and Electronics Engineers
m) Local Power Company Requirements
n) Lightning Protection Institute
o) Local Telephone Company Requirements
p) National Electrical Code, ~~2008~~ **(2011)**
q) National Energy Conservation Policy Act
r) National Electrical Safety Code
s) National Electrical Manufacturers Association
t) NFPA 1 Fire Code, **2012 edition**
u) NFPA 101 Life Safety Code, **2012 edition**
v) Occupational Safety and Health Act
w) Safety Code for Elevators and Escalators
A17.1a, 2008 and A17.1b, 2009 Addenda
x) Safety Code for Existing Elevators and Escalators
A17.3, 1996
y) Sheet Metal and Air Conditioning Contractors
z) Underwriters Laboratories, Inc.
aa) Applicable Federal, State, Local Codes, Laws and Ordinances, Florida Statutes and Referenced Codes/Standards

PART 2 - PRODUCTS (Not Applicable)
PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 16721
ADDRESSABLE FIRE ALARM-DETECTION SYSTEM (EXTENSION OF EXISTING)

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. The work described herein and on the drawings consists of all labor, materials, equipment, and services necessary and required to provide and test an extension of the existing automatic fire detection and alarm system. Any material not specifically mentioned in this specification or not shown on the drawings but required for proper performance and operation shall be provided.

B. The drawings and specifications herein comply to the best of the Engineer's knowledge with all applicable codes at the time of design. However, it is this Contractor's responsibility to coordinate/verify (prior to bid) the requirements of the Authority Having Jurisdiction over this project and bring any discrepancies to the Engineer's attention at least ten days prior to bid. No changes in contract cost will be acceptable, after the bid, for work and/or equipment required to comply with the authority having jurisdiction.

C. The Contractor is advised that circuit routing for this system is not necessarily shown on the project drawings. The contractor shall provide and install all raceways, wiring and cabling required for a complete and fully functional system as intended by these specifications. All wiring and/or cabling shall be in conduit. Contractor shall provide and install a properly sized, flush mounted outlet box for every device. Contractor shall size and route raceways to accommodate the proper installation of the system cabling. T-Tapped cabling shall not be acceptable. In locations where raceway and/or conduit is not accessible after completion of the project, conduit shall be routed from device to device or fire rated access panels shall be installed to provide access to junction and pull boxes. Routing of raceway from device to device shall only be acceptable where the wiring scheme of the system, as recommended by the manufacturer, requires cable to pass from device to device. Contractor shall properly terminate each device according to the manufacturer's recommendations. Provide and install firestopping where penetrations are made through rated walls and floors.

D. The Contractor shall provide and install the fire alarm system (including all equipment, wiring, etc.) in accordance with the manufacturer's recommendations.

1. Installation of devices shall be in accordance with the manufacturer's requirements as well as the requirements of the Contract Documents. Recommendations by the manufacturer for the proper installation of the fire alarm system and its equipment shall not preclude the requirement for the Contractor to comply with the requirements of the Contract Documents.

2. Termination of fire alarm circuits shall be in accordance with the manufacturer's recommendations, applicable requirements of the National Electrical Code (NFPA 70), ADA, other applicable Codes and the Contract Documents.

3. Voice evacuation audio circuits (25V or 70V) shall be run in separate raceways from fire alarm data loops and other system circuits where the potential exists for interference or adverse effect upon the proper operation of the any fire alarm equipment, circuit or the system as a whole.

4. The fire alarm installer shall be responsible for ensuring that prior to bidding the project the Electrical Contractor understands the raceway requirements for the project. Claims by the

Contractor after award of the project in regard to additional raceway required either by the fire alarm system manufacturer's recommendations for proper installation of the system and its associated equipment, or for compliance with the requirements of the Contract Documents shall not be allowed.

5. The Contractor shall be responsible for providing personnel necessary to accomplish either a fire watch and/or a security watch in unprotected areas during times when the fire alarm system is off-line.

   a) Where the fire alarm system is inactive in any area due to the work of this project, the contractor shall, as a minimum, provide personnel necessary to observe the status of each fire alarm control panel in the affected area.

   b) When security functions provided by the fire alarm system are off-line in any area or partial area, the Contractor shall, as a minimum, provide one person at each AOA door until the system is operational. during those times where the off-line time is accidental, the contractor shall station personnel within five minutes of the system going off-line.

E. This specification describes a fully addressable, common fire alarm system with remote power supplies.

   1. All components shall be connected via the Signaling Line Circuit (SLC) to the FACP.
   2. The installation includes the phasing in of new equipment, and/or conduits and temporary wiring, if required, for the existing system in areas of demolition, and then removal of the existing system.
   3. Any existing conduit that is in place, in good condition and meets this specification may be reused.
   4. All new components must be electrically compatible with the existing FACP and must be interconnected by means of suitable wiring circuits to form a complete functional system when the project is completed.
   5. Existing system must remain active at all times. Provide Fire Watch if system is taken off line at any location as required by applicable codes and the local Authority Having Jurisdiction.

F. The Owner shall be responsible for any retrofits, installation and design required by the local AHJ to comply with the requirements of the ~~2010~~ Florida Fire Prevention Code, **5th edition (2014)** Section 11.10. This code requirement can only be determined after the construction of the building and may or may not be required by the local AHJ in the area of this project.

1.3 DESCRIPTION

A. The Contractor shall furnish and install an addressable fire alarm system extension to match the existing system. All devices shall be addressable. Control shall be microprocessor based and field-programmable. All electronics shall be solid state.

B. Provide all materials, work, labor, etc. as required to modify (including any programming, battery capacity, etc.) the existing to comply with the operation, etc. noted in these Contract Documents.

C. The system extension shall include but not be limited to:

   1. Main Fire Alarm Control Panel (FACP) including all required power supplies
   2. Fire Alarm Annunciator Panel (FAAP)
   3. Fire Alarm Shutdown
   4. Smoke Detectors

5. Duct Detectors
6. Remote Fire Alarm Control Panels (Network Nodes)
7. Surge Suppression
8. Programming
9. Grounding
10. Firestopping
11. Wire and Cable Labeling
12. Electrical power required to comply with all functions and operations called for in this section of the specifications.
13. Conduit, wire, wire fittings, terminal cabinets with plywood and terminal strips, and all accessories required to provide a complete operating system.

D. The Contractor shall furnish and install all equipment (raceways, wire/cable, circuit breakers, modules, relays, etc.) necessary, and as required by applicable code, to accomplish incidental functions of the fire alarm system including but not limited to the following:

1. Monitoring of sprinkler system and/or fire protection system flow and tamper switches
2. Monitoring of sprinkler system and/or fire protection system valve supervisory switches
3. Monitoring of post indicator valve (PIV) switches
4. HVAC system control and/or shutdown
5. Ventilation system (supply fans, exhaust fans, fan terminal boxes, etc.) control and/or shutdown
6. Smoke control system control and/or shutdown
7. Control of fire, smoke, and/or combination fire/smoke dampers
8. Control of fire and/or smoke doors, dampers, shutters, etc.

E. The system shall operate as a non-coded, continuous ringing system which will sound all audible devices and activate all visual devices until it is manually silenced. When system is silenced by silence switch in control panel, audible alarm is to silence, but visual alarm devices are to continue to operate.

F. The system shall be wired as a ClassA or ClassB to match existing system for all circuits.

G. The system is to be a complete analog addressable system.

H. All portions of fire alarm system shall be installed in conduit. Conduit and boxes to be installed by electrical contractor.

I. The fire alarm system shall not share a raceway, junction box, enclosure, manhole or device with any other system.

J. Contractor to advise Owner of requirements for monitoring the fire alarm system by Owner's monitoring company and provide all electrical required for remote monitoring.

K. Provide and install wiring, equipment, etc. for connection to devices furnished under other divisions of the work.

L. Provide and install wiring, equipment, etc. as required to deactivate power in the elevator rooms by heat detectors via shunt trip breakers and arm sprinkler pre-action system.

M. Provide and install wiring, equipment, etc. as required to deactivate power to computer power panels and air conditioning equipment by automatic or manual devices as shown on plans.

N. Although they may not be indicated on the fire alarm system diagram and/or drawings, all required control and interlock wiring between the fire alarm system and building equipment shall be provided hereunder, Controls are required to/for/from:

1. Fire/smoke air and duct detectors
2. Fire, smoke and/or combination fire/smoke dampers
3. Supply/return fans, exhaust fans, and/or fan terminal boxes (FTB)
4. Automatic fire extinguishing systems
5. Smoke evacuation equipment

O. Provide wiring for post indicator valve alarms, in each instance in which these are provided under work of other trades, connected to fire alarm system.

P. Provide and install all relays (electric-electric, electric-pneumatic, and/or pneumatic-electric) as required for a complete and operational fire alarm system, complying with all applicable codes and all requirements, and coordinated with all divisions of these specifications.

Q. Provide terminal cabinets sized to house terminal strips and surge suppression equipment.

R. Surge Suppression

1. The Contractor shall have equipment installed on the ac voltage supply and other lines taking care to arrest damaging electrical transient and spikes, which can cause damage to the microprocessor components of the system. Central office telephone lines shall have equipment installed to arrest high voltages from electrical and/or lightning from entering the system and causing damage.
2. Provide and install all materials, labor and auxiliaries required to furnish and install complete surge suppression for the protection of building fire alarm system from the effects of induced transient voltage surge and lightning discharge as indicated on drawings or specified in this section.
3. Provide surge suppression equipment at the following locations:
   a) On each conductor pair and cable sheath entering or leaving a building.
   b) On each conductor associated with fire protection (sprinkler) system fire alarm connections.

1.4 STANDARDS, CODES, REFERENCES, AND REGULATORY REQUIREMENTS

A. Reference Section 16014.

B. The equipment and installation shall comply with the current or applicable provisions of the following standards:

1. ANSI S3.41 American National Standard Audible Emergency Evacuation Signal
2. National Fire Protection Association Standards:
   a) NFPA 70 National Electrical Code (including but not limited to Article 760, Fire Alarm Systems)
   b) NFPA 72 National Fire Alarm Code
   c) NFPA 101 Life Safety Code
   d) NFPA 90A Installation of Air Conditioning and Ventilating Systems
3. Underwriters Laboratories Inc. The system and all components shall be listed by Underwriters Laboratories Inc. for use in fire protective signaling system under the following standards as applicable:

a) UL 864 (Category UOJZ) APOU Control Units and Accessories for Fire Alarm Systems. All Control Equipment shall be listed under UL category UOJZ.

b) UL 268 Smoke Detectors for Fire Alarm Systems

c) UL 268A Smoke Detectors for Duct Application

d) UL 217 Smoke Detectors Single and Multiple Station Smoke Alarms

e) UL 521 Heat Detectors for Fire Protective Signaling Systems

f) UL 228 Door Closers With or Without Integral Smoke Detectors

g) UL 464 Audible Signal Appliances

h) UL 1638 Visual Signaling Appliances

i) UL 1481 Power Supplies for Fire-Protective Signaling Systems

j) UL 1480 Speakers

k) UL 1424 Cables for Power-Limited Fire-Alarm Circuits

l) UL 1971 Signaling Devices for the Hearing Impaired

m) UL 1449 3rd Edition - Standard for Safety Surge Protective Devices

n) UL 497, UL 497A, UL 497B

4. All fire alarm equipment, including accessories to the system and including all wires and cable unless otherwise noted, shall be listed by the Underwriters' Laboratories product directory called Fire Protection Equipment and/or the Electrical Construction Materials List.

5. Each item of the fire alarm system shall be listed and classified by UL and FM as suitable for purpose specified and indicated.

6. The system controls shall be UL listed for Power Limited Applications per NEC. All circuits must be marked in accordance with NEC.

7. All equipment supplied as part of the Fire Alarm System shall be provided by a single manufacturer and shall comprise a complete UL Listed Fire Alarm System.

8. 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 1, Location Category A High Exposure of ANSI/IEEE Standard C62.41-1991.

C. The equipment and installation shall comply with the current or applicable provisions of the following codes and laws:

1. Americans with Disabilities Act (ADA): The fire alarm system shall comply with ADA, Public Law 101-336, 1990. The system shall comply with ADA Accessibility Guidelines (ADAAG).

2. Federal Register - Rules and Regulations - Non-discrimination on the basis of Disability by Public Accommodations and in Commercial Facilities.

3. Local and State Building Codes.

a) Florida Administrative Code. All applicable chapters including but not limited to:

1. Chapter 69A Rules, including but not limited to:

(a) Ch 69A-3 Fire Prevention - General Provisions

(b) Ch 69A-43 (Florida Handicap Code - Lodging)

(c) Ch 69A-46 Fire Protection System Contractors and Systems

(d) Ch 69A-47 Uniform Fire Safety Standards for Elevators

(e) Ch 69A-48 Fire Safety Standards for the Fire Alarm Systems

2. Florida Building Code, Chapter ~~423~~**453,** State Requirement for Education Facilities

3. Florida Administrative Codes 33-8 (Jails)

b) Florida Department of Insurance:

1. Insurance Code: The fire alarm system and installation thereof shall comply with the State of Florida Department of Insurance rules. The requirements of the Florida State Department of Insurance shall be as promulgated by the Division of State Fire Marshal.

2. Fire Alarm Rules: The fire alarm system and installation thereof shall comply with the Fire Safety Rules promulgated by the Florida State Fire Marshal.

c) City of Orlando

d) Orange County

e) 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.

2. Fire Department: Orange County

3. Building Official: City of Orlando

4. State of Florida: Division of State Fire Marshal.

D. Surge Suppression

1. Equipment Certification: When available by any one manufacturer, all surge suppression equipment shall be listed by Underwriters Laboratories, shall bear the UL seal and be marked in accordance with referenced standard. Such surge suppression equipment shall be UL listed and labeled for intended use.

2. Comply with all standards and guides as listed under "References" above.

E. Systems not capable of complete network interface operations as described in this specification shall supply a complete local area or wide area network with CRT/terminals at each location and shall obtain UL site certification and acceptance prior to the completion date. Certification shall not delay final system acceptance.

1.5 RELATED SECTIONS

A. All applicable sections of Division 0, Division 1, and Division 16.

B. Applicable sections of these specifications with regard to, but not limited to:

1. Extinguishing systems

2. Ductwork accessories: smoke dampers

3. Building control systems

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 10 years experience and with service facilities within 50 miles of Project.

B. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 10 years experience and with service facilities capable of providing a maximum response time of 2 hours.

C. Installer:

1. Company specializing in installing the products specified in this section with minimum 10 years experience.
2. The Installer shall be currently licensed as a Florida Certified Alarm System Contractor I (EF).
3. The installing Contractor shall be a direct sales division of, or the authorized and designated distributor for, a fire alarm system manufacturer.
4. Installing Contractor shall maintain a local staff of specialists, including a Fire Alarm Planning Superintendent, for planning, installation, and service.
5. The Installing Contractor shall maintain an office with capability to provide emergency service 7 days a week, 24 hour days, with a maximum response time of 2 hours. The Installing Contractor shall have been actively engaged in the business of selling, installing and servicing fire alarm systems for at least 10 consecutive years going back from date of bid.

D. Surge Suppression

1. All surge suppression devices shall be manufactured by a company normally engaged in the design, development, and manufacture of such devices for electronics/communications systems equipment.
2. The surge suppressor manufacturer shall offer technical assistance through support by a factory representative and local stocking distributor.
3. Verify proper clearances, space, etc. is available for surge suppressor.

E. Coordination/Project Conditions

1. Verify proper grounding is in place.
2. In installations where the electrical contractor does not provide a counterpoise system in conjunction with the underground raceway system, the fire alarm contractor shall provide a coupling conductor within the fire alarm underground raceway system to run along side fire alarm conductors. Coupling conductors shall be sized according to applicable codes and standards.

F. The work specified herein is an extension of the existing system and as such all equipment shall match existing. In the event that the existing equipment is no longer available other equipment will be considered for acceptance provided the following is submitted in writing by the system installer to the Engineer (See Division 1 requirements and Section 16013 on Substitutions):

1. Certified letter from the manufacturer specifically stating the following:
   a) Part numbers and descriptions of each item that is no longer manufactured.
   b) Manufacturer name (if not the same as the original manufacturer), part numbers and descriptions of items that are certified by the manufacturer to be compatible with the existing system.
   c) A detailed listing of specific differences, including both advantages and disadvantages, between the original item and the proposed substitution.
2. Contractor qualifications (as listed above).
3. Complete lists, descriptions and drawings of materials to be used.

4. A complete drawing showing conduit, conduit sizes, backboxes, number of wires and wire sizes.
5. A complete riser diagram of Fire Alarm System.

1.7 SUBMITTALS

A. Submit in accordance with Sections 16010 and 16012.

B. In addition to requirements of 16010 and 16012, the contractor shall submit:

1. Narrative of operation of System as provided. (Submittal will not be reviewed by the A/E without this narrative.)
2. Manufacturer's data on all products, including but not limited to:
   a) Catalog cut sheets.
   b) Roughing-in diagrams.
   c) Installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
   d) Operation and maintenance manuals.
   e) Typical wiring diagrams and risers.
   f) The contractor shall submit test reports, manufacturers' specifications and any other information necessary to determine compliance with material and equipment specifications described herein.
3. Submit floor plans to locate all devices. Wiring diagrams shall include wire and raceway sizes, fire alarm control panels, communication panels, Fire Fighter's HVAC override panel, riser wiring and associated raceway sizes, wiring details, connections and terminal identification. All devices shall be identified by the same applied identification symbol as shown on the contract documents.
4. Submit all load calculations and cable/wire sizing for each branch of the individual fire alarm field circuits. Wire sizing calculations to prove maximum three percent (3%) voltage drop at all ac voltages and maximum eight percent (8%) voltage drop at all dc voltages.
5. Battery sizing calculations.
6. Submit a detailed step by step testing procedure for a component by component system functional checkout and test.
7. Point to point wiring diagrams and block diagrams of system to be installed. Point to point wiring diagrams may be submitted at time of operation and maintenance manuals in lieu of in submittal brochure. Block diagrams shall be required with submittals.
8. Riser diagrams and floor plans showing conduit runs and number of wires. All devices shall be identified by the same applied identification symbol as shown on the drawings.
9. Surge Suppression
   a) Surge protective data for 120 volt power source, power circuit, outside signaling circuit, and exterior incoming circuits from other buildings (if any), and outgoing circuits to other buildings (if any).
   b) Submit Product Data for each type of suppressor:
      1. Dimensions
      2. Means of mounting

3. Compliance with UL Standards referenced
4. Compliance with IEEE Standards referenced
5. Design type (Hybrid, MOV)
6. Size of wire leads
7. Warranty
8. Performance data showing compliance with performance as specified herein.
9. Complete schematic data on each suppressor type indicating component values, part number, conductor sizes, etc.
10. Manufacturer's certified test data on each suppressor type.
11. Test data from an independent test laboratory.

10. Name, qualifications, etc. of company providing and installing system.
11. Qualifications of installer. Submit proof installer meets specified requirements.
12. Proof of UL Listing. Indicate the UL listing, the UL classification, and NEC insulation type used for each type of wire to be used in installation of fire alarm and communications system.
13. Manufacturer's drawings showing all dimensions (height, width, and depth) for all cabinets used to house system components. Provide catalog pages, mounting details and specification sheets for all fire alarm system components and rough-in boxes.
14. Submit Florida Registered Firm certificate number.
15. Submit Florida Fire Alarm Contractor's license number.
16. Submit Fire Alarm Technician(s) Manufacturer's certification.
17. Detail of Fire Department override control panel layout.
18. Detailed drawing of the Fire Alarm Control Panels layout indicating the exact arrangement of all zones, including expansion zones.
19. Coordination Drawing: Coordination CAD drawing of building Fire Command room and equipment layout as shown on drawings, with all panel and rack footprints, using actual manufacturer's dimensions, indicating proper clearances.
20. Network:
    a) Complete description data indicating UL listing for all network components.
    b) Complete sequence of operation of all functions of the network.
    c) A list of every network node address.
    d) A list of every address of every device connected to a network node that is provided for purposes of alarm initiation, status monitoring, supervised notification appliance circuits, and auxiliary control.
    e) Complete network wiring diagrams for all components and interfaces to equipment supplied by others.
21. All drawings required herein shall be on AutoCAD 2007 or higher.
22. Where required by Authority Having Jurisdiction submit signed and sealed documents as required by Authority Having Jurisdiction. Where Authority Having Jurisdiction requires shop drawings to be signed and sealed by a Registered Engineer, Contractor is required to submit same and include in his bid all costs associated with having a Registered Engineer

other then the design Engineer of Record perform signing and sealing.

1.8 PROJECT RECORD DOCUMENTS

A. Submit in accordance with Sections 16010 and 16098.

B. In addition to the requirements of 16010 and 16098, the contractor shall submit:

1. Updated and revised contract documents to record actual locations (as-installed) of all equipment, devices, initiating devices, signaling appliances, and end-of-line devices.
2. Record actual type, size, and routing of cables installed.
3. Record all cable identifications.
4. Drawings required herein are in addition to those required under "OPERATION AND MAINTENANCE DATA".
5. All drawings required herein to be on AutoCAD 2007 or higher.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit in accordance with Sections 16010 and 16098.

B. In addition to the requirements of 16010 and 16098, the contractor's O & M Manuals shall include:

1. A complete as-installed equipment list, listed by room, with manufacturers' names, model numbers, serial numbers, and quantities of each item.
2. A complete and correct system schematic, showing detailed connections for all parts of the system, including wire numbers, terminal block numbers and layouts, and other designations and codings (point-to-point wiring diagrams). System performance measurements shall be documented as noted elsewhere in this specification.
3. Riser diagrams showing as-installed conduit with pull boxes, outlet boxes, physical cable layouts, part numbers of cable types used, and number of circuits in each conduit.
4. Repair parts list for each and every major equipment item furnished.
5. Service manuals for each and every major equipment item furnished.
6. Manufacturer's warranties and operating instructions for each and every equipment item furnished. Include a copy of the certificate of warranty, signed by both parties.
7. Technical Systems Operations Manual, custom-written by the Contractor, for the purpose of instructing the Owner's operating personnel in the detailed step-by-step operation of the system and preventive maintenance procedures. This manual shall include descriptions of the system components and their relationship to system function. This manual shall be bound separately and labeled appropriately.
8. Surge Suppression
   a) O & M data to include:
      1. All accepted shop drawings, product data, and/or cutsheets.
      2. Installation, connection, and maintenance information on each type of surge suppression.
      3. Procedure and/or time table for recommended periodic inspection of devices to determine continued usefulness.
9. Complete equipment rack layouts showing locations of all rack mounted equipment items.
10. CAD floor plans, prepared at a scale of not less than 1/16" = 1'-0" showing detectors,

speaker locations and orientation, rack locations, and all other related device locations.

11. The Contractor/Installer shall videotape the entire training session(s), and submit the video tape with the Operational Manual.

C. Drawings required herein are in addition to those required under "PROJECT RECORD DOCUMENTS".

1. All drawings required herein shall be on AutoCAD 2007 or higher.

1.10 WARRANTY

A. The contractor shall warrant the equipment to be new and free from defects in material and workmanship, and will, within one year from date of acceptance by owner, repair or replace any equipment found to be defective.

1. No charges shall be made by the installer for any labor, equipment, or transportation during this period to maintain functions.

2. Respond to trouble call within twenty-four (24) hours after receipt of such a call.

B. The contractor shall guarantee all wiring and raceways to be free from inherent mechanical or electrical defects for one (1) year from date of final acceptance of the system.

C. Surge Suppression

1. All surge suppression devices shall be warranted free from defects in materials and workmanship for a period of five (5) years.

2. Any suppressor, which shows evidence of failure or incorrect operation during the warranty period, shall be repaired or replaced by the manufacturer and installer at no cost to the owner.

3. Equipment that is damaged by surges during warrantee period shall be replaced at no expense to Owner.

1.11 ADDITIONAL DEVICES FOR JURISDICTIONAL COMPLIANCE

A. Prior to bid, Contractor shall review plans and specifications carefully for compliance with all codes, and in particular the ADA requirements and NFPA 72. Contractor shall include in bid price any devices required to provide a fully compliant system. Said additional devices shall be shown on shop drawings submitted by Contractor.

B. In addition to the above-mentioned devices, Contractor shall include in his bid price the cost of installing twenty additional audible/visual notification devices (over and above those shown on drawings, required by specifications, or determined by system installed to be required) whose location/need may not become apparent until just prior to substantial completion date. At least two weeks prior to substantial completion system shall be fully operational. After system is operational, Owner's safety representative and the system installer shall review the placement of and coverage provided by visual and audible signals throughout the facility for compliance with all codes, and in particular the ADA requirements and NFPA 72. System installer shall provide the additional devices at locations where the Architect/Engineer requests for complete coverage. The additional devices shall be installed and fully operational prior to date of Substantial Completion.

C. After the project has had its first annual safety inspection, the system installer shall install within one week's notice any additional audible/visual signals that have been determined to be required during said inspection from the balance of the twenty additional devices noted above. There shall be no cost for these added devices provided the total does not exceed the balance remaining of the twenty devices noted above. The final balance of the twenty additional devices included in bid price shall be turned over to the Owner as spare material after any fire alarm issues identified during the first annual safety inspection are resolved.

1.12 MAINTENANCE SERVICE

A. Furnish service and maintenance of fire alarm system for one (1) year from date of Substantial Completion.

1. No charge shall be made by the installer and/or contractor for any labor, equipment, or transportation during this period to maintain functions.

2. Respond to trouble call within twenty-four (24) hours after receipt of such call.

1.13 EXTRA MATERIALS

A. Provide six (6) keys of each type.

B. Provide three (3) of each type of automatic smoke detector without base.

C. Provide three (3) of each type of surge suppression device.

1.14 OWNER'S INSTRUCTION:

A. Provide 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 instruction on peripheral device operation, including what are normal indications and alarm indications of each type of new/added device. Videotape all training sessions and deliver (4) copies of tapes to Owner (for use in future training).

1.15 SYSTEM OPERATION

A. System operation shall meet the operation requirements of all codes and regulatory requirements.

B. Upon activation of the Fire Alarm System by a manual station, smoke detector, or any other new or existing automatic device, (except AHU smoke duct detector) the following shall take place:

1. Energize all alarm signaling devices.

2. Sound all audible alarms and flash visual signals throughout the campus. (See Item 9 below)

3. Alert local fire department or proprietary system.

4. Cause alarm to be displayed on the annunciator section of the control panel.

5. Cause alarm to be displayed on remote annunciator

6. Close all doors or fire shutters, held open by automatic release devices throughout the facility, or by zone (coordinate with architect and door hardware supplier, provide all electrical required).

7. Unlock all electrically locked time-out room doors (coordinate with the architect and door hardware supplier, provide all electrical required).

8. Shut down all air handlers, exhaust fans supplying or exhausting air, and fan terminal boxes (FTB).

9. Shut down of air handling unit by a local smoke duct detector shall <u>not</u> activate audible alarms or flash visual signals, but shall provide a supervisory indication at the fire alarm control panel/fire alarm annunciator.

10. Shut all fire and/or smoke dampers in ducts associated with the air handling units and exhaust fans which are shut down.

11. Transmit signals to the building elevator control panel to initiate return to the main floor or alternate floor.

12. Transmit signals to the building automation system to tell system that the fire alarm system has taken control of respective mechanical system.
13. Send a signal to all dimming and lighting relay/control systems. Fire alarm signal shall initiate dimming system controls to drive all dimmed circuits to immediate full-on output. Fire alarm signal shall initiate lighting relay/control system to turn on all emergency lighting circuits.
14. Send a signal to all non-fire alarm sound reinforcement systems (i.e. Cafeteria, Gymnasium, Multi-Purpose Room, Theater, etc.). Fire alarm signals shall override all other sound systems. Alarm notification signals shall take precedence over all other signals. Operation of other sound systems shall resume after fire alarm system clears alarm.

C. System operation shall meet the operation requirements of all codes and regulatory requirements.

D. Upon activation of the Fire Alarm System by a manual station the following shall take place:
1. Energize all alarm signaling devices.
2. Sound all audible alarms and flash visual signals throughout the building.
3. Alert local fire department or proprietary system.
4. Cause alarm to be displayed on the annunciator section of the control panel.
5. Cause alarm to be displayed on remote annunciator
6. Close all doors, held open by automatic release devices throughout the facility, or by zone (coordinate with Architect and door hardware supplier, provide all electrical required).
7. Unlock all electrically locked doors (coordinate with architect and door hardware supplier, provide all electrical required).

E. Upon activation of the Fire Alarm System by any smoke detector, any sprinkler flow alarm switch or other automatic detection device, the following shall take place in addition to the above:
1. Shut down all air handlers and exhaust fans supplying or exhausting air in at least the zone where the alarm is initiated.
2. Shut all smoke dampers in ducts associated with the air handling units and exhaust fans, which are shut down, in at least the zone where the alarm is initiated. (Coordinate with mechanical contractor and provide all electrical as required).
3. Transmit signals to building elevator control panel to initiate return to main floor or alternate floor.
4. Transmit signals to building automation system to tell system that the fire alarm system has taken control of respective mechanical system.
5. Send a signal to all dimming and lighting relay/control systems. Fire alarm signal shall initiate dimming system controls to drive all dimmed circuits to immediate full-on output. Fire alarm signal shall initiate lighting relay/control system to turn on all emergency lighting circuits.
6. Send a signal to all non-fire alarm sound reinforcement systems. Fire alarm signals shall override all other sound systems. Alarm notification signals shall take precedence over all other signals. Operation of other sound systems shall resume after fire alarm system clears alarm.

F. Elevator: Smoke detectors associated with elevator lobbies, hoistways and machine rooms shall be types accepted by the Florida State Fire Marshall under FAC Chapter 69A.47 Uniform Fire Safety Standards for Elevators. Elevator recall shall be initiated ONLY by elevator lobby,

hoistways and machine room smoke detectors. In addition to those functions outlined in "A" above, elevator detector(s) shall initiate the following functions.

1. The operation of any one elevator lobby, hoistways, or machine room product of combustion detectors associated with a single bank of elevators shall signal the elevator controls to commence required procedures for that bank of elevators. Refer to Division 14 for required procedures, floor(s) of recall, and alternate floor(s) of recall.
2. The operation of any elevator machine room product of combustion detector that is part of this Fire Alarm System shall signal the elevator controls to commence required procedures for that bank of elevators. Refer to Division 14 for required procedures.
3. The activation of the smoke detector(s) in a machine room, lobby or hoistway shall cause a suitable warning light to flash. The light is to be located adjacent to the "Phase One" recall switch or elevator hall button at the designated and alternate fire department access level.
4. Fire alarm system shall monitor shunt trip voltage per NFPA 72.

G. System supervisory faults, such as shorts, opens, and grounds in conductors, operating power failure, or faults within supervised devices, shall place the system in the trouble mode, which causes the following system operations:

1. Visual and audible trouble signal indicated be zone at the fire alarm control panel.
2. Visual and audible trouble signal indicated at remote annunciator panel.
3. Trouble signal transmitted to central station.
4. Manual acknowledgement function at fire alarm control panel shall silence audible trouble signal; visual signal shall be displayed until initiating failure or circuit trouble is cleared.

H. Alarm Reset: The system shall remain in the alarm mode until manually reset with a key accessible reset function. The system shall reset only if the initiating circuits are cleared.

I. Lamp Test: manual lamp test function causes alarm indication at each lamp on the fire alarm control panel and the remote annunciator.

J. When the fire alarm system is activated as a drill, all incidental functions shall be exercised including notification of the fire department.

K. Where required by codes or Authority Having Jurisdiction:

1. When system is silenced by silence switch in control panel, audible alarm is to silence but visual alarm devices are to continue to operate.

L. The fire sprinkler valve tamper switch, when closed, shall annunciate a supervision signal at the fire alarm control panel and annunciator panels, if any. This supervision signal shall not cause a general alarm.

M. Operation of auxiliary contacts in control panel to shut all smoke dampers in ducts associated with air handling units and exhaust fans which are shut down. (These shall not be controlled from detector unit contacts.)

1.16 ZONING

A. Alarm Zones.

1. Regardless of the number of zones shown on drawings, the minimum alarm zones required are:

a) One per building, per floor for pull stations.

b) One per building, per floor for automatic devices.

c) One for each duct smoke detector.

d) Zones as required by NFPA and FBC.

B. Notification Zones.

1. Regardless of the number of zones shown on drawings the minimum notification zones (horns and strobe lights) required are:

a) One (or more) circuit(s) for administration building

b) One (or more) circuit(s) for exterior horns

c) One (or more) circuit(s) for remainder of campus.

2. Breakdown circuits as required for load and distances involved.

PART 2- PRODUCTS

2.1 GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS

A. All equipment shall be new and unused. All components and systems shall be designed for uninterrupted duty. All equipment, materials, accessories, devices, and other facilities covered by this specification or noted on the contract drawings shall be the best suited for the intended use and shall be provided by a single manufacturer.

B. Provide all equipment to match existing equipment required to perform all functions and/or features included in this section of the specifications although not specifically noted or specified herein.

C. Modify/rework existing system and reprogram existing system as required for extension to new devices and/or as required for proper operation of system with new devices, adding new zone modules, adding surge suppression, adding power supply and battery capacity to meet regulatory requirements with new devices, etc.

2.2 RACEWAYS

A. General:

1. All raceways (conduit, wireways, pullboxes, outlet boxes, etc.) shall comply with applicable requirements of sections within Division 16 of these specifications.

2. All raceways (conduit, wireways, pull boxes, outlet boxes, etc.) shall comply with all requirements of the manufacturer of the fire alarm system.

B. Conduit: Comply with Section 16111 except as noted below:

1. Pull Cords: Install pull cords in all raceway runs that are installed without cable.

2. Size: Minimum size shall be 3/4" conduit.

C. Boxes:

1. All outlet boxes, junction boxes, pull boxes, etc. shall comply with applicable section of these specifications.

2. Boxes shall be sized as required by the fire alarm system manufacturer and NEC for cables and/or device installed.

2.3 TERMINATION CABINETS

A. Terminal cabinets are to comply with applicable sections of these specifications.

2.4 "SYSTEMS" AND "LOCAL" GROUND BUS

A. Bus to comply with applicable sections of these specifications.

2.5 POWER SUPPLY

A. Provide additional power supplies with battery backup for all equipment as required for a proper and operating fire alarm system with new equipment connected.

B. Power supplies shall supply sufficient power to sound all signals, flash all visual devices, and operate all required functions simultaneously, and shall operate on a single phase 120V ac source.

C. The entire fire alarm system with new devices shall be provided with a continuous back-up power source (batteries) for uninterruptible service during normal/generator power switchover. The batteries shall provide operating and supervisory power for a minimum period of 24 hours, and shall be capable of operating all alarm devices for a duration of 15 minutes at the end of the 24 hour period. The standby battery system shall be supervised for both overcharging and low battery. The power supply shall include a properly sized automatic battery charger.

D. The power supply for the panel and all fire alarm peripheral shall be integral to the control panel. The power supply shall provide all control panel and peripheral power needs as well as 3.0 amperes of unregulated 24V dc power for external audio-visual devices. The audio-visual power may be increased as needed by adding additional modular expansion power suppliers. All power supplies shall be designed to meet UL and NFPA requirements for power-limited operation on all external signaling lines, including initiating circuits and indicating circuits.

E. The same manufacturer as the fire alarm control panel (FACP) shall provide all power supplies. Power supplies provided by manufacturers other than the manufacturer of the fire alarm control panel (FACP) shall not be acceptable.

F. Circuit breakers, or other over-current protection on all power outputs.

G. Input power shall be 120V ac, 60 Hz. The power supply shall provide internal batteries and charger. Internal battery capacity shall be as required.

H. The battery pack shall provide maximum normal operating and supervisory power for:

1. 24 hours per NFPA 72
2. 60 hours per NFPA 72.
3. Provide low maintenance gel cell type batteries with sufficient ampere-hour rating to meet the above NFPA Standard and to operate all alarm signals for a duration of 15 minutes at the end of the required period of time.

I. Wall Mount Equipment Enclosure

1. The control panel, and all associated equipment, shall be housed in an enclosure designed for mounting directly to a wall or vertical surface. The back box and door shall be constructed of 16 gauge steel with provisions for electrical conduit connections into the sides and top. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.
2. The enclosure(s) shall be of sufficient size to house all equipment required for this project. All equipment shall be mounted in the enclosure(s) as designed by the manufacturer. Provide enclosures in quantities as required to provide a complete, UL Listed fire alarm system.

2.6 DUCT MOUNTED SMOKE DETECTOR

A. The Duct Mounted Smoke Detector for the fire and smoke detection system shall be a high velocity rated Analog addressable series smoke detector intended for use with ventilation and conditioning ducts.

B. The detector shall provide detection of combustion gases and smoke in air conditioning ducts in

compliance with NFPA 90A. The detector shall be UL-listed specifically for the use in air handling systems.

C. The detector shall operate at air velocities ranging from 300 feet per minute to 4000 feet per minute without requiring compensation for operation at specific air velocities. Sampling tubes of proper length shall be provided and installed to match duct width at the installed location.

D. Whether shown on drawings or not, a remote alarm indicator/test station shall be provided for each duct mounted smoke detector to annunciate smoke detector operation remotely. Mount unit in ceiling or wall near respective remote smoke detectors (in an occupied space).

2.7 ADDRESSABLE MODULE

A. Analog addressable device shall be furnished as required to monitor fire alarm or supervisory initiating devices or control auxiliary functions. Each module shall contain address switches to assign a unique input point for programming or control by the system.

2.8 RELAYS

A. Relays required for control (i.e. air handler shutdown, supply fan shutdown, exhaust fan shutdown, fan terminal box shutdown, door lock release, fire shutter release, smoke damper closure, fire damper closure, smoke/fire damper closure, or any other interface required by these specifications or applicable codes) shall be UL listed relays suitable for use in fire alarm systems.

B. Per NFPA, relays used for control of other systems shall be located within three feet (3') of the device to be controlled.

C. Relays shall be analog addressable devices powered and controlled from the fire alarm system. Each relay shall contain address switches to assign a unique input point for programming or control by the system.

D. Each relay shall provide at least one set of Form "C" dry relay contacts.

2.9 AUDIBLE NOTIFICATION DEVICES

A. Audible notification devices shall be wall mounted at each location designated on the drawings and/or as specified herein.

B. The audible notification device shall include screw terminals for in-out field wiring. The device shall surface mount to a standard 4" sq. x 2 -1/8" backbox.

C. The audible notification devices shall be UL listed for fire protective service and shall provide 24V dc inputs and sound output of not less than 75 dBA at 10 feet or more than 120 dBA at the minimum hearing distance from the audible appliance.

1. The audible notification device shall compliant with ANSI S3.41 for signal character conformance.

D. Audible notification devices located on the exterior of a building, or in a damp or wet location, shall be a weatherproof version and rated, by the manufacturer, for use in wet locations.

2.10 AUDIBLE/VISUAL NOTIFICATION DEVICES

A. Audible/visual notification devices shall be wall mounted at each location designated on the drawings and/or as specified herein.

B. The audible/visual notification device shall include screw terminals for in-out field wiring. The device shall surface mount to a standard 4" sq. x 2 -1/8" backbox.

C. The audible portion of the audible/visual notification devices shall be UL listed for fire protective service and shall provide 24V dc inputs and sound output of not less than 75 dBA at 10 feet or more than 120 dBA at the minimum hearing distance from the audible appliance.

1. The audible portion of the audible/visual notification device shall compliant with ANSI

S3.41 for signal character conformance.

D. The audible portion of audible/visual notification devices located on the exterior of a building, or in a damp or wet location, shall be a weatherproof version and rated, by the manufacturer, for use in wet locations.

E. The visual portion of the audible/visual notification devices shall comply with the Americans with Disabilities Act which includes the following:

1. The lamp shall be a xenon strobe type or equivalent.
2. The color shall be clear or nominal white (i.e. unfiltered or clear filtered white light).
3. The maximum pulse duration shall be two-tenths of one second (0.2 sec) with a maximum duty cycle of 40 percent. The pulse duration is defined as the time interval between initial and final points of 10 percent of maximum signal.
4. The intensity shall be a minimum of 75 candela. The use of visual devices rated at 15/75, 15 or 30 candela shall not be acceptable. Field selectable devices may be utilized provided the device is set at 75 candela or higher and the setting of the device selector switch is visible when the device is installed.
5. The flash rate shall be a minimum of 1 Hz and a maximum of 3 Hz.
6. More than two visible notification appliances in the same room or adjacent space within the field of view must flash in synchronization. This requirement shall not preclude synchronization of appliances that are not within the same field of view.

2.11 SURGE SUPPRESSION

A. Non-Addressable Initiation Devices:

1. Plug-in replacement modular design with associated female wiring connector.
2. UL 497B listed and labeled.
3. Multi-stage hybrid protection circuit.
4. Fail short/fail safe.
5. Surge Capacity: 10KA with 8 x 20 μs waveform, 500A per line with 10 x 700 μs waveform.
6. Clamp Voltage: 150% of circuit peak operating voltage with 100 amp 10 x 700 μs waveform.
7. Maximum Continuous Operating Voltage: 125% of peak operating voltage, minimum.
8. Capacitance: 1500 pf.
9. Manufacturer:
   a) EDCO #PC642C series with #PCBIB base.

B. Addressable Initiation Devices and Data Loops:

1. Plug-in replacement modular design with associated female wiring connector.
2. UL 497B listed and labeled.
3. Multi-stage hybrid protection circuit.
4. Fail short/fail safe.
5. Surge Capacity: 10KA with 8 x 20 μs waveform, 500A per line with 10 x 700 μs waveform.

6. Clamp Voltage: 150% of circuit peak operating voltage with 100 amp 10 x 700 μs waveform.
7. Maximum Continuous Operating Voltage: 125% of peak operating voltage, minimum.
8. Capacitance: 50 pf.
9. Manufacturer:
   a) EDCO #PC642C-LC series with #PCBIB base.

C. Power Circuit (120 volt):
1. UL 1449 listed.
2. 15 amp, 120V rated.
3. Suppressors shall be tested per IEEE, C62.41-1991 for Categories A and B.
4. Normal mode (L-N), and common mode (L+N-G) protection.
5. Internal fusing.
6. Hybrid design.
7. Indicators for normal operation and failure indication.
8. Enclosure:
   a) Fire retardant high impact, phenolic or plastic housing or metal enclosure.
9. Clamping voltage UL 1449, Line to Neutral, Category B Impulse At (3KA, 8 x 20 μs): 385V @ 120V.
10. Maximum Surge Capacity: 20,000 amps.
11. Maximum Continuous Operating Voltage: 115% of line voltage.
12. Provide hardwire connection or add 15 amp receptacle device to hardwired devices to match equipment being protected and maintain UL listing.
13. Provide additional 15 amp in-line fusing as required to comply with UL and the N.E.C. when connected to a 20 amp, 120V circuit.
14. Manufacturers:
   a) Leviton #51020-WM (hardwired).
   b) EDCO #HSP-121BL2.

2.12 CABLE

A. Contractor shall provide and install cable as required by the manufacturer, as specified elsewhere in these specifications, and to provide a complete, fully operational, UL Listed fire alarm system.

B. Fire alarm system cables installed in exterior and/or underground raceways shall comply with the applicable sections of NEC Article 800.

2.13 WATERFLOW DETECTOR

A. Waterflow switch to be supplied and installed by the mechanical contractor and wired in to fire alarm system by Systems Contractor. Zone as shown on zone schedule.

2.14 SPRINKLER SUPERVISORY SWITCHES

A. Supervisory Switch to be supplied and installed by mechanical contractor and wired in to fire alarm system by Systems Contractor. Zone as shown on zone schedule.

2.15 PRESSURIZATION

A. Upon alarm from the fire alarm system, the fire alarm control panel shall activate pressurization fans for both stairwells and the elevator shaft. Systems Contractor shall provide control relay, 24V dc coil, one per fan, to accomplish this action. Smoke dampers on the roof shall be closed in order for pressurization to be accomplished.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor is advised that circuit routing for this system is not necessarily shown on the project drawings. The contractor shall provide and install all raceways, wiring and cabling required for a complete and fully functional system as intended by these specifications. All wiring and/or cabling shall be in conduit. Contractor shall provide and install a properly sized, flush mounted outlet box for every device. Contractor shall size and route raceways to accommodate the proper installation of the system cabling. T-Tapped cabling shall not be acceptable. In locations where raceway and/or conduit is not accessible after completion of the project, conduit shall be routed from device to device or fire rated access panels shall be installed to provide access to junction and pull boxes. Routing of raceway from device to device shall only be acceptable where the wiring scheme of the system, as recommended by the manufacturer, requires cable to pass from device to device. Contractor shall properly terminate each device according to the manufacturer's recommendations. Provide and install firestopping where penetrations are made through rated walls and floors.

B. Make final connections between new or modified components and the existing fire detection and alarm system.

C. Provide any programming required at the fire alarm control panels, remote panels or fireworks computers. This includes programming in support of outages, planned or unplanned, of the system.

D. Test and certify the completed system in accordance with all regulatory requirements.

E. Update the system as-built drawings, CAD files and bitmaps.

F. Locate, install, and test fire alarm and detection systems in accordance with the equipment manufacturer's written instructions, and the latest editions of the NFPA, the National Electrical Contractor's Association publication "Standard of Installation" and all applicable codes and standards referenced in this specification.

G. Modify/rework existing system as required for extension to new devices and/or as required for proper operation of entire system, adding new zone modules, surge suppression, power supply and battery capacity or new devices to meet regulatory requirements.

H. Rework/modify/reprogram existing fire alarm control panel and remote control panels to accept and reflect all changes made by alterations as specified.

I. Modify/update the existing fire alarm as-built (mylars and blueline) drawings and CAD files to reflect modifications, additions, etc., made by this project. Provide blueline sets of changes for approved and company with all additional requirements as outlined in specifications.

J. Provide all work required for a complete system including complete system testing and checkout. All components shall be properly mounted and wired. The installation of this system shall comply with the directions and recommendations of authorized factory representatives.

K. Provide wiring, cabling, raceways, and electrical boxes in accordance with manufacturer's written instructions.

L. Components shall be electrically "burned-in" by operating the component at full power for a period as recommended by the manufacturer.

M. Installation shall be done in a neat workmanlike fashion by a firm regularly engaged in fire alarm

installation and service.

N. The installation and inspection of all fire detection and fire alarm devices and systems shall be performed by, or under the direct on-site supervision of, a licensed fire alarm technician or a fire alarm planning superintendent who shall certify the work upon completion of the activity. The certifying licensee shall be present for the final test prior to certification.

O. Installation plans and wiring diagrams shall bear the signature and license number of the licensed Fire Alarm Planning Superintendent, the date of installation and the name, address, and certificate of registration number of the registered firm.

P. After completion of the installation of the system, the licensee shall complete a NFPA installation certificate. The installation certificate format shall be furnished by the State Fire Marshal. When an installation certificate form has been completed, legible copies shall be distributed as directed by the State Fire Marshal.

Q. After an installation has been complete, affix a Fire Alarm Tag to the control panel. The Fire Alarm Tag is in addition to the installation certificate. Protect the Fire Alarm Tag from vandalism by applying pressure sensitive label; do not use a "tie on" tag. It shall be as required in the Fire Safety Rules as promulgated by the Florida State Fire Marshal.

R. Power supplies are to be loaded to a maximum of 75% of their capacity. Provide additional power supplies where required to comply with this maximum loading requirement.

S. As-built plans and wiring diagrams shall bear the signature and license number of the licensed fire alarm planning superintendent, the date of installation and the name, address, and certificate-of-registration number of the registered firm.

T. All components shall be completely wired. System shall be fully operable when main power service has failed and the Emergency Standby 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.

U. Installation of detectors:

1. All ceiling mounted detectors shall be installed in accordance with the requirements of NFPA 72.

2. All concealed detectors shall be provided with a remote indicating lamp and test switch installed in an occupied space (corridor, etc.) on wall or on the ceiling grid indicating the type of detector and the zone to which it is connected. Label shall be red with white lettering.

3. Duct detectors shall be installed in accordance with NFPA 90A. All brackets and hardware shall be provided as required to install detector housing in correct position. All detector housings shall be sealed as required to prevent air leakage between duct and housing. Sampling tubes of proper length shall be provided and installed to match duct width at the installed location.

3.2 RACEWAYS AND BOXES

A. Provide dedicated raceway with applicable boxes for all fire alarm wiring in accordance with applicable sections of these specifications.

B. All initiating, indicating and auxiliary control devices shall be mounted on UL listed outlet boxes.

C. Provide supporting devices per Section 16190.

D. Identify raceways and boxes per Section 16195.

3.3 WIRE/CABLE

A. Conductor: 98% conductivity, solid copper or stranded copper. 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.

B. Insulation: A type accepted by NEC for the application. Individual conductors shall be Type THHN/THWN. All cable shall be UL listed for fire-protective signaling application. Communication, Class 3 or Multi-Purpose cables shall not be substituted for FP cable types.

C. Size: All conductors shall be sized as prescribed by the system manufacturer, with following minimums:

1. Multiplex Signaling Line Circuit: AWG #14, shielded twisted pair cable.
2. Initiating Circuits, Hard-Wired Devices: AWG #14, THHN/THWN conductors.
3. Notification Circuits: AWG #14, THHN/THWN conductors.
4. Initiating Circuits, Addressable Devices: AWG #14, shielded twisted pair cable.
5. Provide larger conductors where required to maintain voltage drop or signal strength within acceptable limits.

D. The above wire sizes shall be increased to size as required to comply with authority having jurisdiction or as required for voltage drop, load, etc.

E. Color Coded:

1. Wiring shall be color coded as required to match existing system.
2. Permanent wire materials shall be used to identify all splices and terminations for each circuit at all junction boxes, outlet boxes, and terminations.

F. UL:

1. General: Fire-protective signaling cable shall be UL listed as non-power limited or power limited as needed to match the output of the fire alarm equipment.
2. Non-Power Limited: Fire protective signaling circuits classified as non-power limited shall use cable listed under UL 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 760.176. Minimum cable marking shall be NPLF.
3. Power Limited: Fire protective signaling circuits classified as power limited shall use cable listed under UL 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.
4. Fire Resistance of Cables: Power-limited fire-protective signaling circuit cables shall be UL listed as described in NEC 760.179. All such cable shall bear a cable marking that includes a Type designation as given in NEC Table 760.179(I). Provide Type FPL.

G. 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. Apply a compression lug, similar to T&B Sta-Kon Terminal, to all stranded conductors at terminations or use box-lug terminal strips.
5. There shall be no wire splices. All wiring shall be continuous, uncut between devices and terminal blocks.

H. Rated Enclosures:

1. All vertical fire alarm wiring traversing more than one level shall be routed in rated enclosures. In addition, all horizontal wiring serving devices location on floors other than where wiring originates shall be routed in 2-inch concrete encasement, suitable rated building construction, or 2-hour wrap application enclosure accepted by local authority having jurisdiction.

3.4 END-OF-LINE DEVICE

A. Mount end-of-line device box with last device or separate box adjacent to last device in circuit.

3.5 AUXILIARY CONTROL RELAYS

A. An auxiliary fire alarm relay used to control an emergency control device, e.g. motor controller for HVAC system fan or elevator controller shall be located within 3 ft. of the emergency control device.

B. The installation wiring between the system panel and the auxiliary fire alarm relay shall be monitored for integrity.

C. Auxiliary control relays shall be listed for use with fire alarm systems.

D. All ceiling mounted detectors shall be installed in accordance with the requirements of NFPA 72.

E. All concealed detectors shall be provided with a remote indicating lamp installed in an occupied space (corridor, etc.) on wall or on the ceiling grid indicating the type of detector and the zone to which it is connected. Label shall be red with white lettering.

F. Label each device with point number.

3.6 INSTALLATION OF DUCT DETECTORS

A. Comply with all applicable codes and standards including but not limited to:

1. NEMA Guide for Proper Use of Smoke Detectors in Duct Applications
2. Full requirements of detector UL listing.
3. NFPA 90.
4. Refer to Part 1 – General for additional standards.

B. Location: To permit proper sampling of the air within a duct, locate supply air duct detectors downstream from fans, filters, humidifiers, and heating/cooling elements (if codes permit). Locate supply or return air duct detectors at least six duct widths (diameters) from any opening, detector, bend, or branch connection. When physical parameters or codes make it impossible to meet the six width requirement, locate the detector as far as possible from the obstacle.

C. All brackets and hardware shall be provided as required to install detector housing in correct position. All detector housings shall be sealed as required to prevent air leakage between duct and housing.

D. All concealed detectors shall be provided with a remote indicating lamp installation in an occupied space (corridor, etc.) on wall or on the ceiling grid indicating the type of detector and the zone to which it is connected. Label shall be red with white lettering.

3.7 STAIRWAY PRESSURIZATION

A. Upon alarm from the fire alarm system, the fire alarm control panel shall activate pressurization fans for both stairwells and the elevator shaft. Provide control relay, 24V dc coil, one per fan, to accomplish this action. Also, the applicable smoke dampers on the roof shall close in order for pressurization to be accomplished.

3.8 MAIN FIRE ALARM CONTROL PANEL AND ASSOCIATED EQUIPMENT

A. Install all programming and software changes to existing fie alarm control panel to provide a complete and operational extension of the existing system as specified.

B. All functions/operations/performance specified are to match the same functions/operations/ performance of the existing fire alarm system.

C. All color graphic AutoCAD bit maps shall be updated and tested.

3.9 CABLE IDENTIFICATION

A. Provide and install permanent cable markers on all cables/wire lines, telephone lines, etc. at terminal strips, terminal cabinets and at main equipment.

3.10 SURGE PROTECTION

A. General

1. Provide, install and connect new surge suppression equipment as specified herein, including protection of equipment power source, cable/wire entering or leaving building housing, main fire alarm system equipment, ground lugs, #6 copper ground wire in 3/4"c. to existing main building service ground.
2. Extreme care shall be taken by contractor to assure a properly surge protected system.
3. Surge protection equipment must be selected by contractor to match the equipment being protected including wire sizes, operating volts, amps, and circuit impedance.
4. Installation of surge protection equipment and its grounding must be per manufacturer's recommendations to assure short and proper ground paths.

B. Equipment Selection

1. Contractor to coordinate with suppliers and installers of all equipment being protected and provide surge suppression equipment which meets these specifications on respective equipment, wires, etc.

C. Equipment Installation

1. Install surge suppression equipment per manufacturers recommendation at each wire terminal as noted under Part 1.
2. Install in surge suppression equipment terminal cabinets, etc. as required to facilitate installation of surge protection equipment and terminal points. Increase size of terminal cabinets (from that shown on drawings) to size required to facilitate installation of surge suppression equipment and terminal blocks.
3. Locate surge suppression equipment in terminal cabinet nearest main equipment cabinet (FACP).
4. Coordinate with Section 16691 contractor to assure that surge suppression for 120V ac power circuit and surge suppression required by this section are all installed in same terminal cabinet and bonded together.

D. Ground Installation

1. Ground Bus Connections.

a) Provide "local" ground bus in each terminal cabinet housing surge protection

equipment (with lugs, etc. as required).

b) Bond "local" ground bus to terminal cabinet with minimum #6 copper wire.

c) Connect terminal cabinet "local" ground bus to "systems" ground bus installed per 16170 with minimum #6 copper insulated wire (unless otherwise noted) in conduit.

d) Note that "systems" ground bar is also to be used for power transformation ground (480V to 208V) where applicable.

2. Surge suppression equipment grounding.

a) Connect each surge suppressor to local ground bus in terminal cabinet with wire sized as recommended by manufacturer. Where "M" block type terminations/surge suppressors are used, bond ground rail to local ground bar with wire as recommended by manufacturer.

b) Coordinate with Section 16691 contractor to assure that 120V ac power source/supply surge suppressor is also grounded to same local ground bus as surge suppressors provided in this section for same system (i.e. fire alarm, intercom, television, etc.).

3. Conductors.

a) Conductors shall meet requirements of Section 16123. Minimum size to be #12 THWN.

b) Bends in excess of 90 degrees in any grounding conductor shall not be permitted. A radius of 6 inches or greater shall be maintained on all bends.

c) Do not bundle unprotected conductors with protected conductors.

d) Conductors shall be kept as short as possible.

e) Conductors shall be secured at 12" intervals with an accepted copper clamp.

f) Grounding conductors shall be properly connected to the building service ground by accepted clamps.

4. Grounding Connectors

a) Connectors, splicers, and other fittings used to interconnect grounding conductors, bond to equipment or grounding bars, shall be accepted by NEC or UL for the purpose.

b) All connectors and fittings shall be of the Nicopress crimp or compression set screw type.

c) Special treatment to fittings, lugs, or other connectors of dissimilar material shall be applied to prevent electro-galvanic action.

5. Telephone Circuits

a) Systems utilizing telephone company pairs as a transmission medium shall be provided with a suppressor conforming to device in Part 2 of this specification.

b) Suppressors shall be installed at each point where interface is made to telephone company pairs.

c) In cases where a modem or other device is used to interface with the telephone circuit the following procedure shall apply:

1. Where the modem or coupling device is furnished by the telephone company the suppressors shall be installed on the system side of the modem or coupling device.

2. Where the modem or coupling device is furnished by the system contractor, the suppressor shall be installed on the telephone line side of the modem or coupling device.

3.11 EXISTING CONDITIONS

A. Existing fire alarm control panel and all associated electrical is to be removed, complete.

B. All existing fire alarm wiring and conduit is to be removed complete.

C. Contractor shall investigate existing conditions prior to bid.

3.12 CONDUIT/BOX IDENTIFICATION

A. Contractor shall identify fire alarm conduit and boxes with red paint in exposed locations. Identify conduit in concealed locations with 4" mark of red paint every 4'-0" OC.

3.13 DEMONSTRATION

A. When system is complete it shall be demonstrated to owner's representative who shall be given complete instructions, spare parts, manuals and maintenance information.

3.14 SYSTEM TESTING

A. Prior to certification of the fire alarm system the contractor shall accomplish a complete test of the fire alarm system in accordance with NFPA 72, Chapter 10, paragraph 10.4 Testing.

B. Perform a complete, functional, component by component test of the entire fire alarm and detection system. Provide a detailed step by step testing procedure, which is unique to this project, reflecting the type of system and the number and location of all components.

C. Demonstrate the proper operation of each component as follows:

1. Ionization, photoelectric, and duct smoke detectors: activate the detector with a "false smoke" product which has been specifically formulated for testing smoke detection systems.

2. Heat detectors: activate the detector by utilizing the detector check button.

3. Pull Stations: activate the station by operating the station in its normal mode.

4. Audible and Visual Alarms: verify proper operation when the system is put into the alarm mode.

5. Sprinkler Flow Switches: open the sprinkler system's inspection test valve. Verify that the flow switch sends an alarm signal within the allowed time corresponding to the switch's time delay setting.

6. Fire Alarm Panels: functionally check-out and test the panel per the manufacturer's written instructions. Demonstrate the proper operation of each modular component. Demonstrate automatic power change to batteries and back to building power upon a drop in voltage below the voltage threshold as specified by the panel manufacturer.

D. Demonstrate the supervisory function at each device loop circuit, and at all single component wiring runs such as for the sprinkler valve supervisory switches.

3.15 CERTIFICATION

A. After completion of the installation of the system, the licensee shall complete a NFPA Inspection and Testing form. The Inspection and Testing form format shall be as indicated in NFPA 72, Chapter 10, Figure 10.6.2.3 Inspection and Testing form. When an Inspection and Testing form has been completed, legible copies shall be distributed as directed by the Authority Having Jurisdiction.

B. After an installation has been complete, affix a Fire Alarm Tag to the control panel. The Fire

Alarm Tag is in addition to the Inspection and Testing form. Protect the Fire Alarm Tag from vandalism by applying pressure sensitive label; do not use a "tie-on" tag. It shall be as required in the Fire Safety Rules.

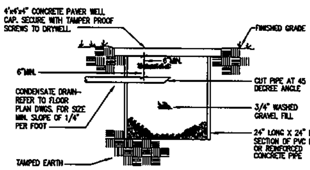
3.16 FINAL DRAWINGS

A. As-built drawings shall be given to the Owner's representative, at time of instruction, in addition to those to be supplied as general requirements of the job.

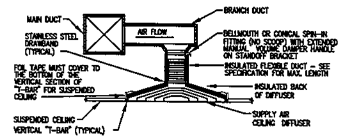
3.17 AUTHORITY HAVING JURISDICTION

A. The drawings and specifications herein comply to the best of the Engineer's knowledge with all applicable codes at time of design. However, it is this contractor's responsibility to coordinate/verify (prior to bid) the requirements of the authority having jurisdiction over this project and bring any discrepancies to the Engineer's attention at least seven days prior to bid. No changes in contract cost will be acceptable after the bid for work/equipment required to comply with the Authority Having Jurisdiction.

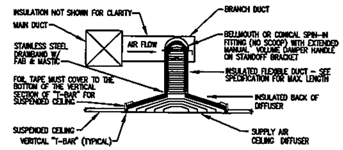
END OF SECTION



DRYWELL DIAGRAM
N.T.S.



BRANCH DUCT BOTTOM TAP



BRANCH DUCT SIDE TAP

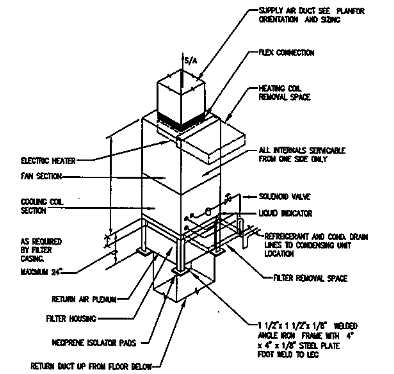
INSULATION MUST BE SECURED TO BACK OF DIFFUSER BY ONE OF THE FOLLOWING METHODS:

1) INSULATE TOP SIDE OF THE DIFFUSER TO THE EDGE. PLACE THE DIFFUSER ON THE SUSPENDED CEILING GRID AND TAPE FROM THE LOWEST PART OF DIFFUSER EDGE TO THE BOTTOM OF VERTICAL SECTION OF THE T-BAR ON THE OPPOSITE SIDE OF THE T-BAR WHERE DIFFUSER RESIDES. NO INSULATION SHOULD BE SHOWING AFTER TAPING AND ALL THE HOLES ON THE VERTICAL SECTION OF T-BAR SHOULD BE COMPLETELY COVERED.

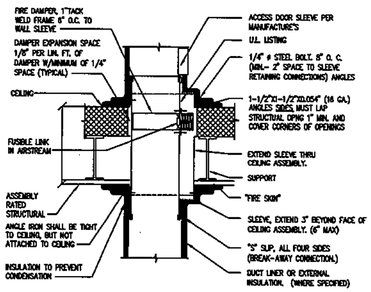
2) INSULATE TOP SIDE OF THE DIFFUSER TO THE EDGE LEAVING ONLY 1/4" COMPLETELY AROUND THE EDGE. TAPE FROM THE TOP SIDE TO THE EDGE AND THEN PLACE THE DIFFUSER IN PLACE. THIS METHOD ALLOWS FOR THE DIFFUSER TO BE MOVED IF NECESSARY. 1/4" SPACE AROUND THE TOP LIP OF THE DIFFUSER IS FOR TAPING PURPOSES ONLY.

3) INSULATE TOP SIDE OF THE DIFFUSER TO THE EDGE. FLIP THE DIFFUSER WITH THE EXPOSED AREA FACING UP. TAPE 1/4" ON ALL FOUR SIDES. FLIP THE DIFFUSER WITH EXPOSED AREA FACING DOWN AND ROLL ALL FOUR TAPES OVER THE INSULATION AND SEAL. THIS METHOD ALSO ALLOWS FRO THE DIFFUSER TO BE MOVED IF NECESSARY.

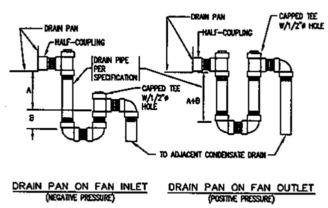
DIFFUSER CONNECTION DETAIL
N.T.S.



TYPICAL A/C MOUNTING DETAIL - AHU-2
N.T.S.



HORIZONTAL FIRE DAMPER THRU RATED CEILING ASSEMBLY DETAIL
N.T.S.

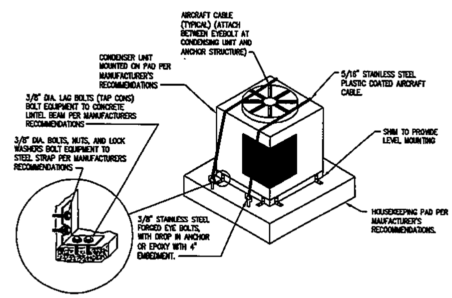


DRAIN PAN ON FAN INLET (NEGATIVE PRESSURE)

DRAIN PAN ON FAN OUTLET (POSITIVE PRESSURE)

NOTE:
1. DRAIN PIPE TO BE SAME SIZE AS UNIT OUTLET, BUT NOT LESS THAN 3/4" PIPE SIZE.
2. "A"=SYSTEM STATIC IN INCHES AT DRAIN POINT. "B"=1/2 SYSTEM STATIC IN INCHES AT DRAIN POINT.

AIR HANDLING UNIT DRAINS
N.T.S.



NOTE:
IT IS THE INTENT OF THIS DETAIL THAT THE CONTRACTOR PROPERLY INSTALL THE CONDENSER TO INSURE THAT THE CONDENSER SHALL WITHSTAND HURRICANE FORCE WINDS.

CONDENSING UNIT MOUNTING DETAIL
N.T.S.

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ORLANDO | Fort Myers | Jacksonville | Tampa
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130 Candace Drive
Maitland, Fl 32751-3331

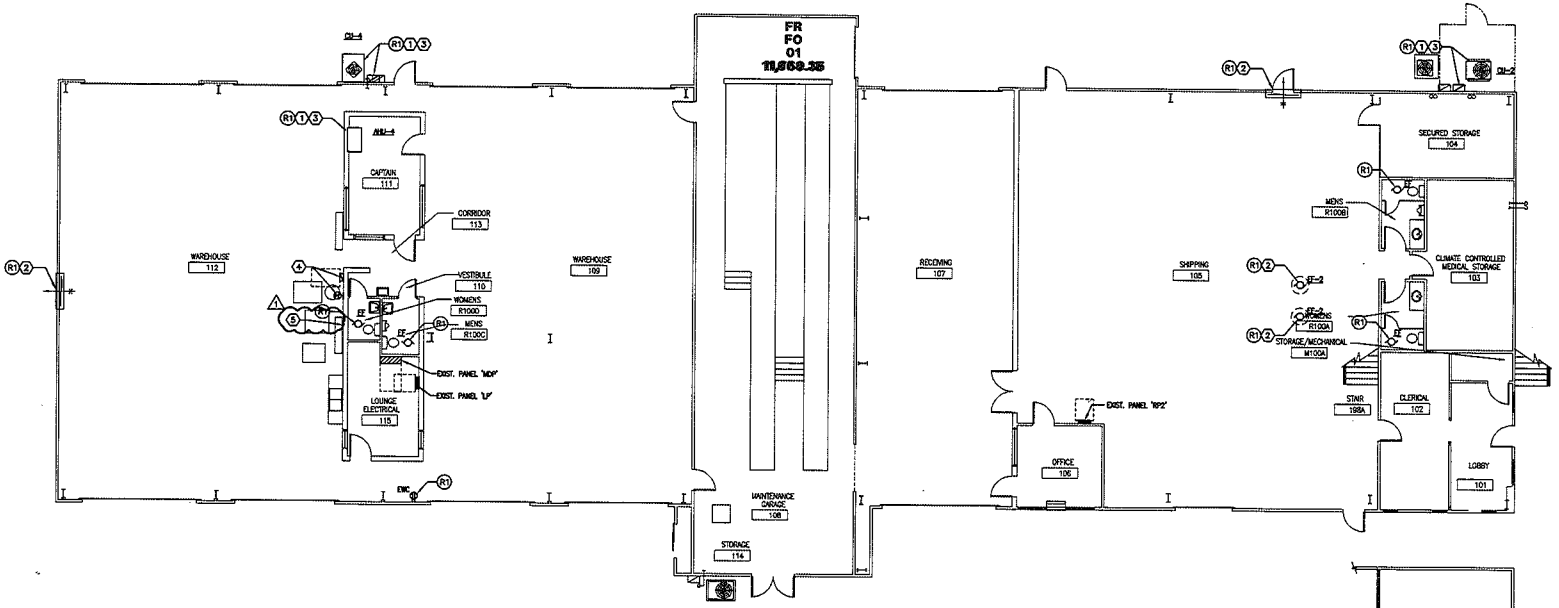
ORANGE COUNTY FIRE LOGISTICS WAREHOUSE HVAC REPLACEMENT

Revisions

No.	Date	Description
1	11/30/15	ADDENDUM #1

Key Plan

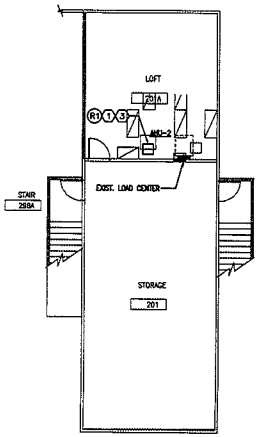
MPE PROJ#: 2013-171
Designed By: BWP
Drawn By: AG/RN
Checked By: BWP
Issue Date: 10/01/15
Drawing Scale: AS NOTED
Drawing Title: DETAILS - MECHANICAL
BID DOCUMENTS
Drawing No. M701



DEMO FLOOR PLAN - ELECTRICAL - LEVEL 1

1/8"=1'-0"

0 4' 8' 16'



DEMO FLOOR PLAN - ELECTRICAL - LOFT

1/8"=1'-0"

0 4' 8' 16'

GENERAL NOTES

1) REFER TO GENERAL NOTES FOR THIS DISCIPLINE.
2) REFER TO SPECIFICATIONS.
3) NO MULTI-WIRE BRANCH CIRCUITS ARE TO BE USED. EACH CIRCUIT IS TO HAVE SEPARATE NEUTRAL.
4) ALL HCK NOTES NOT NECESSARILY USED ON ALL SHEETS.
5) EXISTING CONDUIT ROUTING IS UNKNOWN.
6) WHERE CONDUIT ROUTING IS SHOWN, THE CONDUITS ARE SHOWN FOR DIAGRAMATIC PURPOSES AND ARE NOT NECESSARILY REPRESENTATIVE OF EXACT PLACEMENT.

HCK NOTES

1. MECHANICAL EQUIPMENT TO BE REPLACED. REMOVE ALL ELECTRICAL FOR MECHANICAL EQUIPMENT COMPLETE BACK TO ITS SOURCE.
2. EXISTING MECHANICAL EQUIPMENT TO BE ABANDONED IN PLACE.
3. EXISTING CONDUIT RUN MAY BE RE-USED IN RENOVATIONS PROVIDED SIZE AND CONDITION MEETS CODE REQUIREMENTS. REFER TO RENO DRAWINGS.
4. EXISTING ELECTRICAL TO BE RELOCATED. REFER TO RENO PLAN FOR NEW LOCATION.
5. EXISTING ELECTRICAL CONDUITS AND EQUIPMENT SCHEDULED TO REMAIN SHALL BE RELOCATED OR ADJUSTED FOR NEW 2-HOUR WALL ENCLOSURE. REFER TO ARCHITECTURAL RENOVATION SHEETS FOR NEW WALL DIMENSIONS AND REQUIREMENTS.

DEMOLITION LEGEND

- R1 REMOVE ALL ELECTRICAL ASSOCIATED WITH THIS ITEM, COMPLETE BACK TO ITS SOURCE. SOURCE IS CONSIDERED TO BE FIRST UPSTREAM DEVICE OR CIRCUIT BREAKER THAT FEEDS THIS AFFECTED CIRCUIT. SEE GENERAL NOTES AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- R2 REMOVE ALL ELECTRICAL IN AREA OF REMODEL/RENOVATION COMPLETE BACK TO ITS SOURCE. SOURCE IS CONSIDERED TO BE FIRST UPSTREAM DEVICE OR CIRCUIT BREAKER OUTSIDE OF AREA OF REMODEL THAT FEEDS CIRCUITS/DEVICES WITHIN AREA OF REMODEL/RENOVATION. SEE GENERAL NOTES AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- R3 REMOVE THE DEVICE ONLY. REFER TO RENOVATION PLAN FOR ADDITIONAL ELECTRICAL.

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ENG. REG. No. E08-000000 CERT. OF AUTH. No. 0000

ORANGE COUNTY FIRE LOGISTICS WAREHOUSE HVAC REPLACEMENT

Revisions

No.	Date	Description
1	11/30/15	ADDENDUM #1

Key Plan

MPE PROJ#: 2013-171
Designed By: RB
Drawn By: AG/RB
Checked By: CT
Issue Date: 10/01/15
Drawing Scale: 1/8"=1'-0"

Drawing Title:
FLOOR PLAN ELECTRICAL DEMOLITION

BID DOCUMENTS

Drawing No.
ED101

CREATE DATE: 11/18/2015 8:48:29 AM LAST SAVED: 12/1/2015 11:58:04 PM LAST SAVED BY: BPERRATT
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