Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15100 – VALVES - 230523 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

B. Requirements of the following Division 15 Sections apply to this section:

1. "Basic Mechanical Requirements."
2. "Basic Mechanical Materials and Methods."
3. "Basic Piping Materials and Methods."

1.2 SUMMARY

A. This Section includes general duty valves common to most mechanical piping systems.

1. Special purpose valves are specified in individual piping system specifications.

B. Valve tags and charts are specified in Division 15 Section "MECHANICAL IDENTIFICATION."

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data, including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Comply with the requirements specified in Division 1 Section "MATERIALS AND EQUIPMENT," under "Source Limitations."

B. American Society of Mechanical Engineers (ASME) Compliance: Comply with

ASME B31.9 for building services piping and ASME B31.1 for power piping.

C. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with the various MSS Standard Practices referenced.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation For Transport: Prepare valves for shipping as follows:

1. Ensure valves are dry and internally protected against rust and corrosion.
2. Protect valve ends against damage to threads, flange faces, and weld-end preps.
3. Set valves in best position for handling. Set globe and gate valves closed to prevent rattling; set ball and plug valves open to minimize exposure of functional surfaces; set butterfly valves closed or slightly open; and block swing check valves in either closed or open position.

B. Storage: Use the following precautions during storage:

1. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.
2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.

C. Handling: Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, those listed in valve schedule.

2.2 VALVE FEATURES, GENERAL

A. Valve Design: Rising stem or rising outside screw and yoke stems.

1. Nonrising stem valves may be used where headroom prevents full extension

of rising stems.

B. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.

C. Sizes: Same size as upstream pipe, unless otherwise indicated.

D. Operators: Provide the following special operator features:

1. Handwheels, fastened to valve stem, for valves other than quarter turn.
2. Lever handles, on quarter-turn valves 6-inch and smaller, except for plug valves. Provide plug valves with square heads; provide one wrench for every 10 plug valves.
3. Chain-wheel operators, for valves 2-1/2-inch and larger, install 72 inches or higher above finished floor elevation. Extend chains to an elevation of 5'-0" above finished floor elevation.
4. Gear drive operators, on quarter-turn valves 8-inch and larger.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.

F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.

G. End Connections: As indicated in the valve specifications.

1. Threads: Comply with ANSI B1.20.1
2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves
3. Solder-Joint: Comply with ANSI B16.18

a. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F for gate, globe, and check valves; below 421 deg F for ball valves.

2.3 GATE VALVES

A. Gate Valves, 2-Inch and Smaller: MSS SP-80; Class 150, body and union bonnet of ASTM B 62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Do not use solder end valves for hot water heating or steam piping applications.

B. Gate Valves, 2-1/2-Inch and Larger: MSS SP-70; Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A 126 Class B; with flanged

ends, "Teflon" impregnated packing, and two-piece backing gland assembly.

2.4 BALL VALVES

A. Ball Valves, 1 Inch and Smaller: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; two-piece construction; with bronze body conforming to ASTM B 62, standard (or regular) port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout-proof stem, and vinyl-covered steel handle. Provide solder ends for condenser water, chilled water, and domestic hot and cold water service; threaded ends for heating hot water and low-pressure steam.

B. Ball Valves, 1-1/4-Inch to 2-Inch: Rated for 150 psi saturated steam pressure, 400 psi WOG pressure; 3-piece construction; with bronze body conforming to ASTM B 62, conventional port, chrome-plated brass ball, replaceable "Teflon" or "TFE" seats and seals, blowout proof stem, and vinyl-covered steel handle. Provide solder ends for condenser water, chilled water, and domestic hot and cold water service; threaded ends for heating hot water and low-pressure steam.

2.5 PLUG VALVES

A. Plug Valves, 2-Inch and Smaller: Rated at 150 psi WOG; bronze body, with straightaway pattern, square head, and threaded ends.

B. Plug Valves, 2-1/2-Inch and Larger: MSS SP-78; rated at 175 psi WOG; lubricated plug type, with semisteel body, single gland, wrench operated, and flanged ends.

2.6 GLOBE VALVES

A. Globe Valves, 2-Inch and Smaller: MSS SP-80; Class 125; body and screwed bonnet of ASTM B 62 cast bronze; with threaded or solder ends, brass or replaceable composition disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

B. Globe Valves, 2-1/2-Inch and Larger: MSS SP-85; Class 125 iron body and bolted bonnet conforming to ASTM A 126, Class B; with outside screw and yoke, bronze mounted, flanged ends, and "Teflon" impregnated packing, and two-piece backing gland assembly.

2.7 BUTTERFLY VALVES

A. Butterfly Valves, 2-1/2-Inch and Larger: MSS SP-67; rated at 200 psi; cast-iron body conforming to ASTM A 126, Class B. Provide valves with field replaceable EPDM sleeve, nickel-plated ductile iron disc (except aluminum bronze disc for valves installed in condenser water piping), stainless steel stem, and EPDM O-ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide lug or wafer type as indicated. Drill and tap valves on dead-end service or requiring additional body strength.

2.8 CHECK VALVES

A. Swing Check Valves, 2-Inch and Smaller: MSS SP-80; Class 125, cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, Y-pattern, and bronze disc; and having threaded or solder ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

B. Swing Check Valves, 2-1/2-Inch and Larger: MSS SP-71; Class 125 (Class 175 FM approved for fire protection piping systems), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, and bronze disc or cast-iron disc with bronze disc ring; and flanged ends. Provide valves capable of being refitted while the valve remains in the line.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.

B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.

C. Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.

E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.

F. Replace defective valves with new valves.

3.2 VALVE ENDS SELECTION

A. Select valves with the following ends or types of pipe/tube connections:

1. Copper Tube Size, 2-Inch and Smaller: Solder ends, except provide threaded ends for heating hot water and low-pressure steam service.
2. Steel Pipe Sizes, 2-Inch and Smaller: threaded or grooved end.
3. Steel Pipe Sizes 2-1/2 Inch and Larger: grooved end or flanged.

3.3 VALVE INSTALLATIONS

A. General Application: Use gate, ball, and butterfly valves for shut-off duty; globe, ball, and butterfly for throttling duty. Refer to piping system specification sections for specific valve applications and arrangements.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

D. Install three-valve bypass around each pressure reducing valve using throttling-type valves.

E. Install valves in horizontal piping with stem at or above the center of the pipe.

F. Install valves in a position to allow full stem movement.

G. Installation of Check Valves: Install for proper direction of flow as follows:

1. Swing Check Valves: Horizontal position with hinge pin level.

3.4 SOLDER CONNECTIONS

A. Cut tube square and to exact lengths.

B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket in same manner.

C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

D. Open gate and globe valves to full open position.

E. Remove the cap and disc holder of swing check valves having composition discs.

F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

G. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.5 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.6 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.7 FIELD QUALITY CONTROL

A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing

to stop leaks; replace valves if leak persists.

3.8 ADJUSTING AND CLEANING

A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

3.9 VALVE PRESSURE/TEMPERATURE CLASSIFICATION SCHEDULES

VALVES, 2-INCH AND SMALLER

SERVICE	GATE	GLOBE	BALL	CHECK
Chilled Water	125	125	150	125

VALVES, 2-1/2-INCH AND LARGER

SERVICE	GATE	GLOBE	BUTTERFLY	CHECK
Chilled Water	125	125	200	125

3.10 VALVE SCHEDULE

A. Gate Valves - 2 Inch and Smaller:

MANUFACTURER	THREADED NRS	THREADED RS	SOLDER NRS	SOLDER RS
Crane	x	431UB	x	x
Grinnell	3050	3060	x	x
Hammond	IB637	IB629	x	IB648
Jenkins	x	47U	x	x
Lunkenheimer 3153	3151	3154	3155	
Milwaukee	x	1151	x	1169
Nibco	T-136	T-135	S-136	x
Powell	2712	2714	x	1842
Stockham	B-130	B-120	x	B-124

1. x means not available.

B. Gate Valves - 2-1/2 Inch and Larger:

MANUFACTURER	OS&Y RS	NRS

Crane		465-1/2	461	
Grinnell		6020A		6060A
Hammond		IR1140		IR1138
Jenkins		651A		326
Lunkenheimer	1430	1428		
Milwaukee		F2885		F-2882
Nibco		617-O		F-619
Stockham		G623		G-612
Powell		1793		1787

C. Ball Valves - 1 Inch and Smaller:

MANUFACTURER		THREADED ENDS	SOLDER ENDS
Conbraco (Apollo)	70-100	70-200	
Crane		9302	9322
Grinnell		3500	3500SJ
Jamesbury		351	x
Jenkins		900T	902T
Lunkenheimer		708HST	x
Metraflex		IT	IS
Nibco		T-580	S-580
Powell		4210T	x
Stockham		S-216 BR-R-T	S-216 BR-R-S
Watts		B-6000	B-6001

1. x means not available.

D. Ball Valves - 1-1/4 Inch to 2 Inch:

MANUFACTURER		THREADED ENDS	SOLDER ENDS
Conbraco (Apollo)	82-100	82-200	
Grinnell		3810	3810SJ
Nibco		T-590-Y	S-590-Y
Powell		4201R	x
Stockham		S-216 BR-R-T	S-216 BR-R-S
Watts		B-6800	B-6801

1. For grooved end connections, use Victaulic Style 721.

E. Plug Valves - 2 Inch and Smaller:

1. Lunkenheimer: 454

F. Plug Valves - 2-1/2 Inch and Larger:

1. Powell: 2201

G. Globe Valves - 2 Inch and Smaller:

MANUFACTURER	CLASS 125 THREADED	CLASS 125 SOLDER	CLASS 150 THREADED
Crane	1	1310	17TF
Grinnell	3210	3210SJ	3240
Hammond	IB440	IB423	IB413T
Jenkins	746	1200	106-A-2
Lunkenheimer 2140	2146	407	
Milwaukee	502	1502	590
Nibco	T-211-B T-211-Y	S-211-B S-211-Y	T-235-Y
Powell	650	1823	150
Stockham	B-16	B-14T	B-22

H. Globe Valves - 2-1/2 Inch and Larger:

MANUFACTURER	STRAIGHT BODY	ANGLE BODY
Crane	351	353
Grinnell	6200A	x
Hammond	IR116	IR118
Jenkins	613	x
Lunkenheimer 1123	1124	
Milwaukee	F2981	F2986
Nibco	F-718-B	F-818-B
Powell	241	243
Stockham	G-512	G-515

1. x means not available

I. Butterfly Valves - 2-1/2 Inch and Larger:

1. The following are model numbers for wafer-type, with nickel-plated ductile-iron disc:

MANUFACTURER	LEVER	GEAR
Center Line	Series A	Series A
Crane	12	12
Conbraco (Apollo) 6X13X-01		6W13X-02
Grinnell	WC-8209-7	WC-8202-7

Keystone	239	239
Nibco	WD-20103	WD-20105
Powell	1011-DA1	1011-DA1
Stockham	LG512-DS3E	LG-522-DS3E
Watts	BF-04-111-11	BF-04-111-12

2. Grooved Ends: Victaulic Series 300 and 704

3. The following are model numbers for lug-type, with nickel-plated ductile-iron disc:

MANUFACTURER	LEVER	GEAR
Center Line	Series LT	Series LT
Crane	14	14
Conbraco (Apollo)	6L13X-01	6L-13X-02
Grinnell	LC-8209-7	LC-8202-7
Keystone	129	129
Nibco	LD-20103	LD-20105
Powell	5011-DA1	5011-DA1
Stockham	LG-712-DS3E	LG-722-DS3E
Watts	BF-03-111-11	BF-03-111-12

4. Grooved Ends: Victaulic Series 300 and 704

5. The following are model numbers for wafer-type, with aluminum-bronze disc:

MANUFACTURER	LEVER	GEAR
Center Line	Series A	Series A
Crane	42	42
Conbraco (Apollo)	6W-14X-01	6W-14X-02
Grinnell	WC-8289-7	WC-8282-7
Keystone	239	239
Nibco	WD-20003	WD-20005
Powell	1011-EA1	1011-EA1
Stockham	LG-512-BS3E	LG-522-BS3E
Watts	BF-04-121-11	BF-04-121-12

6. Grooved Ends: Victaulic Series 300A, 700A, and 703A

7. The following are model numbers for lug-type, with aluminum-bronze disc:

MANUFACTURER	LEVER	GEAR
Center Line	Series LT	Series LT
Crane	44	44
Conbraco (Apollo)	6L-14X-01	6L-14X-02

Grinnell	LC-8289-7	LC-8282-7
Keystone	129	129
Nibco	LD-20003	LD-20005
Powell	5011-BA1	5011-BA1
Stockham	LG-712-BS3E	LG-722-BS3E
Watts	BF-03-121-11	BF-03-121-12

8. Grooved Ends: Victaulic Series 300A, 700A, and 703A

A. Swing Check Valves - 2 Inch and Smaller:

MANUFACTURER	CLASS 125 THREADED ENDS	CLASS 125 SOLDER ENDS	CLASS 150 THREADED ENDS
Crane	37	1342	137
Grinnell	3300	3300SJ	3320
Hammond	IB940	IB941	IB946
Jenkins	92-A	1222	92-A
Lunkenheimer 2144	2145	230-70	
Milwaukee	509	1509	510
Nibco	T-413	S-413	T-433
Powell	578	1825	596
Stockham	B-319	B-309	B-321

1. For grooved connections, use Victaulic Series 712

B. Swing Check Valves - 2-1/2 Inch and Larger:

MANUFACTURER	CLASS 125	CLASS 175
Crane	373	x
Grinnell	6300A	x
Hammond	IR1124	x
Jenkins	x	729
Kennedy	x	Fig. 126
Lunkenheimer 1790	IBBM x	
Milwaukee	F2974	x
Nibco	F-918	x
Powell	559	x
Stockham	G-931	G-940

1. For grooved connections, use Victaulic Series 712
2. x means not available

M. Control valves
1. Johnson
2. Bray
3. Fischer
4. Tyco
5. Robertshaw
6. or equal

END OF SECTION 15100

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15135 - METERS AND GAGES – 230900 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes meters and gages used in mechanical systems.

B. Related Sections: Division 15 piping Sections contain requirements that relate to this Section.

1. Meters and gages furnished as part of factory-fabricated equipment are specified as part of the equipment assembly in other Division 15 Sections.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of meter, gage, and fitting specified. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit a meter and gage schedule showing manufacturer's figure number, scale range, location, and accessories for each meter and gage.

C. Product certificates signed by manufacturers of meters and gages certifying accuracies under specified operating conditions and compliance with specified requirements.

D. Maintenance data to include in the "Operating and Maintenance Manuals" specified in Division 1 Section "Project Closeout." Include data for the following:

1. Test plugs.

1.4 QUALITY ASSURANCE

A. Comply with applicable portions of American Society of Mechanical Engineers (ASME) and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gages.

B. Design Criteria: The Drawings indicate types, sizes, capacities, ranges, profiles, connections, and dimensional requirements of meters and gages and are based on the specific manufacturer types and models indicated. Meters and gages having equal performance characteristics by other manufacturers may be considered, provided that deviations do not change the design concept or intended performance as judged by the Architect. The burden of proof for equality of meters and gages is on the proposer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Liquid-in-Glass Thermometers:

    a. Marsh Instrument Co.
    b. Marshalltown Instruments, Inc.
    c. H.O. Trerice Co.
    d. Weiss Instruments, Inc.
    e. Weksler Instruments Corp.

2. Direct-Mounting Filled-System Dial Thermometers:

    a. Ashcroft Instrument Div. of Dresser Industries.
    b. Marsh Instrument Co.
    c. H.O. Trerice Co.
    d. Weiss Instruments, Inc.
    e. Weksler Instruments Corp.

3. Remote-Reading Filled-System Dial Thermometers:

    a. AMETEK, U.S. Gauge Div.
    b. Ashcroft by Dresser Industries, Instrument Div.
    c. Marsh Instrument Co.
    d. Tel-Tru Manufacturing Co., Inc.
    e. H.O. Trerice Co.
    f. Weiss Instruments, Inc.
    g. Weksler Instruments Corp.

4. Bimetal Dial Thermometers:

    a. Ashcroft by Dresser Industries, Instrument Div.

b. Marsh Instrument Co.
c. Marshalltown Instruments, Inc.
d. Reotemp Instrument Corp.
e. Tel-Tru Manufacturing Co., Inc.

f. H.O. Trerice Co.
g. Weiss Instruments, Inc.
h. Weksler Instruments Corp.

5. Insertion Dial Thermometers:

a. Ashcroft by Dresser Industries, Instrument Div.
b. Reotemp Instrument Corp.
c. Tel-Tru Manufacturing Co., Inc.
d. H.O. Trerice Co.
e. Weiss Instruments, Inc.
f. Weksler Instruments Corp.

6. Pressure Gages:

a. AMETEK, U.S. Gauge Div.
b. Ashcroft by Dresser Industries, Instrument Div.
c. Marsh Instrument Co.
d. Marshalltown Instruments, Inc.
e. H.O. Trerice Co.
f. Weiss Instruments, Inc.
g. Weksler Instruments Corp.
h. WIKA Instruments Corp.

7. Test Plugs:

a. Flow Design, Inc.
b. MG Piping Products Co.
c. Peterson Equipment Co., Inc.
d. Sisco Co., Spedco, Inc.
e. H.O. Trerice Co.
f. Watts Regulator Co.

2.2 THERMOMETERS, GENERAL

A. Scale Range: Temperature ranges for services listed as follows:

1. Chilled Water: 0 to 100 deg F, with 2-degree scale divisions (minus 18 to 38 deg C, with 1-degree scale divisions).

B. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

2.3 LIQUID-IN-GLASS THERMOMETERS

A. Description: ASTM E 1, liquid-in-glass thermometer.

B. Case: Die-cast and aluminum-finished in baked-epoxy enamel, glass front, spring secured, 9 inches (230 mm) long.

C. Adjustable Joint: Finished to match case, 180-degree (3.1rad) adjustment in vertical plane, 360-degree (6.3rad) adjustment in horizontal plane, with locking device.

D. Tube: Red-reading, organic liquid-filled instead of mercury-filled, with magnifying lens.

E. Scale: Satin-faced nonreflective aluminum with permanently etched markings.

F. Stem: Copper-plated, steel, aluminum, or brass for a separable socket of length to suit installation.

2.4 DIRECT-MOUNTING FILLED-SYSTEM DIAL THERMOMETERS

A. Description: Vapor-actuated universal-angle dial thermometer.

B. Case: Drawn steel or cast aluminum, with 4-1/2-inch (115mm) -diameter glass lens.

C. Adjustable Joint: Finish to match case, 180-degree (3.1rad) adjustment in vertical plane, 360-degree (6.3rad) adjustment in horizontal plane, with locking device.

D. Thermal Bulb: Copper with phosphor-bronze Bourdon pressure tube.

E. Movement: Brass, precision geared.

F. Scale: Progressive satin-faced nonreflective aluminum with permanently etched markings.

G. Stem: Copper-plated steel, aluminum, or brass for a separable socket of length to suit installation.

2.5 REMOTE-READING, FILLED-SYSTEM DIAL THERMOMETERS

A. Description: Vapor-actuated remote-reading dial thermometer.

B. Case: Drawn steel or cast aluminum, with 4-1/2-inch (115mm) -diameter glass lens.

C. Movement: Brass, precision geared.

D. Scale: Progressive satin-faced nonreflective aluminum with permanently etched markings.

E. Tubing: Bronze double-braided armor-over-copper capillary of length to suit installation.

F. Bulb: Copper with separable socket for liquids; averaging element for air.

2.6 BIMETAL DIAL THERMOMETERS

A. Description: Direct-mounted universal-angle bimetal dial thermometer.

B. Case: Stainless steel with 5-inch (125mm) -diameter glass lens.

C. Adjustable Joint: Finish to match case, 180-degree (3.1rad) adjustment in vertical plane, 360-degree (6.3rad) adjustment in horizontal plane, with locking device.

D. Element: Bimetal coil.

E. Scale: Satin-faced nonreflective-aluminum with permanently etched markings.

F. Stem: Stainless steel for separable socket, of length to suit installation.

2.7 INSERTION DIAL THERMOMETERS

A. Description: Bimetal dial thermometer.

B. Dial: 1-inch (25mm) diameter.

C. Case: Stainless steel.

D. Stem: Dustproof and leakproof 1/8-inch (3mm) -diameter tapered-end stem with nominal length of 5 inches (125 mm).

2.8 THERMOMETER WELLS

A. Description: Brass or stainless-steel thermometer well.

B. Pressure Rating: Not less than piping system design pressure.

C. Stem Length: To extend 2 inches (50 mm) into fluid.

D. Stem Length: To extend to center of pipe.

E. Extension for Insulated Piping: 2 inches (50 mm) nominal, but not less than thickness of insulation.

F. Threaded Cap Nut: With chain permanently fastened to well and cap.

2.9 PRESSURE GAGES

A. Description: ASME B40.1, Grade A phosphor-bronze Bourdon-tube pressure gage, with bottom connection.

B. Case: Drawn steel, brass, or aluminum with 4-1/2-inch (115mm) -diameter glass lens.

C. Connector: Brass, 1/4-inch (8mm) NPS.

D. Scale: White-coated aluminum, with permanently etched markings.

E. Accuracy: Plus or minus 1 percent of range span.

F. Range: Conform to the following:

1. Fluids Under Pressure: 2 times operating pressure.

2.10 PRESSURE-GAGE ACCESSORIES

A. Syphons: 1/4-inch (8mm) straight coil of brass tubing with threads on each end.

B. Snubbers: 1/4-inch (8mm) brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.

2.11 TEST PLUGS

A. Description: Nickel-plated brass-body test plug in 1/2-inch (15mm) fitting.

B. Body: Length as required to extend beyond insulation.

C. Pressure Rating: 500 psig (3450 kPa) minimum.

D. Core Inserts: 2 self-sealing valve types, suitable for inserting a 1/8-inch (3mm) outside-diameter probe from a dial thermometer or pressure gage.

E. Core Material: According to the following for fluid and temperature range:

1. Air, Water, Oil, and Gas: 20 to 200 deg F (minus 7 to 93 deg C), neoprene rubber.
2. Air and Water: Minus 30 deg to 275 deg F (minus 35 to 136 deg C), ethylene-propylene-diene-terpolymer (EPDM) rubber.

F. Test-Plug Cap: Gasketed and threaded cap, with retention chain.

G. Test Kit: Provide test kit consisting of 1 pressure gage and gage adapter with probe, 2 bimetal dial thermometers and a carrying case.

H. Pressure Gage and Thermometer Ranges: Approximately 2 times systems operating conditions.

PART 3 - EXECUTION

3.1 METER AND GAGE APPLICATIONS

A. General: Where indicated, install meters and gages of types, sizes, capacities, and with features indicated.

3.2 METER AND GAGE INSTALLATION, GENERAL

A. Install meters, gages, and accessories according to manufacturers' written instructions for applications where used.

3.3 THERMOMETER INSTALLATION

A. Install thermometers and adjust vertical and tilted positions.

B. Install in the following locations and elsewhere as indicated:

1. At inlet and outlet of each hydronic zone.
2. At inlet and outlet of each hydronic coil in air-handling units and built-up central systems.

C. Remote-Reading Dial Thermometers: Install in control panels with tubing connecting panel and thermometer bulb supported to prevent kinks. Use minimum tubing length.

D. Thermometer Wells: Install in vertical position in piping tees where thermometers are indicated.

1. Install wells with stem extending minimum of 2 inches (50 mm) into fluid.
2. Install wells with stem extending to center of pipe.
3. Fill wells with oil or graphite and secure caps.

3.4 PRESSURE GAGE INSTALLATION

A. Install pressure gages in piping tee with pressure gage valve located on pipe at most readable position.

B. Install in the following locations and elsewhere as indicated:

1. At chilled water and condenser water inlets and outlets of hydronic coils.

C. Pressure Gage Needle Valves: Install in piping tee with snubber. Install syphon instead of snubber for steam pressure gages.

3.5 TEST PLUG INSTALLATION

A. Install test plugs in piping tees where indicated, located on pipe at most readable position. Secure cap.

END OF SECTION 15135

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15145 - HANGERS AND SUPPORTS – 230529 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes hangers and supports for mechanical systems piping and equipment.

1.3 DEFINITIONS

A. Terminology used in this Section is defined in MSS SP-90.

1.4 PERFORMANCE REQUIREMENTS

A. Design seismic restraint hangers and supports, for piping and equipment.

B. Design and obtain approval from authority with jurisdiction over seismic restraint hangers and supports for piping and equipment.

1.5 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of hanger and support.

C. Submit pipe hanger and support schedule showing manufacturer's Figure No., size, location, and features for each required pipe hanger and support.

D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

E. Shop drawings for each type of hanger and support, indicating dimensions, weights, required clearances, and methods of component assembly.

1.6 QUALITY ASSURANCE

A. Qualify welding processes and welding operators according to AWS D1.1

"Structural Welding Code--Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

B. Qualify welding processes and welding operators according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."

C. Listing and Labeling: Provide hangers and supports that are listed and labeled as defined in NFPA 70, Article 100.

1. UL and FM Compliance: Hangers, supports, and components include listing and labeling by UL and FM where used for fire protection piping systems.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

D. Licensed Operators: Use operators that are licensed by powder-operated tool manufacturers to operate their tools and fasteners.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Hangers, Supports, and Components: Factory-fabricated according to MSS SP-58.

1. Components include galvanized coatings where installed for piping and equipment that will not have a field-applied finish.
2. Pipe attachments include nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.

B. Thermal-Hanger Shield Inserts: 100-psi (690kPa) average compressive strength, waterproofed calcium silicate, encased with sheet metal shield. Insert and shield cover entire circumference of pipe and are of length indicated by manufacturer for pipe size and thickness of insulation.

C. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Fasteners for fire protection systems include UL listing and FM approval.

D. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Fasteners for fire protection systems include UL listing and FM approval.

2.2 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.

C. Washers: ASTM F 844, steel, plain, flat washers.

D. Grout: ASTM C 1107, Grade B, nonshrink, nonmetallic.

1. Characteristics include post-hardening, volume-adjusting, dry, hydraulic-cement-type grout that is nonstaining, noncorrosive, nongaseous and is recommended for both interior and exterior applications.
2. Design Mix: 5000-psi (34.5MPa), 28-day compressive strength.
3. Water: Potable.
4. Packaging: Premixed and factory-packaged.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger requirements are specified in the Section specifying the equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping specification Sections.

3.2 HANGER AND SUPPORT INSTALLATION

A. General: Comply with MSS SP-69 and SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible.

C. Install supports with maximum spacings complying with MSS SP-69.

D. Where pipes of various sizes are supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.

E. Install building attachments within concrete or to structural steel. Space

attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Install reinforcing bars through openings at top of inserts.

F. Install concrete inserts in new construction prior to placing concrete.

G. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Do not use in lightweight concrete slabs or in concrete slabs less than 4 inches (100 mm) thick.

H. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install according to fastener manufacturer's written instructions. Do not use in lightweight concrete slabs or in concrete slabs less than 4 inches (100 mm) thick.

I. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

J. Heavy-Duty Steel Trapezes: Field-fabricate from ASTM A 36 steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.

K. Support fire protection systems piping independent of other piping.

L. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

M. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so that maximum pipe deflections allowed by ASME B31.9 "Building Services Piping" is not exceeded.

O. Insulated Piping: Comply with the following installation requirements.

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.
2. Saddles: Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that

match adjoining pipe insulation.

3. Shields: Install MSS Type 40, protective shields on cold piping with vapor barrier. Shields span an arc of 180 degrees (3.1 rad) and have dimensions in inches (mm) not less than the following:

NPS (Inches)	LENGTH (Inches)	THICKNESS (Inches)
1/4 to 3-1/2	12	0.048
4	12	0.060
5 and 6	18	0.060
8 to 14	24	0.075

PIPE SIZE (mm)	LENGTH (mm)	THICKNESS (mm)
8 to 90	300	1.22
100	300	1.52
125 and 150	450	1.52
200 to 350	600	1.91

4. Insert Material: Length at least as long as the protective shield.
5. Thermal-Hanger Shields: Install with insulation of same thickness as piping.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor.

B. Grouting: Place grout under supports for equipment, and make a smooth bearing surface.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports.

B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for manual shielded metal-arc welding, appearance and quality of welds, methods used in correcting welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.
4. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint and paint exposed areas immediately after erection of hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal to match existing paint colors

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 15145

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15170 – MOTORS –230513 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes basic requirements for motors. It includes motors that are factory-installed as part of equipment and appliances as well as field-installed motors.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 70, "National Electrical Code."

B. NRTL Listing: Provide NRTL listed motors.

1. Term "Listed": As defined in "National Electrical Code," Article 100.
2. Listing Agency Qualifications: "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Comply with NEMA MG 1, "Motors and Generators."

D. Comply with UL 1004, "Motors, Electric."

E. Comply with Ashrae 90.1 and the Florida Energy Code standard for motor efficiency.

PART 2 - PRODUCTS

2.1 MOTORS, GENERAL

A. General: Requirements below apply to motors covered by this Section except as otherwise indicated.

B. Motors 1/2 HP and Larger: Polyphase.

C. Motors Smaller Than 1/2 HP: Single-phase.

D. Frequency Rating: 60 Hz.

E. Voltage Rating: Determined by voltage of circuit to which motor is connected for the following motor voltage ratings (utilization voltages):

1. 120 V Circuit: 115 V - motor rating.
2. 208 V Circuit: 200 V - motor rating.
3. 240 V Circuit: 230 V - motor rating.
4. 480 V Circuit: 460 V - motor rating.

F. Service factors indicated for motors are minimum values and apply at frequency and utilization voltage at which motor is connected. Provide motors which will not operate in service factor range when supply voltage is within 10 percent of motor voltage rating.

G. Capacity: Sufficient to start and operate connected loads at designated speeds in indicated environment, and with indicated operating sequence, without exceeding nameplate ratings. Provide motors rated for continuous duty at 100 percent of rated capacity.

H. Temperature Rise: Based on 40 deg C ambient except as otherwise indicated.

I. Enclosure: Open dripproof, TEFC for exterior motors .

2.2 POLYPHASE MOTORS

A. General: Squirrel-cage induction-type conforming to the following requirements except as otherwise indicated.

B. NEMA Design Letter Designation: "B."

C. Multi-Speed Motors: Separate winding for each speed.

D. Energy Efficient Motors: Nominal efficiency equal to or greater than that stated in Ashrae 90.1 -2010 for that type and rating of motor.

E. Variable Speed Motors for Use With Solid-State Drives: Energy efficient, squirrel-cage induction, design B units with ratings, characteristics, and features coordinated with and approved by drive manufacturer.

F. Internal Thermal Overload Protection For Motors: For motors so indicated, protection automatically opens control circuit arranged for external connection. Protection operates when winding temperature exceeds safe value calibrated to

the temperature rating of the motor insulation.

G. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading of the application.

H. Rugged Duty Motors: Totally enclosed with 1.25 minimum service factor. Provide motors with regreasable bearings and equipped with capped relief vents. Insulate windings with nonhygroscopic material. External finish shall be chemical resistant paint over corrosion resistant primer. Provide integral condensate drains.

I. Motors for Reduced Inrush Starting: Coordinate with indicated reduced inrush controller type and with characteristics of driven equipment load. Provide required wiring leads in motor terminal box to suit control method.

2.3 SINGLE-PHASE MOTORS

A. General: Conform to the following requirements except as otherwise indicated.

B. Energy Efficient Motors: One of the following types as selected to suit the starting torque and other requirements of the specific motor application.

1. Permanent Split Capacitor.
2. Split-Phase Start, Capacitor-Run.
3. Capacitor-Start, Capacitor-Run.
4. Nema Premium Efficient

C. Shaded-Pole Motors: Use only for motors smaller than 1/20 hp.

D. Internal Thermal Overload Protection for Motors: For motors so indicated, protection automatically opens the power supply circuit to the motor, or a control circuit arranged for external connection. Protection operates when winding temperature exceeds a safe value calibrated to the temperature rating of the motor insulation. Provide device that automatically resets when motor temperature returns to normal range except as otherwise indicated.

E. Bearings, belt connected motors and other motors with high radial forces on motor shaft shall be ball bearing type. Sealed, prelubricated sleeve bearings may be used for other single phase motors.

F. Refer to schedules for motors in air streams rated for smoke and heat use with shields and extended lubricant lines.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: The following requirements apply to field-installed motors.

B. Install motors in accordance with manufacturer's published instructions and the following:

1. Direct Connected Motors: Mount securely in accurate alignment.
2. Belt Drive Motors: Use adjustable motor mounting bases. Align pulleys and install belts. Use belts identified by the manufacturer and tension belts in accordance with manufacturer recommendations.

3.2 COMMISSIONING

A. Check operating motors, both factory and field-installed, for unusual conditions during normal operation. Coordinate with the commissioning of the equipment for which the motor is a part.

B. Report unusual conditions.

C. Correct deficiencies of field-installed units including sheave and bearing changes.

END OF SECTION 15170

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15250 - MECHANICAL INSULATION –230700 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes pipe, duct, and equipment insulation.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 15 Section "Supports and Anchors" for pipe insulation shields and protection saddles.
2. Division 15 Section "Metal Ductwork" for duct lining.

1.3 DEFINITIONS

A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.

B. Dual-Temperature Surfaces: Normal operating temperatures that vary from hot to cold.

C. Cold Surfaces: Normal operating temperatures less than 75 deg F.

D. Thermal Resistivity: "r-values" represent the reciprocal of thermal conductivity (k-value). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees F between two exposed faces required to cause one Btu to flow through one square foot of material, in one hour, at a given mean temperature.

E. Density: Is expressed in lb/sq.ft.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of mechanical insulation identifying k-value, thickness, and accessories.

C. Samples of each type of insulation and jacket. Identify each sample describing product and intended use. Submit the following sizes of sample materials:

1. Board and Block Insulation: 12-inch square section.
2. Pre-Formed Pipe Insulation: 12 inches long, 2-inch NPS.

D. Material certificates, signed by the manufacturer, certifying that materials comply with specified requirements where laboratory test reports cannot be obtained.

E. Material test reports prepared by a qualified independent testing laboratory. Certify insulation meets specified requirements.

1.5 QUALITY ASSURANCE

A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.

1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

1.6 SEQUENCING AND SCHEDULING

A. Schedule insulation application after testing of piping and duct systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Glass Fiber:

    a. CertainTeed Corporation.
    b. Knauf Fiberglass GmbH.
    c. Manville.
    d. Owens-Corning Fiberglas Corporation.
    e. USG Interiors, Inc. - Thermafiber Division.

2. Cellular Glass:

    a. Pittsburg Corning Corporation.

3. Flexible Elastomeric Cellular:

    a. Armstrong World Industries, Inc.
    b. Halstead Industrial Products.
    c. IMCOA.
    d. Rubatex Corporation.

2.2 GLASS FIBER

A. Material: Inorganic glass fibers, bonded with a thermosetting resin.

B. Jacket: All-purpose, factory-applied, laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.

C. Board: ASTM C 612, Class 2, semi-rigid jacketed board.

1. Thermal Conductivity: 0.26 average maximum, at 75 deg F mean temperature.
2. Density: 12 pcf average maximum.

D. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets.

1. Thermal Conductivity: 0.32 average maximum, at 75 deg F mean temperature.

E. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, jacketed.

1. Thermal Conductivity: 0.26 average maximum at 75 deg F mean temperature.
2. Density: 10 average maximum.

F. Adhesive: Produced under the UL Classification and Follow-up service.

1. Type: Non-flammable, solvent-based.
2. Service Temperature Range: Minus 20 to 180 deg F.

G. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.3 CELLULAR GLASS

A. Material: Inorganic, foamed or cellulated glass, annealed, rigid, hermetically sealed cells, incombustible.

B. Facing: ASTM C 921, Type 1, factory-applied, laminated foil, flame-retardant, vinyl facing.

C. Form: The following as indicated:

1. Blocks: ASTM C 552, Type I.
2. Boards: ASTM C 552, Type IV.
3. Preformed Pipe: ASTM C 552, Type II, Class 2 (jacketed).
4. Special Shapes: ASTM C 552, Type III, in shapes and thicknesses as indicated.

D. Thermal Conductivity: 0.38 average maximum at 75 deg F mean temperature.

E. Minimum Density: 7 pcf.

F. Maximum Density: 9.5 pcf.

2.4 FLEXIBLE ELASTOMERIC CELLULAR

A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.

1. Tubular Materials: ASTM C 534, Type I.
2. Sheet Materials: ASTM C 534, Type II.

B. Thermal Conductivity: 0.30 average maximum at 75 deg F.

C. Coating: Water based latex enamel coating recommended by insulation manufacturer.

2.5 INSULATING CEMENTS

A. Mineral Fiber: ASTM C 195.

1. Thermal Conductivity: 1.0 average maximum at 500 deg F mean temperature.
2. Compressive Strength: 10 psi at 5 percent deformation.

B. Expanded or Exfoliated Vermiculite: ASTM C 196.

1. Thermal Conductivity: 1.10 average maximum at 500 deg F mean temperature.
2. Compressive Strength: 5 psi at 5 percent deformation.

C. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: ASTM C 449.

1. Thermal Conductivity: 1.2 average maximum at 400 deg F mean temperature.
2. Compressive Strength: 100 psi at 5 percent deformation.

2.6 ADHESIVES

A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive recommended by insulation manufacturer.

B. Lagging Adhesive: MIL-A-3316C, non-flammable adhesive in the following Classes and Grades:

1. Class 1, Grade A for bonding glass cloth and tape to unfaced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to unfaced glass fiber insulation.
2. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.

2.7 JACKETS

A. General: ASTM C 921, Type 1, except as otherwise indicated.

B. Foil and Paper Jacket: Laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.

1. Water Vapor Permeance: 0.02 perm maximum, when tested according to ASTM E 96.
2. Puncture Resistance: 50 beach units minimum, when tested according to ASTM D 781.

C. Aluminum Jacket: ASTM B 209, 3003 Alloy, H-14 temper, factory cut and rolled to indicated sizes.

2.8 ACCESSORIES AND ATTACHMENTS

A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, presized a minimum of 8 ounces per sq. yd.

1. Tape Width: 4 inches.
2. Cloth Standard: MIL-C-20079H, Type I.
3. Tape Standard: MIL-C-20079H, Type II.

B. Bands: 3/4-inch wide, in one of the following materials compatible with jacket:

1. Stainless Steel: Type 304, 0.020 inch thick.
2. Galvanized Steel: 0.005 inch thick.
3. Aluminum: 0.007 inch thick.
4. Brass: 0.01 inch thick.
5. Nickel-Copper Alloy: 0.005 inch thick.

C. Wire: 14-gage nickel copper alloy, 16-gage, soft-annealed stainless steel, or 16-gage, soft-annealed galvanized steel.

D. Corner Angles: 28-gage, 1-inch by 1-inch aluminum, adhered to 2-inch by 2-inch kraft paper.

E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.9 SEALING COMPOUNDS

A. Vapor Barrier Compound: Water-based, fire-resistive composition.

1. Water Vapor Permeance: 0.08 perm maximum.
2. Temperature Range: Minus 20 to 180 deg F.

B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.

1. Water Vapor Permeance: 0.02 perm maximum.
2. Temperature Range: Minus 50 to 250 deg F.
3. Color: Aluminum.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.

B. Mix insulating cements with clean potable water. Mix insulating cements contacting stainless-steel surfaces with demineralized water.

1. Follow cement manufacturer's printed instructions for mixing and portions.

3.2 INSTALLATION, GENERAL

A. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each mechanical system.

B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.

C. Install vapor barriers on insulated pipes, ducts, and equipment having surface operating temperatures below 60 deg F.

D. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.

E. Install insulation with smooth, straight, and even surfaces.

F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.

G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.

H. Seal Ends: Except for flexible elastomeric insulation, taper ends at 45 degree angle and seal with lagging adhesive. Cut ends of flexible elastomeric cellular insulation square and seal with adhesive.

I. Apply adhesives and coatings at manufacturer's recommended coverage-per-gallon rate.

J. Keep insulation materials dry during application and finishing.

K. Items Not Insulated: Unless otherwise indicated do not apply insulation to the following systems, materials, and equipment:

1. Fibrous glass ducts.

2. Metal ducts with duct liner.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
5. Flexible connectors for ducts and pipes.
6. Vibration control devices.
7. Testing laboratory labels and stamps.
8. Nameplates and data plates.
9. Access panels and doors in air distribution systems.
10. Fire protection piping systems.
11. Sanitary drainage and vent piping.

3.3 PIPE INSULATION INSTALLATION, GENERAL

A. Tightly butt longitudinal seams and end joints. Bond with adhesive.

B. Stagger joints on double layers of insulation.

C. Apply insulation continuously over fittings, valves, and specialties, except as otherwise indicated.

D. Apply insulation with a minimum number of joints.

E. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.
2. Cover circumferential joints with butt strips, at least 3-inches wide, and of same material as insulation jacket. Secure with adhesive and outward clinching staples along both edges of butt strip and space 4 inches on center.
3. Longitudinal Seams: Overlap seams at least 1-1/2 inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches on center.

    a. Exception: Do not staple longitudinal laps on insulation applied to piping systems with surface temperatures at or below 35 deg F.

4. Vapor Barrier Coatings: Where vapor barriers are indicated, apply on seams and joints, over staples, and at ends butt to flanges, unions, valves, and fittings.
5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor barrier coating.
6. Repair damaged insulation jackets, except metal jackets, by applying jacket material around damaged jacket. Adhere, staple, and seal. Extend

patch at least 2 inches in both directions beyond damaged insulation jacket and around the entire circumference of the pipe.

F. Roof Penetrations: Apply insulation for interior applications to a point even with the top of the roof flashing. Seal with vapor barrier coating. Apply insulation for exterior applications butted tightly to interior insulation ends. Extend metal jacket for exterior insulation outside roof flashing at least 2 inches below top of roof flashing. Seal metal jacket to roof flashing with vapor barrier coating.

G. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions. Apply an aluminum jacket with factory-applied moisture barrier over insulation. Extend 2 inches from both surfaces of wall or partition. Secure aluminum jacket with metal bands at both ends. Seal ends of jacket with vapor barrier coating. Seal around penetration with joint sealer. Refer to Division 7 Section "Joint Sealants."

H. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through fire-rated walls and partitions. Seal insulation ends with vapor barrier coating. Seal around penetration with firestopping or fire-resistant joint sealer. Refer to plans for firestopping.

I. Floor Penetrations: Terminate insulation underside of floor assembly and at floor support at top of floor.

J. Flanges, Fittings, and Valves - Interior Exposed and Concealed: Coat pipe insulation ends with vapor barrier coating. Apply premolded, precut, or field-fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.

1. Use same material and thickness as adjacent pipe insulation.
2. Overlap nesting insulation by 2 inches or 1-pipe diameter, which ever is greater.
3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.
4. Insulate elbows and tees smaller than 3-inches pipe size with premolded insulation.
5. Insulate elbows and tees 3 inches and larger with premolded insulation or insulation material segments. Use at least 3 segments for each elbow.
6. Cover insulation, except for metal jacketed insulation, with PVC fitting covers and seal circumferential joints with butt strips.
7. Cover insulation, except for metal jacketed insulation, with 2 layers of lagging adhesive to a minimum thickness of 1/16 inch. Install glass cloth between layers. Overlap adjacent insulation by 2 inches in both directions from joint with glass cloth and lagging adhesive.

K. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified in

Division 15 Section "Supports and Anchors." For cold surface piping, extend insulation on anchor legs a minimum of 12 inches and taper and seal insulation ends.

1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

3.4 GLASS FIBER PIPE INSULATION INSTALLATION

A. Bond insulation to pipe with lagging adhesive.

B. Seal exposed ends with lagging adhesive.

C. Seal seams and joints with vapor barrier compound.

3.5 CELLULAR GLASS PIPE INSULATION INSTALLATION

A. Cellular Glass Insulation: Join sections of cellular glass insulation with vapor barrier compound. Secure insulation with manufacturer's recommended adhesive. Seal joints with manufacturer's recommended joint sealer.

2. Multiple Layer Installations: Stagger joints of multilayer installations. Secure inner layer with glass fiber reinforced tape. Secure outer layers with 2 metal bands for each insulation section.
3. Finishing: Apply manufacturer's recommended weather barrier mastic.
4. Finishing: Apply metal jacket over manufacturer's recommended vapor barrier mastic.

3.6 FLEXIBLE ELASTOMERIC CELLULAR PIPE INSULATION INSTALLATION

A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.

B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.

1. Miter cut materials to cover soldered elbows and tees.
2. Fabricate sleeve fitting covers from flexible elastomeric cellular insulation for screwed valves, fittings, and specialties. Miter cut materials. Overlap adjoining pipe insulation.

3.7 EQUIPMENT INSULATION INSTALLATION, GENERAL

A. Install board and block materials with a minimum dimension of 12 inches and a maximum dimension of 48 inches.

B. Groove and score insulation materials as required to fit as closely as possible to the equipment and to fit contours of equipment. Stagger end joints.

C. Insulation Thicknesses Greater than 2 Inches: Install insulation in multiple layers with staggered joints.

D. Bevel insulation edges for cylindrical surfaces for tight joint.

E. Secure sections of insulation in place with wire or bands spaced at 9-inch centers, except for flexible elastomeric cellular insulation.

F. Protect exposed corners with corner angles under wires and bands.

G. Manholes, Handholes, and Information Plates: Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.

H. Removable Insulation: Install insulation on components that require periodic inspecting, cleaning, and repairing for easy removal and replacement without damage to adjacent insulation.

I. Finishing: Except for flexible elastomeric cellular insulation, apply 2 coats of vapor barrier compound to a minimum thickness of 1/16 inch. Install a layer of glass cloth embedded between layers.

3.8 GLASS FIBER EQUIPMENT INSULATION INSTALLATION

A. Secure insulation with anchor pins and speed washers.

B. Space anchors at maximum intervals of 18 inches in both directions and not more than 3 inches from edges and joints.

C. Apply a smoothing coat of insulating and finishing cement to finished insulation.

3.9 CELLULAR GLASS EQUIPMENT INSULATION INSTALLATION

A. Join sections of insulation with vapor barrier compound.

B. Secure insulation with manufacturer's recommended adhesive. Seal joints with manufacturer's recommended joint sealer.

C. Secure inner layer of multiple layer installations with glass fiber reinforced tape. Secure outer layers with 2 metal bands for each insulation section.

3.10 FLEXIBLE ELASTOMERIC CELLULAR EQUIPMENT INSULATION INSTALLATION

A. Install sheets of the largest manageable size.

B. Apply full coverage of adhesive to the surfaces of the equipment and to the insulation.

C. Butt insulation joints firmly together and apply adhesive to insulation edges at joints.

3.11 DUCT INSULATION

A. Install block and board insulation as follows:

3. Adhesive and Band Attachment: Secure block and board insulation tight and smooth with at least 50 percent coverage of adhesive. Install bands spaced 12 inches apart. Protect insulation under bands and at exterior corners with metal corner angles. Fill joints, seams, and chipped edges with vapor barrier compound.
4. Speed Washers Attachment: Secure insulation tight and smooth with speed washers and welded pins. Space anchor pins 18 inches apart each way and 3 inches from insulation joints. Apply vapor barrier coating compound to insulation in contact, open joints, breaks, punctures, and voids in insulation.

B. Blanket Insulation: Install tight and smooth. Secure to ducts having long sides or diameters as follows:

1. Smaller Than 24 Inches: Bonding adhesive applied in 6-inch-wide transverse strips on 12-inch centers.
2. 24 Inches and Larger: Anchor pins spaced 12 inches apart each way. Apply bonding adhesive to prevent sagging of the insulation.
3. Overlap joints 3 inches.
4. Seal joints, breaks, and punctures with vapor barrier compound.

3.12 JACKETS

A. Foil and Paper Jackets (FP): Install jackets drawn tight. Install lap or butt strips at joints with material same as jacket. Secure with adhesive. Install jackets with 1-1/2-inch laps at longitudinal joints and 3-inch-wide butt strips at end joints.

1. Seal openings, punctures, and breaks in vapor barrier jackets and exposed insulation with vapor barrier compound.

B. Interior Exposed Insulation: Install continuous aluminum jackets.

C. Exterior Exposed Insulation: Install continuous aluminum jackets and seal all joints and seams with waterproof sealant.

D. Install metal jacket with 2-inch overlap at longitudinal and butt joints. Overlap longitudinal joints to shed water. Seal butt joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel draw bands 12 inches on center and at butt joints.

3.13 FINISHES

A. Paint finished insulation as specified in Division 9 Section "Painting."

B. Flexible Elastomeric Cellular Insulation: After adhesive has fully cured, apply 2 coats of protective coating to exposed insulation.

3.14 APPLICATIONS

A. General: Materials and thicknesses are specified in schedules at the end of this Section.

B. Interior, Exposed Piping Systems: Unless otherwise indicated, insulate the following piping systems:

1. Hydronic piping (35 to 99 deg F).

C. Interior, Concealed Piping Systems: Unless otherwise indicated, insulate the following piping systems:

1. Chilled water (35 to 55 deg F).
2. Hydronic piping (35 to 99 deg F).

D. Equipment: Unless otherwise indicated, insulate the following indoor equipment:

1. Chilled water equipment.

E. Duct Systems: Unless otherwise indicated, insulate the following duct systems:

1. Interior concealed supply, return, smoke, and outside air ductwork.
2. Interior exposed supply, return, smoke, and outside air ductwork.

3. Exterior exposed supply, smoke , and return ductwork.
4. Interior exposed and concealed supply fans, air handling unit casings and outside air plenums.
5. **Smoke supply and exhaust ductwork is to be insulated same as supply. But in areas indicated on the plans only. Exterior smoke duct connected to the interior duct is to be double wall duct.**

3.15 PIPE INSULATION SCHEDULES

A. General: Abbreviations used in the following schedules include:

1. Field-Applied Jackets: P - PVC, K - Foil and Paper, A - Aluminum, SS - Stainless Steel.
2. Pipe Sizes: NPS - Nominal Pipe Size.

DUAL-TEMP HYDRONIC (35 TO 100 DEG F) EXPOSED AND CONCEALED

PIPE SIZES (NPS)	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET
1/2 TO 1-1/4	GLASS FIBER	1	YES	NONE
	CELLULAR GLASS	1	YES	NONE
	FLEXIBLE ELASTOMERIC	3/4	YES	NONE
1-1/2 TO 4	GLASS FIBER	1	YES	NONE
	CELLULAR GLASS	1-1/2	YES	NONE
	FLEXIBLE ELASTOMERIC	3/4	YES	NONE
5 TO 10	GLASS FIBER	1-1/2	YES	NONE
	CELLULAR GLASS	1-1/2	YES	NONE
12 TO 36	GLASS FIBER	1-1/2	YES	NONE
	CELLULAR GLASS	2	YES	NONE

DUAL-TEMP HYDRONIC (35 TO 100 DEG F) EXPOSED AND CONCEALED

PIPE SIZES (NPS)	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET

1/2 TO 1-1/4	GLASS FIBER	2	YES	(P)(A)(SS)
	CELLULAR GLASS	2	YES	(P)(A)(SS)
	FLEXIBLE ELASTOMERIC	3/4	YES	NONE
1-1/2 TO 4	GLASS FIBER	2	YES	(P)(A)(SS)
	CELLULAR GLASS	2-1/2	YES	(P)(A)(SS)
	FLEXIBLE ELASTOMERIC	3/4	YES	NONE
5 TO 10	GLASS FIBER	2-1/2	YES	(P)(A)(SS)
	CELLULAR GLASS	2-1/2	YES	(P)(A)(SS)
12 TO 36	GLASS FIBER	2-1/2	YES	(P)(A)(SS)
	CELLULAR GLASS	3	YES	(P)(A)(SS)

3.16 EQUIPMENT INSULATION SCHEDULES

INTERIOR EXPOSED CHILLED AND DUAL-TEMP WATER EQUIP, (35 TO 100 DEG F)

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET
GLASS FIBER	BLOCK	2-1/2	YES	(A)(SS)
CELLULAR GLASS	BLOCK	3	YES	(A)(SS)

3.17 DUCT SYSTEMS INSULATION SCHEDULE- see 3.14 for application

INTERIOR CONCEALED HVAC SUPPLY AND RETURN DUCTS AND PLENUMS

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET
GLASS FIBER	BLANKET	1-1/2	YES	NONE

INTERIOR EXPOSED HVAC SUPPLY AND RETURN DUCTS AND PLENUMS

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET
GLASS FIBER	BOARD - RECT.	1-1/2	YES	NONE
GLASS FIBER	PIPE - ROUND	1-1/2	YES	NONE

EXTERIOR CONCEALED HVAC SUPPLY AND RETURN DUCTS AND PLENUMS

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET
GLASS FIBER	BOARD - RECT.	2	YES	NONE
GLASS FIBER	PIPE - ROUND	2	YES	NONE
CELLULAR GLASS	BOARD - RECT.	3	YES	NONE
GLASS FIBER	PIPE - ROUND	3	YES	NONE
FLEXIBLE ELASTOMERIC	SHEET	2	YES	NONE

INTERIOR EXPOSED HVAC SUPPLY FANS, AIR HANDLING UNITS, CASINGS, AND PLENUMS

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD-APPLIED JACKET
GLASS FIBER	BOARD	2	YES	NONE

END OF SECTION 15250

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15330 - WET-PIPE SPRINKLER SYSTEMS-211300 CSI 2004

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. This Section specifies wet-pipe sprinkler systems for buildings and structures. The project as indicated on the plans shows the criteria and contractor scope of work.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 16 Section "Fire Alarm Systems" for alarm devices not specified in this Section.

1.3 DEFINITIONS

A. Pipe sizes used in this Section are nominal pipe size (NPS) specified in inches. Tube sizes are standard tube size specified in inches. Equivalent or approximate SI (metric) sizes are indicated in millimeters (mm) in parentheses.

B. Working plans as used in this Section refer to documents (including drawings and calculations) prepared pursuant to requirements in NFPA 13 for obtaining approval of authority having jurisdiction.

C. Other definitions for fire protection systems are included in referenced NFPA standards.

1.4 SYSTEM DESCRIPTION

A. Wet-Pipe Sprinkler System: System with automatic sprinklers attached to piping system containing water and connected to water supply so that water discharges immediately from sprinklers when they are opened by fire.

B. Sprinkler System Protection Limits: All spaces within areas indicated. Include closets, toilet and room areas, each landing of each stair, and special applications areas.

1.5 SYSTEM PERFORMANCE REQUIREMENTS

A. Design and obtain approval from authority having jurisdiction for fire protection systems specified.

B. Minimum Pipe Sizes: Not smaller than sizes indicated for connection to water supply piping, standpipes, and branches from standpipes to sprinklers.

C. Hydraulically design sprinkler systems according to:

1. Sprinkler System Occupancy Hazard Classifications: As follows:

a. Office and Public Areas: Light hazard.

2. Minimum Density Requirements for Automatic Sprinkler System Hydraulic Design: As follows:

a. Light Hazard Occupancy: 0.10 GPM over 1500 sq. ft. (6.3 mL/s over 140 sq. m) area.

D. Components and Installation: Capable of producing piping systems with the following minimum working pressure ratings except where indicated otherwise.

1. Sprinkler Systems: 175 psig, refer to existing system plans as indacted on criteria plans .

1.6 SUBMITTALS

A. Product data for fire protection system components. Include the following:

1. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other data.

B. Sprinkler system drawings, identified as "working plans" and prepared according to NFPA 13, that have been approved by authority having jurisdiction. Include system hydraulic calculations where applicable.

C. Test reports and certificates as described in NFPA 25. Include "Contractor's Material & Test Certificate for Aboveground Piping" and "Contractor's Material & Test Certificate for Underground Piping."

D. Maintenance data for each type of fire protection specialty specified, for inclusion in "Operating and Maintenance Manual" specified in Division 1 Section "Project Closeout."

E. 2 copies of NFPA 13A "Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems." Deliver to Owner's maintenance personnel.

F. 2 copies of NFPA 25 "Standard for Inspection, Testing and Maintenance of Water Based Fire Protection Systems." Deliver to Owner's maintenance personnel.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL Fire Protection Equipment Directory and FM Approval Guide and that conform to other requirements indicated.

B. Listing/Approval Stamp, Label, or Other Marking: On equipment, specialties, and accessories made to specified standards.

C. Listing and Labeling: Equipment, specialties, and accessories that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in "National Electrical Code," Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

D. Comply with requirements of authority having jurisdiction for submittals, approvals, materials, hose threads, installation, inspections, and testing.

E. Comply with requirements of Owner's insurance underwriter for submittals, approvals, materials, installation, inspections, and testing.

F. Installer's Qualifications: Firms qualified to install and alter fire protection piping, equipment, specialties, and accessories, and repair and service equipment. A qualified firm is one that is experienced (minimum of 5 previous projects similar in size and scope to this Project) in such work, familiar with precautions required, and in compliance with the requirements of the authority having jurisdiction. Submit evidence of qualifications to the Architect upon request. Refer to Division 1 Section "Reference Standards and Definitions" for

definition of "Installer."

G. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:

1. NFPA 13 "Standard for the Installation of Sprinkler Systems."
2. NFPA 70 "National Electrical Code."
3. NFPA 25 " Inspection Testing and Maintenance of Water based Fire Protection Systems"
4. NFPA 72 " National Fire Alarm and Signaling Code."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following: **Contractors shall match existing systems.**

1. Waterflow Indicators and Supervisory Switches:

a. Gamewell Co.
b. Gem Sprinkler Co. Div., Grinnell Corp.
c. Potter Electric Signal Co.
d. Reliable Automatic Sprinkler Co., Inc.
e. System Sensor Div., Pittway Corp.
f. Victaulic Company of America.
g. Watts Regulator Co.

2. Sprinklers:

a. ASCOA Fire Systems, Figgie International Co.
b. Central Sprinkler Corp.
c. Firematic Sprinkler Devices, Inc.
d. Gem Sprinkler Co. Div., Grinnell Corp.
e. Globe Fire Sprinkler Corp.
f. Reliable Automatic Sprinkler Co., Inc.
g. Star Sprinkler Corp.
h. Viking Corp.

3. Grooved Couplings for Steel Piping:

   a. Grinnell Supply Sales Co., Grinnell Corp.
   b. Gustin-Bacon Div., Tyler Pipe Subsid., Tyler Corp.
   c. Sprink-Line by Sprink, Inc.
   d. Stockham Valves and Fittings, Inc.
   e. Victaulic Company of America.

2.2 PIPES AND TUBES

A. Refer to Part 3 Article "Sprinkler System Piping Applications" for identification of systems where pipe and fitting materials specified below are used.

B. Steel Pipe: ASTM A 53, Schedule 40 in sizes 6 inches (150 mm) and smaller and Schedule 30 in sizes 8 inches (200 mm) and larger, black and galvanized, plain and threaded ends, for welded, threaded, cut-groove, and rolled-groove joints.

C. Steel Pipe: ASTM A 135, Schedule 10 through 5-inch (125 mm) sizes and NFPA 13 specified wall thickness for 6-inch (150 mm) through 10-inch (250 mm) sizes, with plain ends, black and galvanized, for rolled-groove and welded joints.

2.3 PIPE AND TUBE FITTINGS

A. Cast-Iron Threaded Fittings: ASME B16.4, Class 250, standard pattern, with threads according to ASME B1.20.1.

B. Malleable-Iron Threaded Fittings: ASME B16.3, Class 300, standard pattern, with threads according to ASME B1.20.1.

C. Grooved-End Fittings for Ductile-Iron Pipe: ASTM A 536 ductile-iron or ASTM A 47 malleable-iron, AWWA pipe-size, designed to accept AWWA C606 grooved couplings. Include cement lining or Food and Drug Administration (FDA)-approved interior coating.

D. Steel Fittings: ASTM A 234/A 234M, seamless or welded; ASME B16.9, buttwelding; or ASME B16.11, socket-welding type for welded joints.

E. Steel Flanges and Flanged Fittings: ASME B16.5.

F. Grooved-End Fittings for Steel Pipe: UL-listed and FM-approved, ASTM A 536, Grade 65-45-12 ductile iron or ASTM A 47 Grade 32510 malleable iron, with grooves or shoulders designed to accept grooved couplings.

G. Steel Press-Seal Fittings: UL 213, FM-approved, 175-psig (1200 kPa) pressure rating, for use with Schedule 5, plain-end, steel pipe and fitting manufacturer's pressure sealing tools. Fittings include carbon-steel housing, butylene O-rings, and pipe stop.

2.4 JOINING MATERIALS

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joining materials not included in this Section.

B. Couplings for Grooved-End Steel Pipe and Grooved-End Ferrous Fittings: UL 213, AWWA C606, ASTM A 536 ductile-iron or ASTM A 47 malleable-iron housing, with enamel finish. Include synthetic-rubber gasket with central-cavity, pressure-responsive design; ASTM A 183 carbon-steel bolts and nuts; and locking pin, toggle, or lugs to secure grooved pipe and fittings.

C. Couplings for Grooved-End Ductile-Iron Pipe and Fittings: UL 213, AWWA C606, ASTM A 536 ductile-iron housing, with enamel finish. Include synthetic-rubber gasket with central-cavity, pressure-responsive design, and ASTM A 183 carbon-steel bolts and nuts to secure grooved pipe and fittings

2.5 GENERAL-DUTY VALVES

A. Refer to Division 15 Section "Valves" for general-duty gate, ball, butterfly, globe, and check valves.

2.6 SPRINKLERS

A. Automatic Sprinklers: With heat-responsive element conforming to:

1. UL , for applications except residential.

B. Sprinkler types and categories are as indicated and as required by application. Furnish automatic sprinklers with nominal 1/2-inch (12.7 mm) orifice for "Ordinary" temperature classification rating except where otherwise indicated and required by application.

C. Sprinkler types, features, and options include:

1. Concealed ceiling sprinklers, including cover plate.
2. Pendent sprinklers.
3. Quick-response sprinklers.
4. Recessed sprinklers, including escutcheon.
5. Upright sprinklers.

D. Sprinkler Finishes: Chrome-plated, bronze, and painted. See plans and coordinate with Project Manager.

E. Sprinkler Escutcheons: Materials, types, and finishes for following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, 1-piece, flat.
2. Ceiling Mounting: Chrome-plated steel, 2-piece, with 1-inch vertical adjustment.

F. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

G. Sprinkler Cabinets: Finished steel cabinet and hinged cover, with space for minimum of 6 spare sprinklers plus sprinkler wrench, suitable for wall mounting. Include number of sprinklers required by NFPA 13 and 1 wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each style sprinkler on Project.

2.7 SPECIALTY SPRINKLER FITTINGS

A. Specialty Fittings: UL-listed and FM-approved, made of steel, ductile iron, or other materials compatible with system materials and applications where used.

B. Drop-Nipple Fittings: UL 1474, with threaded inlet, threaded outlet, and seals; adjustable.

C. Sprinkler Alarm Test Fittings: Ductile-iron housing with 1-1/2-inch (40 mm) inlet and outlet, integral test valves, combination orifice and sight glass, and threaded or locking-lug ends.

2.8 ALARM DEVICES

A. Alarm Devices: Types and sizes that will match piping and equipment connections.

B. Water-Motor-Operated Alarms: UL 753, mechanical operation type, 10-inch

(250 mm) diameter, cast-aluminum alarm gong, with red enamel factory finish. Include Pelton-wheel-type operator with nylon shaft bearings, and shaft length and sleeve to suit wall thickness and construction; 3/4-inch (20 mm) inlet and 1-inch (25 mm) drain.

C. Waterflow Indicators: UL 346, electrical-supervision type, vane-type waterflow detector, rated to 250 psig (1725 kPa), and designed for horizontal or vertical installation. Include 2 SPDT (single-pole, double-throw) circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere, 125 volts a.c. (7 A, 125 V a.c.) and 0.25 ampere, 24 volts d.c. (0.25 A, 24 V d.c.); complete with factory-set, field-adjustable retard element to prevent false signals, and tamper-proof cover that sends a signal when cover is removed.

D. Pressure Switches: UL 753, waterflow switch with retard, electrical-supervision type, SPDT (single-pole, double-throw), normally closed contacts, designed to operate on rising pressure and signal water flow.

E. Supervisory Switches: UL 753, for valves, electrical-supervision type, SPDT (single-pole, double-throw), normally closed contacts, designed to signal controlled valve in other than full open position.

F. Supervisory Switches: UL 753, for indicator posts, electrical-supervision type, SPDT (single-pole, double throw), normally closed contacts, designed to signal controlled valve in other than full open position.

PART 3 - EXECUTION

3.1 SPRINKLER SYSTEM PIPING APPLICATIONS

A. Refer to Part 2 of this Section for detailed specifications on pipe and fittings products listed below. Use pipe, tube, fittings, and joining methods according to the following applications. Piping may be joined with flanges instead of indicated joints. Use grooved-end fittings with grooved couplings that are made by the same manufacturer and that comply with listing when used together for grooved-coupling joints.

B. Refer to NFPA 13 for pipe materials and schedule approved for this application.

3.2 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use gate, ball, or butterfly valves.
2. Throttling Duty: Use globe, ball, or butterfly valves.

3.3 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Grooved-End Pipe and Grooved-End Fitting Joints: Use grooved-end fittings and grooved couplings that are made by the same manufacturer and that are listed for use together. Groove pipe and assemble joints with grooved coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

1. Groove Type: Cut.
2. Groove Type: Rolled.

C. Dissimilar Materials Piping Joints: Make joints using adapters compatible with both piping materials.

3.4 PIPING INSTALLATIONS

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

3. Deviations from approved "working plans" for sprinkler piping require written approval from authority with jurisdiction. File written approval with the Architect prior to deviating from approved "working plans."

C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install unions adjacent to each valve in pipes 2 inches (50 mm) and smaller. Unions are not required on flanged devices or in piping installations using grooved couplings.

E. Install flanges or flange adapters on valves, apparatus, and equipment having 2-1/2-inch (65 mm) and larger connections.

F. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.

G. Install sprinkler piping with drains for complete system drainage.

H. Install sprinkler zone control valves, test assemblies, and drain headers adjacent to standpipes when sprinkler piping is connected to standpipe.

I. Install ball drip valves to drain piping between fire department connections and check valves, and where indicated. Drain to floor drain or outside building.

J. Install alarm devices in piping systems.

K. Hangers and Supports: Comply with NFPA 13.

1. Install hanger and support spacing and locations for steel piping joined with grooved mechanical couplings according to manufacturer's written instructions for rigid systems.
2. Earthquake Protection: Install piping according to NFPA 13 to protect from earthquake damage.

3.5 SPECIALTY SPRINKLER FITTING INSTALLATIONS

A. Install specialty sprinkler fittings according to manufacturer's written instructions.

3.6 SPRINKLER INSTALLATIONS

A. Install sprinklers in patterns indicated.

B. Install sprinklers in suspended ceilings in center of acoustical panels and tiles.

C. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical panels.

3.7 CONNECTIONS

A. Connect to specialty valves, specialties, fire department connections, and accessories.

B. Connect water supplies to sprinkler systems.

C. Electrical Connections: Power wiring is specified in Division 16.

D. Connect alarm devices to fire alarm system.

3.8 FIELD QUALITY CONTROL

A. Perform field acceptance tests of each fire protection system.

1. Flush, test, and inspect sprinkler piping systems according to NFPA 25.

B. Replace piping system components that do not pass test procedures specified, then retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.

1. Report test results promptly and in writing to Architect.
2. Report test results promptly and in writing to authority having jurisdiction when required.

3.9 CLEANING

A. Clean dirt and debris from sprinklers. Replace sprinklers having paint other than factory finish with new sprinklers. Cleaning and reuse of painted sprinklers is prohibited.

3.10 COMMISSIONING

A. Starting Procedures: Follow manufacturer's written procedures. If no procedures are prescribed by manufacturer, proceed as follows:

1. Verify that specialty valves, trim, fittings, controls, and accessories have been installed correctly and operate correctly.
2. Verify that pumps and accessories have been installed correctly and operate correctly.
3. Verify that specified tests of piping are complete.
4. Check that damaged sprinklers and sprinklers with paint or coating not specified have been replaced with new, correct type of sprinklers.
5. Check that sprinklers are correct type, have correct finish and temperature ratings, and have guards where required for applications.
6. Check that potable water supplies have correct type of backflow preventer.
7. Check that fire department connections have threads compatible with local fire department equipment and have correct pressure rating.
8. Fill wet-pipe sprinkler systems with water.
9. Energize circuits to electrical equipment and devices.
10. Start and run excess pressure pumps.
11. Adjust operating controls and pressure settings.

B. Coordinate with fire alarm system tests. Operate systems as required.

C. Coordinate with fire pump tests. Operate systems as required.

3.11 DEMONSTRATION

A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.

B. Schedule demonstration with at least 7 days' advance notice.

END OF SECTION 15330

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15510 - HYDRONIC PIPING –232100 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

B. The following Division-15 Sections apply to this Section:

1. Basic Mechanical Requirements.
2. Basic Mechanical Materials and Methods.
3. General Duty Valves.
4. Supports and Anchors.

1.2 SUMMARY

A. This Section includes piping systems for hot water heating, chilled water cooling, condenser water, make-up water for these systems, blow-down drain lines, and condensate drain piping. Piping materials and equipment specified in this Section include:

1. Pipes, fittings, and specialties;
2. Special duty valves;
3. hydronic specialties.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 15 Section "General Duty Valves" for gate, globe, ball, butterfly, and check valves.
2. Division 15 Section "Gages" for thermometers, flow meters, and pressure gages.
3. Division 15 Section "Mechanical Identification" for labeling and identification of hydronic piping system.
4. Division 15 Section "Mechanical Insulation" for pipe insulation.
5. Division 15 Section "Electric Control System" for temperature control valves and sensors.
6. Division 15 Section "Adjusting and Balancing" for procedures for hydronic systems adjusting and balancing.

1.3 DEFINITIONS

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

1.4 SYSTEM DESCRIPTION

A. General: The hydronic piping systems are the "water-side" of an air-and-water or all-water heating and air conditioning system. Hydronic piping systems specified in this Section include 2-pipe, chilled water piping system. These systems are classified by ASHRAE as Low Water Temperature, Forced, Recirculating systems.

1.5 SUBMITTALS

A. Product Data, including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties and accessories, and installation instructions for each hydronic specialty and special duty valve specified.

1. Furnish flow and pressure drop curves for diverting fittings and calibrated plug valves, based on manufacturer's testing.

B. Maintenance Data for hydronic specialties and special duty valves, for inclusion in operating and maintenance manual specified in Division 1 and Division-15 Section "Basic Mechanical Requirements."

C. Welders' certificates certifying that welders comply meet the quality requirements specified in Quality Assurance below.

D. Certification of compliance with ASTM and ANSI manufacturing requirements for pipe, fittings, and specialties.

E. Reports specified in Part 3 of this Section.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: comply with the provisions of the following:

1. ASME B 31.9 "Building Services Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.
2. Fabricate and stamp air separators and compression tanks to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
3. ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualification" for qualifications for welding processes and operators.
4. Florida Mechanical Code, latest edition.

1.7 EXTRA STOCK

A. Maintenance Stock: Furnish a sufficient quantity of chemical for initial system

start-up and for preventative maintenance for one year from Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide hydronic piping system products from one of the following:

5. Grooved Mechanical Joint Pipe, Fittings, and Couplings:

   a. Victaulic Company of America.
   b. or equal

6. Calibrated Plug Valves:

   a. Bell & Gossett ITT; Fluid Handling Div.
   b. Taco, Inc.
   c. or equal

3. Air Vents (manual and automatic):

   a. Armstrong Machine Works.
   b. Bell & Gossett ITT; Fluid Handling Div.
   c. Hoffman Specialty ITT; Fluid Handling Div.
   d. Spirax Sarco.
   e. or equal

4. Dielectric Unions:

   a. Perfection Corp.
   b. Watts Regulator Co.
   c. or equal

5. Y-Pattern Strainers:

   a. Armstrong Machine Works.
   b. Hoffman Specialty ITT; Fluid Handling Div.
   c. Metraflex Co.
   d. Spirax Sarco.
   e. Trane Co.
   f. Victaulic Co. of America.
   g. Watts Regulator Co.
   h. or equal

2.2 PIPE AND TUBING MATERIALS

A. General: Refer to Part 3 Article "PIPE APPLICATIONS" for identification of where the below materials are used.

B. Annealed Temper Copper Tubing: ASTM B 88, Type K.

C. Steel Pipe: ASTM A 120, Schedule 40, seamless, black steel pipe, plane ends.

D. CPVC Plastic Pipe: ASTM D 2846, Chlorinated Poly (Vinyl Chloride) (CPVC) pipe.- condensate pipe only

2.3 FITTINGS

A. Cast-Iron Threaded Fittings: ANSI B16.4, Class 125, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

B. Malleable-Iron Threaded Fittings: ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

C. Steel Fittings: ASTM A 234, seamless or welded, for welded joints.

D. Grooved Mechanical Fittings: ASTM A 536, Grade 65-45-12 Ductile Iron; ASTM A 47 Grade 32510 Malleable Iron; ASTM A 53, Type F, or Types E or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders designed to accept grooved end couplings.

E. Grooved Mechanical Couplings: consist of ductile or malleable iron housing, a synthetic rubber gasket of a central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

F. Wrought-Copper Fittings: ANSI B16.22, streamlined pattern.

G. CPVC Plastic Fittings: ASTM D 2846, Chlorinated Poly (Vinyl Chloride) (CPVC) socket-type fittings and solvent for solvent cemented joints.

H. Cast-Iron Threaded Flanges: ANSI B16.1, Class 125; raised ground face, bolt holes spot faced.

I. Cast Bronze Flanges: ANSI B16.24, Class 150; raised ground face, bolt holes spot faced.

J. Steel Flanges and Flanged Fittings: ANSI B16.5, including bolts, nuts, and gaskets of the following material group, end connection and facing:

1. Material Group: 1.1.

2. End Connections: Butt Welding.
3. Facings: Raised face.

K. Unions: ANSI B16.39 malleable-iron, Class 150, hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends. Threads shall conform to ANSI B1.20.1.

L. Dielectric Unions: Threaded or soldered end connections for the pipe materials in which installed; constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

M. Flexible Connectors: Stainless steel bellows with woven flexible bronze wire reinforcing protective jacket; minimum 150 psig working pressure, maximum 250 deg F operating temperature. Connectors shall have flanged or threaded end connections to match equipment connected; and shall be capable of 3/4 inch misalignment.

2.4 JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, 50-50, Tin-Lead, for condenser water, chilled water, and make-up water and drain piping.

B. Solder Filler Metals: ASTM B 32, 95-5 Tin-Antimony, for heating hot water and low pressure steam piping.

C. Brazing Filler Metals: AWS A5.8, Classification BAg 1 (Silver).

1. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.

D. Welding Materials: Comply, with Section II, Part C. ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.

E. Gasket Material: thickness, material, and type suitable for fluid to be handled, and design temperatures and pressures.

2.5 GENERAL DUTY VALVES

A. General duty valves (i.e., gate, globe, check, ball, and butterfly valves) are specified in Division 15 Section "General Duty Valves." Special duty valves are specified below by their generic name; refer to Part 3 Article "VALVE APPLICATION" for specific uses and applications for each valve specified.

2.6 SPECIAL DUTY VALVES

A. Calibrated Plug Valves: 125 psig water working pressure, 250 deg F maximum operating temperature, bronze body, plug valve with calibrated orifice. Provide with connections for portable differential pressure meter with integral check valves and seals. Valve shall have integral pointer and calibrated scale to register degree of valve opening. Valves 2 inch and smaller shall have threaded connections and 2-1/2 inch valves shall have flanged connections.

B. Automatic Flow Control Valves: Class 150, cast iron housing, stainless steel operating parts; threaded connections for 2 inch and smaller, flanged connections for 2-1/2 inch and larger. Factory set to automatically control flow rates within plus or minus 5 percent design, while compensating for system operating pressure differential. Provide quick disconnect valves for flow measuring equipment. Provide a metal identification tag with chain for each valve, factory marked with the zone identification, valve model number, and rate flow in GPM.

2.7 HYDRONIC SPECIALTIES

A. Manual Air Vent: bronze body and nonferrous internal parts; 150 psig working pressure, 225 deg F operating temperature; manually operated with screwdriver or thumbscrew; and having 1/8 inch discharge connection and 1/2 inch inlet connection.

B. Automatic Air Vent: designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150 psig working pressure, 240 deg F operating temperature; and having 1/4 inch discharge connection and 1/2 inch inlet connection.

C. Diverting Fittings: cast iron body with threaded ends, or wrought copper with solder ends; 125 psig working pressure, 250 deg F maximum operating temperature. Indicate flow direction on fitting.

D. Y-Pattern Strainers: 125 psig working pressure cast-iron body (ASTM A 126, Class B), flanged ends for 2-1/2 inch and larger, threaded connections for 2 inch and smaller, bolted cover, perforated Type 304 stainless steel basket, and bottom drain connection.

PART 3 - EXECUTION

3.1 PIPE APPLICATIONS

A. Install steel pipe with threaded joints and fittings fittings for 2 inch and smaller, and with welded joints for 2-1/2 inch and larger.

B. Install mechanical grooved end steel pipe with mechanical couplings and fittings for condenser water piping systems.

C. Install CPVC plastic pipe with solvent cemented joints for condensate water piping systems.

3.2 PIPING INSTALLATIONS

A. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

B. Use fittings for all changes in direction and all branch connections.

C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

D. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

E. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1" clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

F. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

G. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4" ball valve, and short 3/4" threaded nipple and cap.

H. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.

I. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, and floors, maintain the fire rated integrity. Refer to Division 7 for special sealers and materials.

J. Install piping at a uniform grade of 1 inch in 40 feet upward in the direction of flow.

K. Make reductions in pipe sizes using eccentric reducer fitting installed with the level side up.

L. Install branch connections to mains using Tee fittings in main with take-off out the bottom of the main, except for up-feed risers which shall have take-off out the top of the main line.

M. Install unions in pipes 2 inch and smaller, adjacent to each valve, at final connections each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

N. Install dielectric unions to join dissimilar metals.

O. Install flanges on valves, apparatus, and equipment having 2-1/2 inch and larger connections.

P. Install strainers on the supply side of each control valve, pressure reducing valve, pressure regulating valve, solenoid valve, inline pump, and elsewhere as indicated. Install nipple and ball valve in blow down connection of strainers 2 inch and larger.

Q. Anchor piping to ensure proper direction of expansion and contraction.

3.3 HANGERS AND SUPPORTS

A. General: Hanger, supports, and anchors devices are specified in Division 15 Section "SUPPORTS AND ANCHORS." Conform to the table below for maximum spacing of supports:

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet in length.
2. Adjustable roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe roller complete - MSS Type 44 for multiple horizontal runs, 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.

C. Install hangers with the following minimum rod sizes and maximum spacing:

Nom. Pipe Size	Max. Span-Ft.	Min. Rod Size-Inches
1	7	3/8
1-1/2	9	3/8
2	10	3/8
3	12	1/2
3-1/2	13	1/2
4	14	5/8
5	16	5/8
6	17	3/4

8	19	7/8
10	22	7/8
12	23	7/8

D. Support vertical runs at each floor.

3.4 PIPE JOINT CONSTRUCTION

A. Soldered Joints: Comply with the procedures contained in the AWS "Soldering Manual."

B. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."

1. CAUTION: Remove stems, seats, and packing of valves and accessible internal parts at piping specialties before brazing.
2. Fill the pipe and fittings during brazing, with an inert gas (ie., nitrogen or carbon dioxide) to prevent formation of scale.
3. Heat joints using oxy-acetylene torch. Heat to proper and uniform temperature.

C. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe fittings and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
2. Align threads at point of assembly.
3. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
4. Assemble joint wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

a. Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

D. Welded Joints: Comply with the requirement in ASME Code B31.9-"Building Services Piping."

E. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

F. Grooved Joints: Assemble joints in accordance with fitting manufacturers written instructions.

G. CPVC Joints: Prepare surfaces to be solvent cemented by wiping with a clean cloth moistened with acetone or methylethyl keytone. Solvent cement joints in accordance with ASTM D2846.

3.5 VALVE APPLICATIONS

A. General Duty Valve Applications: The Drawings indicate valve types to be used. Where specific valve types are not indicated the following requirements apply:

1. Shut-off duty: use gate, ball, and butterfly valves
2. Throttling duty: use globe, ball, and butterfly valves
3. Install shut-off duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and elsewhere as indicated.
4. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, elsewhere as indicated.

B. Install calibrated plug valves on the outlet of each heating or cooling element and elsewhere as required to facilitate system balancing.

C. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage.

3.6 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in the system, at heat transfer coils, and elsewhere as required for system air venting.

B. Install automatic air vents at high points in the system, heat transfer coils, and elsewhere as required for system air venting.

3.7 FIELD QUALITY CONTROL

A. Preparation for testing: Prepare hydronic piping in accordance with ASME B 31.9 and as follows:

1. Leave joints including welds uninsulated and exposed for examination during the test.
2. Provide temporary restraints for expansion joints which cannot sustain the reactions due to test pressure. If temporary restraints are not practical, isolate expansion joints from testing.
3. Flush system with clean water. Clean strainers.
4. Isolate equipment that is not to be subjected to the test pressure from the piping. If a valve is used to isolate the equipment, its closure shall be capable of sealing against the test pressure without damage to the valve.

Flanged joints at which blinds are inserted to isolate equipment need not be tested.

5. Install relief valve set at a pressure no more than 1/3 higher than the test pressure, to protect against damage by expansion of liquid or other source of overpressure during the test.

B. Testing: Test hydronic piping as follows:

1. Use ambient temperature water as the testing medium, except where there is a risk of damage due to freezing. Another liquid may be used if it is safe for workmen and compatible with the piping system components.
2. Use vents installed at high points in the system to release trapped air while filling the system. Use drains installed at low points for complete removal of the that liquid.
3. Examine system to see that equipment and parts that cannot withstand test pressures are properly isolated. Examine test equipment to ensure that it is tight and that low pressure filling lines are disconnected.
4. Subject piping system to a hydrostatic test pressure which at every point in the system is not less than 1.5 times the design pressure. The test pressure shall not exceed the maximum pressure for any vessel, pump, valve, or other component in the system under test. Make a check to verify that the stress due to pressure at the bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength, or 1.7 times the "SE" value in Appendix A of ASME B31.9, Code For Pressure Piping, Building Services Piping.
5. After the hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components as appropriate, and repeat hydrostatic test until there are no leaks.

3.8 ADJUSTING AND CLEANING

A. Clean and flush hydronic piping systems. Remove, clean, and replace strainer screens. After cleaning and flushing hydronic piping system, but before balancing, remove disposable fine mesh strainers in pump suction diffusers.

B. Mark calibrated name plates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.

C. Chemical Treatment: Provide a water analysis prepared by the chemical treatment supplier to determine the type and level of chemicals required for prevention of scale and corrosion. Preform initial treatment after completion of system testing.

3.9 COMMISSIONING

A. Fill system and perform initial chemical treatment.

B. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.

C. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean strainers.
3. Check pump for proper direction of correct improper wiring.
4. Set automatic fill valves for required system pressure.
5. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
6. Set temperature controls so all coils are calling for full flow.
7. Check operation of automatic bypass valves.
8. Check and set operating temperatures of chillers, and pumps to design requirements.
9. Lubricate motors and bearings.

END OF SECTION 15510

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15530 - REFRIGERANT PIPING – 232300 CSI

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements of the following Division 15 Sections apply to this section:

1. Basic Mechanical Requirements.
2. Basic Mechanical Materials and Methods.
3. Supports and Anchors.

1.2 SUMMARY

A. This Section includes refrigerant piping used for air conditioning applications. This Section includes:

1. Pipes, tubing, fittings, and specialties.
2. Special duty valves.
3. Refrigerants.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 15, Section "Mechanical Identification" for labeling and identification of refrigerant piping.
2. Division 15, Section "Mechanical Insulation" for pipe insulation.

C. Products installed but not furnished under this Section include pre-charged tubing, refrigerant specialties, and refrigerant accessories furnished as an integral part of or separately with packaged air conditioning equipment.

1.3 SUBMITTALS

A. Product data for the following products:

1. Each type valve specified.
2. Each type refrigerant piping specialty specified.

B. Shop Drawings showing layout of refrigerant piping, specialties, and fittings including, but not necessarily limited to, pipe and tube sizes, valve arrangements

and locations, slopes of horizontal runs, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and proximate to equipment.

C. Brazer's Certificates signed by Contractor certifying that brazers comply with requirements specified under "Quality Assurance" below.

D. Maintenance data for refrigerant valves and piping specialties, for inclusion in Operating and Maintenance Manual specified in Division 1 and Division 15 Section "Basic Mechanical Requirements."

1.4 QUALITY ASSURANCE

A. Qualify brazing processes and brazing operators in accordance with ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications".

B. Regulatory Requirements: Comply with provisions of the following codes:

1. ANSI B31.5: ASME Code for Pressure Piping - Refrigerant Piping.
2. ANSI/ASHRAE Standard 15: Safety Code for Mechanical Refrigeration.
3. Florida Mechanical Code.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

4. Refrigerant Valves and Specialties:

a. Alco Controls Div, Emerson Electric.
b. Danfoss Electronics, Inc.
c. EATON Corporation, Control Div.
d. Henry Valve Company.
e. Parker-Hannifin Corporation, Refrigeration and Air Conditioning Division.
f. Sporlan Valve Company.

2.2 PIPE AND TUBING MATERIALS

A. General: Refer to Part 3, Article "PIPE APPLICATION" for identification of systems where the below specified pipe and fitting materials are used.

B. Copper Tubing: ASTM B 280, Type ACR, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing. Tubing shall be factory cleaned, ready for installation, and have ends capped to protect cleanliness of pipe interiors prior to shipping.

C. Copper Tubing: ASTM B 88, Type L, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing.

2.3 FITTINGS

A. Wrought-Copper Fittings: ANSI B16.22, streamlined pattern.

2.4 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (Silver).

2.5 VALVES

A. General: Complete valve assembly shall be UL-listed and designed to conform to ARI 760.

B. Globe: 450 psig maximum operating pressure, 275 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass wing cap and bolted bonnet; replaceable resilient seat disc; plated steel stem. Valve shall be capable of being repacked under pressure. Valve shall be straight through or angle pattern, with solder-end connections.

C. Check Valves - Smaller Than 7/8 inch: 500 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast brass body, with removable piston, Teflon seat, and stainless steel spring; straight through globe design. Valve shall be straight through pattern, with solder-end connections.

D. Check Valves - 7/8 inch and Larger: 450 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass bolted bonnet; floating piston with mechanically retained Teflon seat disc. Valve shall be straight through or angle pattern, with solder-end connections.

E. Solenoid Valves: 250 deg. F temperature rating, 400 psig working pressure; forged brass, with Teflon valve seat, two-way straight through pattern, and solder end connections. Provide manual operator to open valve. Furnish complete with NEMA 1 solenoid enclosure with 1/2 inch conduit adapter, and 24 volt, 60 Hz. normally closed holding coil.

F. Evaporator Pressure Regulating Valves: pilot-operated, forged brass or cast

bronze; complete with pilot operator, stainless steel bottom spring, pressure gage tappings, 24 volts DC, 50/60 Hz, standard coil; and wrought copper fittings for solder end connections.

G. Thermal Expansion Valves: thermostatic adjustable, modulating type; size as required for specific evaporator requirements, and factory set for proper evaporator superheat requirements. Valves shall have copper fittings for solder end connections; complete with sensing bulb, a distributor having a side connection for hot gas bypass line, and an external equalizer line.

H. Hot Gas Bypass Valve: adjustable type, sized to provide capacity reduction beyond the last step of compressor unloading; and wrought copper fittings for solder end connections.

2.6 REFRIGERANT PIPING SPECIALTIES

A. General: Complete refrigerant piping specialty assembly shall be UL-listed and designed to conform to ARI 760.

B. Strainers: 500 psig maximum working pressure; forged brass body with monel 80-mesh screen, and screwed cleanout plug; Y-pattern, with solder end connections.

C. Moisture/liquid Indicators: 500 psig maximum operation pressure, 200 deg. F maximum operating temperature; forged brass body, with replaceable polished optical viewing window, and solder end connections.

D. Filter-driers: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter-drier core kit, including gaskets, as follows:

1. Standard capacity desiccant sieves to provide micronic filtration.
2. High capacity desiccant sieves to provide micronic filtration and extra drying capacity.

E. Suction Line Filter-Drier: 350 psig maximum operation pressure, 225 deg. F maximum operating temperature; steel shell, and wrought copper fittings for solder end connections. Permanent filter element shall be molded felt core surrounded by a desiccant. for removal of acids and moisture for refrigerant vapor.

F. Suction Line Filters: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter core kit, including gaskets, as follows:

G. Flanged Unions: 400 psig maximum working pressure, 330 deg. F maximum operating temperature; two brass tailpiece adapters for solder end connections to copper tubing; flanges for 7/8 inch through 1-5/8 inch unions shall be forged steel, and for 2-1/8 inch through 3-1/8 inch shall be ductile iron; four plated steel bolts, with silicon bronze nuts and fiber gasket. Flanges and bolts shall have factory-applied rust-resistant coating.

H. Flexible Connectors: 500 psig maximum operating pressure; seamless tin bronze or stainless steel core, high tensile bronze braid covering, solder connections, and synthetic covering; dehydrated, pressure tested, minimum 7 inch in length.

2.7 REFRIGERANT

A. Refrigerant No. R410A in accordance with ASHRAE Standard 34.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine rough-in for refrigerant piping systems to verify actual locations of piping connections prior to installation.

3.2 PIPE APPLICATIONS

A. Use Type L, or Type ACR drawn copper tubing with wrought copper fittings and brazed joints above ground, within building. Use Type K, annealed temper copper tubing for 2 inch and smaller without joints, below ground and within slabs. Mechanical fittings (crimp or flair) are not permitted.

1. Install annealed temper tubing in pipe duct. Vent pipe duct to the outside.

B. If other than Type ACR tubing is used, clean and protect inside of tubing as specified in Article "CLEANING" below.

3.3 PIPING INSTALLATIONS

A. General: Install refrigerant piping in accordance with ASHRAE Standard 15 - "The Safety Code for Mechanical Refrigeration."

B. Install piping in as short and direct arrangement as possible to minimize pressure drop.

C. Install piping for minimum number of joints using as few elbows and other fitting as possible.

D. Arrange piping to allow normal inspection and servicing of compressor and other equipment. Install valves and specialties in accessible locations to allow for servicing and inspection.

E. Provide adequate clearance between pipe and adjacent walls and hanger, or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full thickness insulation.

F. Insulate suction lines. Liquid line are not required to be insulated, except where they are installed adjacent and clamped to suction lines, where both liquid and suction lines shall be insulated as a unit.

1. Do not install insulation until system testing has been completed and all leaks have been eliminated.

G. Install branch tie-in lines to parallel compressors equal length, and pipe identically and symmetrically.

H. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.

I. Slope refrigerant piping as follows:

1. Install horizontal hot gas discharge piping with 1/2" per 10 feet downward slope away from the compressor.
2. Install horizontal suction lines with 1/2 inch per 10 feet downward slope to the compressor, with no long traps or dead ends which may cause oil to separate from the suction gas and return to the compressor in damaging slugs.
3. Install traps and double risers where indicated, and where required to entrain oil in vertical runs.
4. Liquid lines may be install level.

J. Use fittings for all changes in direction and all branch connections.

K. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

L. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

M. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

N. Install piping tight to slabs, beams, joists, columns, walls, and other permanent

elements of the building. Provide space to permit insulation applications, with 1 inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

O. Locate groups of piper parallel to each other, spaced to permit applying insulation and servicing of valves.

P. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.

Q. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side down.

R. Install strainers immediately ahead of each expansion valve, solenoid valve, hot gas bypass valve, compressor suction valve, and as required to protect refrigerant piping system components.

S. Install moisture/liquid indicators in liquid lines between filter/driers and thermostatic expansion valves and in liquid line to receiver.

1. Install moisture/liquid indicators in lines larger than 2-1/8 inch OD, using a bypass line.

T. Install unions to allow removal of solenoid valves, pressure regulating valves, expansion valves, and at connections to compressors and evaporators.

U. Install flexible connectors at the inlet and discharge connection of compressors.

3.4 HANGERS AND SUPPORTS

A. General: Hanger, supports, and anchors are specified in Division 15 Section "SUPPORTS AND ANCHORS." Conform to the table below for maximum spacing of supports:

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet in length.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe rollers complete supports for multiple horizontal runs, 20 feet or longer supported by a trapeze.
4. Spring hangers to support vertical runs.

C. Install hangers with the following minimum rod sizes and maximum spacing:

NOM. PIPE SIZE	MAX. SPAN-FT	MIN. ROD SIZE - INCHES
1	7	3/8
1-1/2	9	3/8
2	10	3/8
3	12	1/2
3-1/2	13	1/2
4	14	5/8

D. Support vertical runs at each floor.

3.5 PIPE JOINT CONSTRUCTION

A. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."

1. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.
2. CAUTION: When solenoid valves are being installed, remove the coil to prevent damage. When sight glasses are being installed, remove the glass. Remove stems, seats, and packing of valves, and accessible internal parts of refrigerant specialties before brazing. Do no apply heat near the bulb of the expansion valve.

B. Fill the pipe and fittings during brazing, with an inert gas (ie., nitrogen or carbon dioxide) to prevent formation of scale.

C. Heat joints using oxy-acetylene torch. Heat to proper and uniform brazing temperature.

3.6 VALVE INSTALLATIONS

A. General: Install refrigerant valves where indicated, and in accordance with manufacturer's instructions.

B. Install globe valves on each side of strainers and driers, in liquid and suction lines at evaporators, and elsewhere as indicated.

C. Install a full sized, 3-valve bypass around each drier.

D. Install solenoid valves ahead of each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at the top.

1. Electrical wiring for solenoid valves is specified in Division 16. Coordinate electrical requirements and connections.

E. Thermostatic expansion valves may be mounted in any position, as close as possible to the evaporator.

1. Where refrigerant distributors are used, mount the distributor directly on the expansion valve outlet.
2. Install the valve in such a location so that the diaphragm case is warmer than the bulb.
3. Secure the bulb to a clean, straight, horizontal section of the suction line using two bulb straps. Do not mount bulb in a trap or at the bottom of the line.
4. Where external equalizer lines are required make the connection where it will clearly reflect the pressure existing in the suction line at the bulb location.

F. Install pressure regulating and relieving valves as required by ASHRAE Standard 15.

3.7 EQUIPMENT CONNECTIONS

A. The Drawings indicate the general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow servicing and maintenance.

3.8 FIELD QUALITY CONTROL

A. Inspect, test, and perform corrective action of refrigerant piping in accordance with ASHRAE standard 15, and ASME Code B31.5.

B. Repair leaking joints using new materials, and retest for leaks.

3.9 CLEANING

A. Before installation of copper tubing other than Type ACR tubing, clean the tubing and fitting using following cleaning procedure:

1. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through the tubing by means of a wire or an electrician's tape.
2. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
3. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe

visually for remaining dirt and lint.

4. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

3.10 ADJUSTING AND CLEANING

A. Verify actual evaporator applications and operating conditions, and adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.

B. Clean and inspect refrigerant piping systems in accordance with requirements of Division-15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

C. Adjust controls and safeties. Replace damaged or malfunctioning controls and equipment with new materials and products.

3.11 COMMISSIONING

A. Charge system using the following procedure:

1. Install core in filter dryer after leak test but before evacuation.
2. Evacuate refrigerant system with vacuum pump; until temperature of 35 deg F is indicated on vacuum dehydration indicator.
3. During evacuation, apply heat to pockets, elbows, and low spots in piping.
4. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
5. Break vacuum with refrigerant gas, allow pressure to build up to 2 psi.
6. Complete charging of system, using new filter dryer core in charging line. Provide full operating charge.

B. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance of refrigerant piping valves and refrigerant piping specialties.

C. Review data in Operating and Maintenance Manuals. Refer to Division 1 section "Project Closeout."

D. Schedule training with County personnel through the County Project Manager, with at least 7 days advance notice.

END OF SECTION 15530

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15670 - CONDENSING UNITS – 236213 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 SUMMARY

A. Section includes:
1. Air-cooled condensing units.- **repair existing unit and install on roof of Hensley wing.**

B. Related Sections:

1. Section 15030 - Electrical Provisions for Mechanical Work
2. Section 15530 - Refrigerant Piping

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating), dimensions, required clearances, and methods of assembly of components, furnished specialties and accessories; and installation and start-up instructions.

B. Wiring Diagrams: Submit ladder-type wiring diagrams for power and control wiring required for final installation of condensing units and controls. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

C. Operation and Maintenance Data: Submit maintenance data and parts list for each condensing unit, control, and accessory; including "trouble shooting" maintenance guide; plus servicing, and preventative maintenance procedures and schedule. Include this data and product data in maintenance manual; in accordance with requirements of Division 1.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of condensing units, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. Capacity ratings for condensing units shall be in accordance with ARI Standard 360 "Standard for Commercial and Industrial Unitary Air-Conditioning Equipment".
2. Refrigeration system of condensing units shall be constructed in accordance with ASHRAE Standard ASHRAE 15 "Safety Code for Mechanical Refrigeration".
3. Condensing units shall meet or exceed the minimum COP/Efficiency levels as prescribed in ASHRAE 90 "Energy Conservation in New Building Design".
4. Construction and testing of water cooled condensing units shall be in accordance with ASME Boiler and Pressure Vessel Code, Section VIII.
5. Condensing units shall be listed by UL and have UL label affixed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle condensing units and components carefully to prevent damage. Follow manufacturer's written instructions for rigging. Replace damaged condensing units or components.

B. Store condensing units and components in clean dry place off the ground. Protect from weather, water, and physical damage.

1.6 SPECIAL PROJECT WARRANTY

A. Warranty on Motor/Compressor: Provide written warranty, signed by manufacturer, agreeing to replace/repair, within warranty period, motors/compressors with inadequate or defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units have been adhered to during warranty period. Replacement is limited to component replacement only, and does not include labor for removal and reinstallation.

1. Warranty Period: 5 years from date of substantial completion.

PART 2 - PRODUCTS

2.1 AIR-COOLED CONDENSING UNITS

A. Manufacturers: Subject to compliance with requirements, provide air-cooled condensing units of one of the following:

1. Payne co – existing unit
2. or equal

A. General: factory-assembled and tested air-cooled condensing units, consisting of casing, compressors, condensers, coils, condenser fans and motors, and unit controls. Capacities and electrical characteristics are scheduled on the Drawings.

B. Unit Casings: designed for outdoor installation and complete with weather protection for components and controls, and complete with removable panels for required access to compressors, controls, condenser fans, motors, and drives. Additional features include:

1. zinc-coated steel for exposed casing surfaces, treated and finished with manufacturer's standard paint coating;
2. lifting lugs to facilitate rigging of units;
3. factory-installed metal grilles, for protection of condenser coil during shipping, installation, and operation;
4. hinged and gasketed control panel door.
5. coated coils for corrosion resitance

C. Compressor: reciprocating hermetic-type compressor or hermetic scroll, 1,750 RPM, designed for air-cooled condensing, complete with crankcase sight glass, crankcase heater, and backseating service access valves on suction and discharge ports. Capacity shall be controlled through cylinder unloading. Additional features include:

1. Crankcase heater in well within crankcase;
2. Capacity steps as scheduled, or greater number;
3. Compressor of same manufacturer as condensing unit.

D. Controls: Operating and safety controls shall include high and low pressure cutouts, oil pressure cutout, compressor winding thermostat cutout, 3-leg compressor overload protection, and condenser fan motors with thermal and overload cutouts. Control transformer if required shall be 115-volts. Provide magnetic contactors for compressor and condenser fan motors. Additional features include:

1. Reset relay circuit for manual resetting of cutouts from remote thermostat location;
2. Automatic nonrecycling pumpdown, and timing device to prevent excessive

compressor cycling;
3. Factory- wired, for single external electrical power disconnect supplied by Electrical contractor connection.

E. Condensing Section: Condenser coil shall be seamless copper tubing mechanically bonded to heavy-duty, configurated aluminum fins, coated coils, with separate and independent refrigeration circuit for each compressor. Units shall include liquid accumulator and subcooling circuit, and backseating liquid line service access valve. Condenser coils shall be factory-tested at 500 psig, vacuum dehydrate, and filled with a holding charge of nitrogen.

F. Condenser fans and drives: propeller-type condenser fans for vertical air discharge; either direct drive or belt drive. Additional features include:

1. Permanent lubricated ball bearing condenser fan motors;
2. Separate motor for each condenser fan;
3. Constant speed condenser fan motors;
4. Each fan assembly shall be dynamically and statically balanced.

G. Low ambient control: factory-installed low ambient damper assembly, fan speed control, or fan cycling control.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site structure, mounting supports, and existing pads are complete to the proper point to allow installation of units. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install condensing units in accordance with manufacturers installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

B. Support:

1. Install ground-mounted units on 4" thick reinforced concrete pad, 4" larger on each side than condensing unit. Coordinate installation of anchoring devices.
2. Install roof-mounted units on equipment supports. Anchor unit to supports with removable fasteners.

3. Air-Cooled Condensing Units: Connect refrigerant piping to unit; maintain required access to unit.

a. Install furnished field-mounted accessories.

3.3 FIELD QUALITY CONTROL

A. Testing:

1. Charge systems with refrigerant and oil, and test for leaks. Repair leaks and replace lost refrigerant and oil.

3.4 DEMONSTRATION

A. Provide services of manufacturer's authorized service representative to provide start-up service and to instruct Owner's personnel in operation and maintenance of condensing units.

B. Start-up condensing units, in accordance with manufacturer's start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

C. Train Owner's personnel on start-up and shut-down procedures, troubleshooting procedures, servicing, and preventative maintenance schedule and procedures. Review with the Owner's personnel, the data contained in the Operating and Maintenance Manuals specified in Division One.

1. Schedule training with Owner, provide at least 7-day prior notice to Project Manager.

END OF SECTION 15670

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15830 - TERMINAL UNITS –233600 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of terminal unit work is indicated by drawings and schedules, and by requirements of this section.

B. Types of terminal units required for project include the following:

1. Fan-Coil units.- **repair and service existing unit**

C. Refer to other Division-15 sections for piping; ductwork; and testing, adjusting and balancing of terminal units; not work of this section.

D. Refer to electrical plans for the following work; not work of this Section.

1. Power supply wiring from power source to power connection on terminal unit. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
2. Interlock wiring between electrically-operated terminal units; and between terminal units and field-installed control devices.
3. Interlock wiring specified as factory-installed is work of this section.

E. Provide the following electrical work as work of this section, complying with requirements of the electrical plans:

1. Control wiring between field-installed controls, indicating devices, and terminal unit control panels.

a. Control wiring specified as work of Division-15 for Automatic Temperature Controls is work of that section.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of

terminal units, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Codes and Standards:

1. ARI Compliance: Provide coil ratings in accordance with ARI Standard 410 "Forced-Circulation Air-Cooling and Air-Heating Coils".
2. ASHRAE Compliance: Test coils in accordance with ASHRAE Standard 33 "Methods of Testing Forced Circulation Air Cooling and Heating Coils".
3. ARI Compliance: Test and rate fan-coil units in accordance with ARI Standard 440 "Room Fan-Coil Air Conditioners".
4. UL Compliance: Construct and install fan-coil units in compliance with UL 883 "Safety Standards for Fan Coil Units and Room Fan Heater Units".
5. UL Compliance: Provide electrical components for terminal units which have been listed and labeled by UL.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications for terminal units showing dimensions, capacities, ratings, performance characteristics, gages and finishes of materials, and installation instructions.

B. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, construction details, and field connection details.

C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to terminal units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

D. Maintenance Data: Submit maintenance instructions, including lubrication instructions, filter replacement, motor and drive replacement, and spare parts lists. Include this data, product data, shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle terminal units and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged terminal units or components; replace with new.

B. Store terminal units and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

C. Comply with Manufacturer's rigging and installation instructions for unloading terminal units, and moving them to final location.

PART 2 - PRODUCTS

2.1 FAN-COIL UNITS- existing reused and repaired

A. General: Provide fan-coil units having cabinet sizes, and in locations indicated, and of capacities, style, and having accessories as scheduled. Include in basic unit chassis, coils. fanboard, drain pan assembly, fans, housing, motor, filter and insulation
Repair wall unit with supply and return grille for fit in t-bar ceiling . Provide wall mount thermostat with unit with alarm contacts for over temperature. (adjustable).

B. Chassis: Construct chassis of galvanized steel with flanged edges.

C. Insulation: Faced, heavy density glass fiber.

D. Cabinet: Construct of 18-ga steel removable panels, 16-ga front. Provide insulation over entire coil section. Clean cabinet parts, bonderize, phosphatize, and flow-coat with baked-on primer.

E. Coils: Construct of 5/8" seamless copper tubes mechanically bonded to configurated aluminum fins. Design for 300 psi working pressure, and leak test at 300 psi under water.

F. Drain Pans: Construct of galvanized steel. Insulate with polystyrene or polyurethane insulation. Provide drain connection and integral condensate pump.

G. Fans: Provide centrifugal forward curved double width wheels of reinforced fiberglass, in galvanized steel fan scrolls.

H. Motors: Provide motors with integral thermal overload protection. Run test motors at factory in assembled unit prior to shipping. Provide quickly detachable motor cords.

I. Filters: Provide 1" thick throwaway type filters in fiberboard frames.

K. Accessories: Provide the following accessories as indicated and/or scheduled:

1. Discharge Grille Panels: Provide 18-ga galvanized steel, stamped integral grilles, with access doors.
2. Sub-Bases: Provide 18-ga steel sub-base, height as indicated.
3. Extended Oilers: Provide plastic motor oiler tubes extending to beneath top discharge grille.
4. Mounting Flanges: Provide 16-ga steel flanges for mounting fan-coil units into wall or ceiling.

L. Manufacturer: Subject to compliance with requirements, provide fan-coil units of one of the following:

1. Payne co. – existing unit
2. or equal

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which terminal units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF FAN-COIL UNITS

A. General: Install fan-coil units as indicated, and in accordance with manufacturer's installation instructions.

B. Locate fan-coil units as indicated, coordinate with other trades to assure correct recess size for recessed units.

C. Install piping as indicated.

D. Protect units with protective covers during balance of construction.

3.3 ELECTRICAL WIRING

A. General: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electric Installer.

1. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of electrical plans. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.4 ADJUSTING AND CLEANING

A. General: After construction is completed, including painting, clean unit exposed surfaces, vacuum clean terminal coils and inside of cabinets.

B. Retouch any marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

C. Install new filter units for terminals requiring same.

END OF SECTION 15830

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15850 - AIR HANDLING –233400 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements of the following Division 15 Sections apply to this section:

1. "Basic Mechanical Requirements."
2. "Basic Materials and Methods."

1.2 SUMMARY

A. This Section includes the following types of air-handling units:

1. Centrifugal fans for indoor installations.
2. Utility set fans.
3. Tubular centrifugal fans.
4. Inline centrifugal fans.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 15 Section "Electric Control Systems" for electric control devices.
2. Division 15 Section "Testing, Adjusting, and Balancing" for air-handling systems testing, adjusting, and balancing requirements and procedures.
3. Division 16 Section "Circuit and Motor Disconnects" for disconnect switches.
4. Division 16 Section "Motor Controllers" for motor starters.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:

1. Product data for selected models, including specialties, accessories, and the following:

a. Certified fan performance curves with system operating conditions indicated.
b. Certified fan sound power ratings.
c. Motor ratings and electrical characteristics plus motor and fan

accessories.
d. Materials gages and finishes, including color charts.
e. Dampers, including housings, linkages, and operators.

2. Shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, required clearances, components, and location and size of field connections.
3. Wiring diagrams that detail power, signal, and control wiring. Differentiate between manufacturer-installed wiring and field- installed wiring.
4. Product certificates, signed by manufacturers of air-handling units, certifying that their products comply with specified requirements.
5. Maintenance data for air-handling units, for inclusion in Operating and Maintenance Manual specified in Division 1 and Division 15 Section "Basic Mechanical Requirements."

1.4 QUALITY ASSURANCE

A. UL Compliance: Fans shall be designed, manufactured, and tested in accordance with UL 705 "Power Ventilators."

B. UL Compliance: Fans and components shall be UL listed and labeled.

C. Nationally Recognized Testing Laboratory and NEMA Compliance (NRTL): Fans and components shall be NRTL listed and labeled. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

D. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

E. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Lift and support units with the manufacturer's designated lifting or supporting points.

B. Disassemble and reassemble units as required for movement into the final location following manufacturer's written instructions.

C. Deliver fan units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate the installation of roof curbs, equipment supports, and roof penetrations.

B Coordinate the size and location of structural steel support members.

1.7 EXTRA MATERIALS

A. Furnish one additional complete set of belts for each belt-driven fan.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Centrifugal Fans:

a. Cook (Loren) Co.
b.Greenheck Fan Corp.
c. or equal

2. Utility Sets:

a. Cook (Loren) Co.
b. Greenheck Fan Corp.
c. Or equal

3. Tubular Centrifugal Fans:

a. Cook (Loren) Co.
b. Greenheck Fan Corp.
c. Or equal

4. Inline Centrifugal Fans:

a. Cook (Loren) Co.
b. Greenheck Fan Corp.
c. or equal

2.2 SOURCE QUALITY CONTROL

A. Testing Requirements: The following factory tests are required:

1. Sound Power Level Ratings: Comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans in accordance with AMCA Standard 300 "Test Code for Sound Rating." Fans

shall be licensed to bear the AMCA Certified Sound Ratings Seal.

2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

2.3 FANS, GENERAL

A. General: Provide fans that are factory fabricated and assembled, factory tested, and factory finished, with indicated capacities and characteristics.

B. Fans and Shafts: Statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.

1. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fan's class.

C. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.

1. Service Factor: 1.4.

D. Belts: Oil-resistant, nonsparking, and nonstatic.

E. Motors and Fan Wheel Pulleys: Adjustable pitch for use with motors through 15 HP; fixed pitch for use with motors larger than 15 HP. Select pulley so that pitch adjustment is at the middle of the adjustment range at fan design conditions.

1. Belt Guards: Provide steel belt guards for motors mounted on the outside of the fan cabinet.

F. Shaft Bearings: Provide type indicated, having a median life "Rating Life" (AFBMA (L50)) of 200,000, calculated in accordance with AFBMA Standard 9 for ball bearings and AFBMA Standard 11 for roller bearings.

G. Factory Finish: The following finishes are required:

1. Sheet Metal Parts: Prime coating prior to final assembly.
2. Exterior Surfaces: Baked-enamel finish coat after assembly.

2.4 CENTRIFUGAL FANS

A. General Description: Belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and support structure. Smoke rated fans shall have heat shield and UL rated for use in smoke removal.

B. Housings: Fabricated from formed and reinforced galvanized steel panels to form curved scroll housings with continuously welded or deep-locked seams and access doors or panels to allow access to internal parts and components.

1. Inlet Cones: Spun metal.
2. Duct Connections: Flanged.
3. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.

C. Fan Wheels: Double-width, double-inlet, welded to cast-iron or cast-steel hub and spun steel inlet cone, with hub keyed to the shaft.

4. Blade Materials: Steel.
5. Blade Type: as scheduled.

D. Shaft Bearings: Grease-lubricated, self-aligning, pillow-block type; tapered roller bearings with double-locking collars and two- piece, cast-iron housing.

E. Accessories: The following accessories are required where indicated:

6. Scroll Bypass Dampers: Aluminum, opposed, airfoil blades with extruded vinyl seals on blades, low-friction bearings, and positive control linkage for manual or automatic operation.
7. Scroll Housing Access Doors: Latch-type handles; flush-mounted for uninsulated housings and raised-mounted for insulated housings.
8. Inlet Vanes: Radial vanes with linkage for manual or automatic operation.

a. Double-Width Fans Inlet Vanes: Connected for single operator.

9. Inlet Screens: Heavy wire mesh screens, mounted inside of shaft bearings.
10. Discharge Dampers: Heavy-gage steel, opposed blade design, with linkage for manual or automatic operation.
11. Drain Connections: Threaded, 3/4-inch NPS, capped nipple installed at lowest point of housing.
7. Spark-Resistant Construction: AMCA construction option A, B, or C as indicated.
8. Shaft Seals: Air-tight seals installed around shaft on drive side of single-width fans.

2.5 UTILITY SET FANS

A. General Description: Belt-driven, centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and accessories. Smoke rated fans shall have heat shield and UL rated for use in smoke removal.

B. Housings: Fabricated from heavy-gage steel with side sheets fastened to scroll sheets by means of welding or deep lock seam.

1. Inlet: Round duct collar.
2. Discharge: Slip-joint duct connection.
3. Housings Discharge Arrangement: Adjustable to 8 standard positions.

C. Fan Wheels: Single-width, single-inlet, welded to cast-iron or cast-steel hub and spun steel inlet cone, with hub keyed to the shaft.

1. Blade Materials: Steel.
2. Blade Type: as scheduled

D. Shaft Bearings: grease lubricated, self-aligning, tapered pillow- block-type ball bearings.

E. Accessories: The following accessories are required where indicated:

1. Backdraft Dampers: Gravity-actuated with counterweight and interlocking aluminum blades and felt edges in steel frame installed on fan discharge.
2. Access Doors: Gasketed doors with latch-type handles.
3. Scroll Dampers: Single-blade damper installed at fan scroll top with adjustable linkage.
4. Spark-Resistant Construction: AMCA construction option A, B, or C as indicated.
5. Inlet Screens: Removable, heavy wire mesh.
6. Drain Connections: 3/4-inch, threaded coupling drain connection installed at lowest point of housing.
7. Weather Hoods: Weather-resistant with stamped vents over motor and drive compartment.

2.6 TUBULAR CENTRIFUGAL FANS

A. General Description: Tubular, inline, belt-driven, centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, drive assembly, motor and disconnect switch, mounting brackets, and accessories.

B. Housings: Fabricated from formed and reinforced galvanized steel panels with welded seams.

1. Duct Connections: Spun inlet cones with flange removable for access to internal parts, and an outlet flange.
2. Mounting Brackets: Suitable for horizontal or vertical mounting.
3. Motor Mount: Adjustable for belt tensioning.
4. Fan Wheels: Single-width, single-inlet, welded to cast-iron or cast-steel hub

and spun steel inlet cone, with hub keyed to the shaft.

a. Blade Materials: Steel.
b. Blade Type: as scheduled.

C. Shaft Bearings: Grease-lubricated, self-aligning, pillow-block type; tapered roller bearings with double-locking collars and two- piece, cast-iron housing.

D. Shaft Bearings: Grease-lubricated, self-aligning, pillow-block type, with double spherical roller bearings with adapter mount and two-piece cast-iron housing.

E. Accessories: The following accessories are required where indicated:

5. Companion Flanges: For inlet and outlet connections.
6. Weather Cover: Heavy-gage, galvanized, sheet steel with ventilation slots, bolted to housing.
7. Belt Guard: Manufacturer's standard to meet OSHA requirements.
8. Ceiling Brackets: Structural angles welded and drilled for hanger rod attachment.
9. Inlet Vanes: Radial vanes with linkage suitable for manual or automatic operation.
10. Access Doors: Located over wheel in an accessible position, hinged and having latch-type handles; flush mounted for uninsulated housings, raised-mounted for insulated housings.
11. Spark-Resistant Construction: AMCA construction option A, B, or C as indicated.
12. Inlet and Outlet Screens: Removable, heavy wire mesh.

2.7 INLINE CENTRIFUGAL FANS

A. General Description: Inline, belt-driven, centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, drive assembly, motor and disconnect switch, mounting brackets, and accessories. Smoke rated fans shall have heat shield and UL rated for use in smoke removal.

B. Housing: Split, spun-aluminum housing, with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

C. Direct-Drive Units: Motor encased in housing out of air stream, factory-wired to disconnect located on outside of fan housing.

D. Belt-Drive Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

E. Wheel: steel, airfoil blades welded to hub.

F. Accessories: The following accessories are required as indicated:

1. Volume Control Damper: Manual operated with quadrant lock, located in fan outlet.
2. Companion Flanges: For inlet and outlet duct connections.
3. Fan Guards: Expanded metal in removable frame.
4. Speed Control: Variable speed switch with on-off control and speed control for 100 to 50 percent of fan air delivery.

2.8 MOTORS

A. Torque Characteristics: Sufficient to accelerate the driven loads satisfactorily.

B. Motor Sizes: Minimum sizes and electrical characteristics as indicated. If not indicated, large enough so that the driven load will not require the motor to operate in the service factor range.

C. Temperature Rating: 50 deg C maximum temperature rise at 40 deg C ambient for continuous duty at full load (Class A Insulation).

D. Service Factor: 1.15 for polyphase motors and 1.35 for single-phase motors.

E. Motor Construction: NEMA Standard MG 1, general purpose, NEMA premium, continuous duty, for use with VFD drives. Provide permanent-split capacitor classification motors for shaft-mounted fans and capacitor start classification for belted fans.

1. Bases: Adjustable.
2. Bearings: The following features are required:

c. Ball or roller bearings with inner and outer shaft seals.
d. Grease lubricated.
e. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.

3. Enclosure Type: The following features are required:

a. Open dripproof motors where satisfactorily housed or remotely located during operation.
b. Guarded dripproof motors where exposed to contact by employees or building occupants.
c. Sealed units are required inside of smoke fans . TEFC for exterior use.

4. Overload protection: Built-in, automatic reset, thermal overload protection.
5. Noise rating: Quiet.

6. Efficiency: Energy-efficient motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, Test Method B. If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors" in accordance with IEEE Standard 112, Test Method B.
7. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, and special features.

F. Starters, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 16.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, housekeeping pads, and other conditions affecting performance of fans.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install fans level and plumb, in accordance with manufacturer's written instructions. Support units as described below, using the vibration control devices indicated. Vibration control devices are specified in Division 15 Section "Vibration Controls."

1. Support floor-mounted units on concrete equipment bases using neoprene pads. Secure units to anchor bolts installed in concrete equipment base.
2. Support floor-mounted units on concrete equipment bases using housed spring isolators. Secure units to anchor bolts installed in concrete equipment base.
3. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.

4. Suspended Units: Suspend units from structural steel support frame using threaded steel rods and vibration isolation springs.

B. Arrange installation of units to provide access space around air- handling units for service and maintenance.

3.3 CONNECTIONS

A. Duct installations and connections are specified in other Division 15 sections. Make final duct connections with flexible connections.

B. Electrical Connections: The following requirements apply:

1. Electrical power wiring is specified in Division 16.
2. Temperature control wiring and interlock wiring are specified in Division 15 Section "Electrical Control Systems."
3. Grounding: Connect unit components to ground in accordance with the National Electrical Code.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Inspection: Arrange and pay for a factory- authorized service representative to perform the following:

1. Inspect the field assembly of components and installation of fans including ductwork and electrical connections.
2. Prepare a written report on findings and recommended corrective actions.

3.5 ADJUSTING, CLEANING, AND PROTECTING

A. Adjust damper linkages for proper damper operation.

B. Clean unit cabinet interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheel and cabinet.

3.6 COMMISSIONING

A. Final Checks Before Start-Up: Perform the following operations and checks before start-up:

1. Remove shipping blocking and bracing.
2. Verify unit is secure on mountings and supporting devices and that connections for piping, ductwork, and electrical are complete. Verify proper thermal overload protection is installed in motors, starters, and disconnects.
3. Perform cleaning and adjusting specified in this Section.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearings operations. Reconnect fan drive system, align belts, and install belt guards.
5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
6. Verify manual and automatic volume control and that fire and smoke dampers in connected ductwork systems are in the full-open position.
7. Disable automatic temperature control operators.
8. Verify smoke sequence and static pressures are programmed into vfd drive on smoke fans.

B. Starting procedures for fans:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.

    a. Replace fan and motor pulleys as required to achieve design conditions.

2. Measure and record motor electrical values for voltage and amperage.

C. Shut unit down and reconnect automatic temperature control operators.

D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for procedures for air-handling-system testing, adjusting, and balancing.

3.7 DEMONSTRATION

A. Demonstration Services: Arrange and pay for a factory-authorized service representative to train Owner's maintenance personnel on the following:

1. Procedures and schedules related to start-up and shutdown, troubleshooting, servicing, preventative maintenance, and how to obtain replacement parts.
2. Familiarization with contents of Operating and Maintenance Manuals specified in Division 1 Section "Project Closeout" and Division 15 Section "Basic Mechanical Requirements."

B. Schedule training with at least 7 days' advance notice.

END OF SECTION 15850

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15854 - CENTRAL-STATION AIR-HANDLING UNITS- 237300 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements of the following Division 15 Sections apply to this section:

1. "Basic Mechanical Requirements."
2. "Basic Materials and Methods."
3. "Electrical Requirements for Mechanical Equipment."

1.2 SUMMARY

A. This Section includes variable -volume, central-station air-handling units with coils for indoor installations. Unit shall be broken down to fit within an elevator for installation. Measure elevator prior to order.

B. Related Sections: The following Sections contain requirements that relate to this section:

1. Division 15 Section "Mechanical Insulation" for field-applied equipment insulation.
2. Division 16 Section "Circuit and Motor Disconnects" for field- installed disconnect switches.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data for each central-station air-handling unit indicated, including the following:

a. Certified fan performance curves with system operating conditions indicated.
b. Certified fan sound power ratings.
c. Certified coil performance ratings with system operating conditions indicated.
d. Motor ratings and electrical characteristics plus motor and fan accessories.

e. Materials gages and finishes.
f. Filters with performance characteristics.
g. Dampers, including housings, linkages, and operators.

2. Shop drawings from manufacturer detailing dimensions, required clearances, components, and location and size of each field connection.
3. Wiring diagrams detailing wiring for power and controls and differentiating between manufacturer-installed wiring and field- installed wiring.
4. Product certificates signed by manufacturers of central-station air- handling units certifying that their products comply with specified requirements.
3. Field quality control test reports specified in Part 3 of this Section.
4. Maintenance data for central-station air-handling units for inclusion in Operating and Maintenance Manual specified in Division 1 and Division 15 Section "Basic Mechanical Requirements."

1.4 QUALITY ASSURANCE

A. NFPA Compliance: Central-station air-handling units and components shall be designed, fabricated, and installed in compliance with NFPA Standard 90A "Standard for the Installation of Air Conditioning and Ventilating Systems."

B. UL Compliance: Electric coils, along with the complete central- station air-handling unit, shall be listed and labeled by Underwriters' Laboratories.

C. Nationally Recognized Testing Laboratory and NEMA Compliance (NRTL): Electric coils, along with the complete central-station air-handling unit shall be listed and labeled by a NRTL. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

D. ARI Certification: Central-station air-handling units and their components shall be factory tested in accordance with the applicable portions of ARI 430 - Standard for Central-Station Air-Handling Units and shall be listed and bear the label of the Air-Conditioning and Refrigeration Institute.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Lift and support units with the manufacturer's designated lifting or supporting points.

B. Disassemble and reassemble units as required for movement into the final location following manufacturer's written instructions.

C. Deliver central-station air-handling units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate the size and location of concrete equipment pads. Cast anchor bolt inserts into pad.

B. Coordinate the size and location of structural steel support members.

1.7 EXTRA MATERIALS

A. Furnish one additional complete set of filters for each central- station air-handling unit.

B. Furnish one additional complete set of belts for each central- station air-handling unit.

C. Furnish one additional gasket for each sectional joint of each central-station air-handling unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carrier Air Conditioning
2. McQuay Air Conditioning
3. The Trane Co.
4. York International Corp.
5. or equal

2.2 MANUFACTURED UNITS

A. General Description: Factory assembled, consisting of fans, motor and drive assembly, coils, damper, plenums, filters, drip pans, and mixing dampers.

B. Types: Central-station air-handling units included in this project are of the following types:

1. Draw-through. “L” shape

C. Motor and Electrical Components: Refer to Division 15 Section "Electrical Requirements for Mechanical Equipment."

2.3 CABINET

A. Materials: Formed and reinforced galvanized steel panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

1. Medium- and high-pressure units shall be constructed with additional bracing and supports. Units rated at 5.5 inches w.g. and higher shall connected to accessories sections with double- thickness neoprene-coated flexible connection.

B. Insulation: Comply with NFPA Standard 90A "Standard for the Installation of Air Conditioning and Ventilating Systems," for insulation.

1. Type: Coated, glass-fiber insulation, 1 inch thick and having a minimum density of 1-1/2 pcf.
2. Location and Application: Factory applied with adhesive and mechanical fasteners to the internal surface of section panels downstream from and including the cooling coil section.

C. Access Panels and Doors: Same materials and finishes as cabinet and complete with hinges, latches, handles, and gaskets.

1. Fan section shall have inspection and access panels and doors sized and located to allow periodic maintenance and inspections.

D. Double-Wall Drain Pans: Formed sections of galvanized sheet steel. Fabricate pans in sizes and shapes to collect condensate from cooling coils (including coil piping connections and return bends) and humidifiers when units are operating at the maximum cataloged face velocity across the cooling coil. Fill space between double- wall construction with foam insulation and seal moisturetight.

2. Drain connections: Both ends of the pan.
3. Pan top surface coating: Elastomeric compound. Or AG ion .
4. Units with stacked coils shall have an intermediate drain pan or a drain trough to collect condensate from top coil.

2.4 FANS SECTION

A. Testing Requirements: The following factory tests are required:

1. General: Sound power level ratings shall comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data" and shall be the result of tests made in accordance with AMCA Standard 300 "Test Code for Sound Rating." Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.
2. Unit's fans performance ratings for flow rate, pressure, power, air density,

speed of rotation, and efficiency shall be factory tested and ratings established in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

B. Fan Section Construction: Fan section shall be equipped with a formed steel channel base for integral mounting of fan, motor, and casing panels. The fan scroll, wheel, shaft, bearings, and motor shall be mounted on a structural steel frame with frame mounted on base with vibration isolators.

C. Fans and Shafts: Statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower. Fan wheel shall be as indicated. Airfoil wheels shall be steel painted with zinc chromate primer and an enamel finish coat. Fan shaft shall be solid steel, turned, ground, and polished. Fan wheels shall be keyed to the shaft.

D. Shaft Bearings: Grease-lubricated ball bearings selected for 200,000 hours' average life, with grease fittings extended to an accessible location outside the fan section.

E. Fan Drives: Designed for a 1.4 service factor and factory mounted with final alignment and belt adjustment made after installation.

1. Belt Drive: Motors and fan wheel pulleys shall be adjustable pitch for use with motors up to and including 15 HP and fixed pitch for use with motors larger than 15 HP.
2. Motors mounted on the outside of the fan cabinet shall have steel belt guards.

2.5 MOTORS

A. Torque Characteristics: Sufficient to accelerate the driven loads satisfactorily.

B. Motor Sizes: Minimum size as indicated. If not indicated, large enough so that the driven load will not require the motor to operate in the service factor range.

C. Temperature Rating: 50 deg C maximum temperature rise at 40 deg C ambient for continuous duty at full load (Class A Insulation).

D. Service Factor: 1.15 for polyphase motors and 1.35 for single-phase motors.

E. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, designed for use with VFD drives.

1. Bases: Adjustable.
2. Bearings: The following features are required:

a. Ball or roller bearings with inner and outer shaft seals.
b. Grease lubricated. Lubrication extensions.
c. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.

3. Enclosure Type: The following features are required:

a. Open drip-proof/ tefc motors where satisfactorily housed or remotely located during operation.
b. Guarded drip-proof motors where exposed to contact by employees or building occupants.

4. Overload protection: Built-in, automatic reset, thermal overload protection.
5. Noise rating: Quiet.
6. Efficiency: Energy-efficient motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, Test Method B. If efficiency not specified, motors shall have a higher efficiency than “NEMA Premium " and meet ASHRAE 90.1, 2010. Provide rebate data with motor.
7. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, and special features.

F. Starters, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 16.

2.6 COILS

A. Testing Requirements: The following factory tests are required:

1. Coil Performance Tests: Cooling and heating coils, except sprayed surface coils, shall be factory tested for rating in accordance with ARI 410 - Standard for Forced-Circulation Air- Cooling and Air-Heating Coils.

B. Coil Sections: Common or individual insulated, galvanized steel casings for heating and cooling coils. Coil section shall be designed and constructed to facilitate removal of coil for maintenance and replacement and to assure full air flow through coils.

1. Multizone units shall have air deflectors and air baffles for balanced air flow across both heating and cooling coils.
2. Medium- and high-pressure units shall have double gaskets between sections and coil connection penetrations through casing sealed to minimize leakage.

C. Coils, General: Drainable, rigidly supported across the full face of the coil, and pitched to allow drainage.

1. Fins: Aluminum or copper, constructed from flat plate with belled collars for tubes. Fins shall be bonded to tubes by mechanically expanding copper tubes.
2. Tubes: Seamless copper.
3. Coil Casing: Galvanized steel.
4. Headers for Steam and Water Coils: Steel or cast iron, with connections for drain valve and air vent and threaded piping connections.
5. Water Coil Turbulators: Bronze, spring-type.

2.7 DAMPERS

A. General: Leakage rate when tested in accordance with AMCA Standard 500 - Test Method for Louvers, Dampers and Shutters, shall not exceed 2 percent of air quantity calculated at 2,000 fpm face velocity through damper and 4.0 inches w.g. pressure differential.

1. Damper operators shall be pneumatically operated.
2. Damper operators shall be electrically operated.
3. Damper operators are specified in Division 15 Section "Electric Controls Systems."

2.8 FILTERS SECTION

A. General: Filters shall comply with NFPA Standard 90A "Standard for the Installation of Air Conditioning and Ventilating Systems."

B. Filter Section: Cabinet material and finish shall match the air-handling unit cabinet, with filter media holding frames arranged for flat or angular orientation. Section shall have access doors on front of the unit.

A. Disposable Filters: Provide disposable type air filters 2 inches thick, consisting of viscous coated fibers with filtering media encased in fiberboard cell sides having perforated metal grids on each face to provide media support. Airflow resistance with clean media shall not exceeding 0.10 inch w.g. at face velocity of 300 fpm, and filter arrestance efficiency of 70 to 82 percent based on ASHRAE Test Standard 52 - Method of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter. Merv 8 filters minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, housekeeping pads, and other conditions affecting performance of central-station air- handling units.

B. Examine rough-in for steam, hydronic, condensate drainage piping and electrical to verify actual locations of connections prior to installation.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install central-station air-handling units level and plumb, in accordance with manufacturer's written instructions.

4. Support floor-mounted units on existing concrete equipment bases using neoprene pads. Secure units to anchor bolts installed in concrete equipment base.
5. Support floor-mounted units on concrete equipment bases using housed spring isolators. Secure units to anchor bolts installed in concrete equipment base.

B. Arrange installation of units to provide access space around air- handling units for service and maintenance.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 sections. The Drawings indicate the general arrangement of piping, valves, fittings, and specialties. The following are specific connection requirements:

1. Arrange piping installations adjacent to units to allow unit servicing and maintenance.
2. Connection piping to air-handling units with flexible connectors.
3. Connect condensate drain pans using 1-inch, Type L copper tubing. Extend to the nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

B. Duct installations and connections are specified in other Division 15 sections. Make final duct connections with flexible connections.

C. Electrical Connections: The following requirements apply:

1. Electrical power wiring is specified in Division 16.
2. Temperature control wiring and interlock wiring is specified in Division 15 Section "Electrical Control Systems."
3. Grounding: Connect unit components to ground in accordance with the National Electrical Code.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Inspection: Arrange and pay for a factory- authorized service representative to perform the following:

1. Inspect the field assembly of components and installation of central-station air-handling units including piping, ductwork, and electrical connections.
2. Prepare a written report on findings and recommended corrective actions.

3.4 ADJUSTING, CLEANING, AND PROTECTING

A. Adjust water coil flow, with control valves to full coil flow, to indicated gpm.

B. Adjust damper linkages for proper damper operation.

C. Clean unit cabinet interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheel, fan cabinet, and coils entering air face.

3.5 COMMISSIONING

A. Final Checks Before Start-Up: Perform the following operations and checks before start-up:

1. Remove shipping, blocking, and bracing.
2. Verify unit is secure on mountings and supporting devices and that connections for piping, ductwork, and electrical are complete. Verify proper thermal overload protection is installed in motors, starters, and disconnects.
3. Perform cleaning and adjusting specified in this Section.
4. Disconnect fan drive from motor and verify proper motor rotation direction and verify fan wheel free rotation and smooth bearings operations. Reconnect fan drive system, align belts, and install belt guards.
5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
6. Set zone dampers to full open for each zone.
7. Set face-and-bypass dampers to full face flow.
8. Set outside-air mixing dampers to minimum outside- air setting.
9. Comb coil fins for parallel orientation.
10. Install clean filters.
11. Verify manual and automatic volume control, and fire and smoke dampers in

connected ductwork systems are in the full-open position.

12. Disable automatic temperature control operators.

B. Starting procedures for central-station air-handling units:

1. Energize motor, verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.

a. Replace fan and motor pulleys as required to achieve design conditions.

2. Measure and record motor electrical values for voltage and amperage.

C. Shut unit down and reconnect automatic temperature control operators.

D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for procedures for air-handling-system testing, adjusting, and balancing.

3.6 DEMONSTRATION

A. Demonstration Services: Arrange and pay for a factory-authorized service representative to train Owner's maintenance personnel on the following:

1. Procedures and schedules related to start-up and shut down, troubleshooting, servicing, preventative maintenance, and how to obtain replacement parts.
2. Familiarization with contents of Operating and Maintenance Manuals specified in Division 1 Section "Project Closeout" and Division 15 Section "Basic Mechanical Requirements."

B. Schedule training with at least 7 days' advance notice.

END OF SECTION 15854

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15891 - METAL DUCTWORK – 233113 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Requirements of the following Division 15 Sections apply to this section:

1. "Basic Mechanical Requirements."
2. "Basic Mechanical Materials and Methods."

1.2 SUMMARY

A. This Section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air conditioning systems in pressure classes from minus 2 inches to plus 10 inches water gage.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 15 Section "Mechanical Insulation" for exterior duct and plenum insulation.
2. Division 15 Section "Duct Accessories" for flexible duct materials, dampers, duct-mounted access panels and doors, and turning vanes.
3. Division 15 Section "Diffusers, Registers, and Grilles."
4. Division 15 Section "Air Terminals," for constant-volume control boxes, variable-air-volume control boxes, and reheat boxes.
5. Division 15 Section "Electric Control Systems" for automatic volume control dampers and operators.
6. Division 15 Section "Testing, Adjusting, and Balancing."

1.3 DEFINITIONS

A. Sealing Requirements Definitions: For the purposes of duct systems sealing requirements specified in this Section, the following definitions apply:

1. Seams: A seam is defined as joining of two longitudinally (in the direction of airflow) oriented edges of duct surface material occurring between two joints. All other duct surface connections made on the perimeter are deemed to be joints.
2. Joints: Joints include girth joints; branch and subbranch intersections; so-called duct collar tap-ins; fitting subsections; louver and air terminal

connections to ducts; access door and access panel frames and jambs; duct, plenum, and casing abutments to building structures.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. The duct system design, as indicated, has been used to select and size air moving and distribution equipment and other components of the air system. Changes or alterations to the layout or configuration of the duct system must be specifically approved in writing. Accompany requests for layout modifications with calculations showing that the proposed layout will provide the original design results without increasing the system total pressure.

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data including details of construction relative to materials, dimensions of individual components, profiles, and finishes for the following items:

1. Sealing Materials.
2. Fire-Stopping Materials.

C. Welding certificates including welding procedures specifications, welding procedures qualifications test records, and welders' qualifications test records complying with requirements specified in "Quality Assurance" below.

D. Record drawings including duct systems routing, fittings details, reinforcing, support, and installed accessories and devices, in accordance with Division 15 Section "Basic Mechanical Requirements" and Division 1.

E. Maintenance data for volume control devices, fire dampers, and smoke dampers, in accordance with Division 15 Section "Basic Mechanical Requirements" and Division 1.

1.6 QUALITY ASSURANCE

A. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel" for hangers and supports and AWS D9.1 "Sheet Metal Welding Code."

B. Qualify each welder in accordance with AWS qualification tests for welding processes involved. Certify that their qualification is current.

C. NFPA Compliance: Comply with the following NFPA Standards:

1. NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating

Systems," except as indicated otherwise.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver sealant and fire-stopping materials to site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle sealant fire-stopping materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

C. Deliver and store stainless steel sheets with mill-applied adhesive protective paper, maintained through fabrication and installation.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Sheet Metal, General: Provide sheet metal in thicknesses indicated, packaged and marked as specified in ASTM A 700.

B. Galvanized Sheet Steel: Lock-forming quality, ASTM A 527, Coating Designation G 90. Provide mill phosphatized finish for exposed surfaces of ducts exposed to view.

C. Reinforcement Shapes and Plates: Unless otherwise indicated, provide galvanized steel reinforcing where installed on galvanized sheet metal ducts. For aluminum and stainless steel ducts provide reinforcing of compatible materials.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 SEALING MATERIALS

A. Joint and Seam Sealants, General: The term sealant used here is not limited to materials of adhesive or mastic nature, but also includes tapes and combinations of open weave fabric strips and mastics.

B. Joint and Seam Tape: 2 inches wide, glass-fiber-fabric reinforced.

C. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with the tape to form a hard, durable, airtight seal.

D. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant complying with FS TT-S-001657, Type I; formulated with a minimum of 75 percent solids.

E. Flanged Joint Mastics: One-part, acid-curing, silicone elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.3 FIRE-STOPPING

A. Fire-Resistant Sealant: Provide two-part, foamed-in-place, fire-stopping silicone sealant formulated for use in a through-penetration fire-stop system for filling openings around duct penetrations through walls and floors, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction. All products shall have listing documentation provided with submittals for authority having jurisdiction.

B. Fire-Resistant Sealant: Provide one-part elastomeric sealant formulated for use in a through-penetration fire-stop system for filling openings around duct penetrations through walls and floors, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

D. Products: Subject to compliance with requirements, provide one of the following:

1. "Dow Corning Fire Stop Foam"; Dow Corning Corp.
2. "Pensil 851"; General Electric Co.
3. "Dow Corning Fire Stop Sealant"; Dow Corning Corp.
4. "3M Fire Barrier Caulk CP-25"; Electrical Products Div./3M.
5. "RTV 7403"; General Electric Co.
6. "Fyre Putty"; Standard Oil Engineered Materials Co.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder actuated fasteners, or structural steel fasteners appropriate for building materials. Do not use powder actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4 inches thick.

B. Hangers: Galvanized sheet steel, or round, uncoated steel, threaded rod.

1. Hangers Installed In Corrosive Atmospheres: Electro-galvanized, all-thread rod or hot-dipped-galvanized rods with threads painted after

installation.

2. Straps and Rod Sizes: Conform with Table 4-1 in SMACNA HVAC Duct Construction Standards, 1985 Edition, for sheet steel width and gage and steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes conforming to ASTM A 36.

1. Where galvanized steel ducts are installed, provide hot-dipped-galvanized steel shapes and plates.
2. For stainless steel ducts, provide stainless steel support materials.
3. For aluminum ducts, provide aluminum support materials, except where materials are electrolytically separated from ductwork.

2.5 RECTANGULAR DUCT FABRICATION

A. General: Except as otherwise indicated, fabricate rectangular ducts with galvanized sheet steel, in accordance with SMACNA "HVAC Duct Construction Standards," Tables 1-3 through 1-19, including their associated details. Conform to the requirements in the referenced standard for metal thickness, reinforcing types and intervals, tie rod applications, and joint types and intervals.

1. Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
2. Provide materials that are free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.

B. Static Pressure Classifications: Except where otherwise indicated, construct duct systems to the following pressure classifications:

3. Supply Ducts: 3 inches water gage.
4. Return Ducts: 2 inches water gage, negative pressure.
5. Exhaust Ducts: 2 inches water gage, negative pressure.

C. Crossbreaking or Cross Beading: Crossbreak or bead duct sides that are 19 inches and larger and are 20 gage or less, with more than 10 sq. ft. of unbraced panel area, as indicated in SMACNA "HVAC Duct Construction Standard," unless they are lined or are externally insulated.

2.6 RECTANGULAR DUCT FITTINGS

A. Fabricate elbows, transitions, offsets, branch connections, and other duct construction in accordance with SMACNA "HVAC Metal Duct Construction Standard," 1985 Edition, Figures 2-1 through 2-10.

B. Double-Wall (Insulated) Ducts: Fabricate double-wall insulated ducts with an outer

shell, insulation, and an inner liner as specified below. Dimensions indicated on internally insulated ducts are nominal inside dimensions.

1. Thermal Conductivity: 0.27 Btu/sq.ft./deg F/inch thickness at 75 deg F mean temperature.
2. Outer Shell: Base outer shell gage on actual outer shell dimensions. Provide outer shell lengths 2 inches longer than inner shell and insulation, and in gages specified above for single-wall duct.
3. Insulation: Unless otherwise indicated, provide 1-inch-thick fiber-glass insulation. Provide insulation ends where internally insulated duct connects to single-wall duct or noninsulated components. The insulation end shall terminate the insulation and reduce the outer shell diameter to the inner liner diameter.
4. Solid Inner Liner: Construct round and flat oval inner liners with solid sheet metal of the gages listed below. For flat oval ducts, the diameter indicated in the table below is the "basic round diameter."
5. Perforated Inner Liner: Construct round and flat oval inner liners with perforated sheet metal of the gages listed below. Provide 3/32-inch-diameter perforations, with an overall open area of 23 percent. For flat oval ducts, the diameter indicated below is the "basic round diameter."

    a. 3 to 8 inches: 28 gage with standard spiral construction.
    b. 9 to 42 inches: 28 gage with single-rib spiral construction.
    c. 44 to 60 inches: 26 gage with single-rib spiral construction.
    d. 62 to 88 inches: 22 gage with standard spiral construction.

6. Maintain concentricity of liner to outer shell by mechanical means. Retain insulation from dislocation by mechanical means

2.7 ROUND DUCT FABRICATION

A. General: "Basic Round Diameter" as used in this article is the diameter of the size of round duct that has a circumference equal to the perimeter of a given sized of flat oval duct. Except where interrupted by fittings, provide round and flat oval ducts in lengths not less than 12 feet.

B. Round Ducts: Fabricate round supply ducts with spiral lockseam construction, except where diameters exceed 72 inches. Fabricate ducts having diameters greater than 72 inches with longitudinal butt-welded seams. Comply with SMACNA "HVAC Duct Construction Standards," Table 3-2 for galvanized steel gages.

C. Round Ducts: Fabricate round supply ducts using seam types identified in SMACNA "HVAC Duct Construction Standards," 1985 Edition, Figure 3-1, RL-1, RL-4, or RL-5. Seams Types RL-2 or RL-3 may be used if spot-welded on 1-inch

intervals. Comply with SMACNA "HVAC Duct Construction Standards," Table 3-2 for galvanized steel gages.

D. Double-Wall (Insulated) Ducts: Fabricate double-wall insulated ducts with an outer shell, insulation, and an inner liner as specified below. Dimensions indicated on internally insulated ducts are nominal inside dimensions.

7. Thermal Conductivity: 0.27 Btu/sq.ft./deg F/inch thickness at 75 deg F mean temperature.
8. Outer Shell: Base outer shell gage on actual outer shell dimensions. Provide outer shell lengths 2 inches longer than inner shell and insulation, and in gages specified above for single-wall duct.
9. Insulation: Unless otherwise indicated, provide 1-inch-thick fiber-glass insulation. Provide insulation ends where internally insulated duct connects to single-wall duct or noninsulated components. The insulation end shall terminate the insulation and reduce the outer shell diameter to the inner liner diameter.
10. Solid Inner Liner: Construct round and flat oval inner liners with solid sheet metal of the gages listed below. For flat oval ducts, the diameter indicated in the table below is the "basic round diameter."
11. Perforated Inner Liner: Construct round and flat oval inner liners with perforated sheet metal of the gages listed below. Provide 3/32-inch-diameter perforations, with an overall open area of 23 percent. For flat oval ducts, the diameter indicated below is the "basic round diameter."

    a. 3 to 8 inches: 28 gage with standard spiral construction.
    b. 9 to 42 inches: 28 gage with single-rib spiral construction.
    c. 44 to 60 inches: 26 gage with single-rib spiral construction.
    d. 62 to 88 inches: 22 gage with standard spiral construction.

12. Maintain concentricity of liner to outer shell by mechanical means. Retain insulation from dislocation by mechanical means.

2.8 ROUND SUPPLY AND EXHAUST FITTINGS FABRICATION

A. 90-Degree Tees and Laterals and Conical Tees: Fabricate to conform to SMACNA "HVAC Duct Construction Standards," 1985 Edition, Figures 3-4 and 3-5 and with metal thicknesses specified for longitudinal seam straight duct.

B. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from the body onto branch tap entrance.

C. Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate the bend radius of die-formed, gored, and pleated elbows 1.5 times the elbow diameter. Unless elbow construction type is indicated, provide elbows meeting the following requirements:

1. Mitered Elbows: Fabricate mitered elbows with welded construction in gages specified below.

    a. Mitered Elbows Radius and Number of Pieces: Unless otherwise indicated, construct elbow to comply with SMACNA "HVAC Duct Construction Standards," Table 3-1.
    b. Round Mitered Elbows: Solid welded and with metal thickness listed below for pressure classes from minus 2 inches to plus 2 inches:

        1) 3 to 26 inches: 24 gage.
        2) 27 to 36 inches: 22 gage.
        3) 37 to 50 inches: 20 gage.
        4) 52 to 60 inches: 18 gage.
        5) 62 to 84 inches: 16 gage.

    c. Round Mitered Elbows: Solid welded and with metal thickness listed below for pressure classes from 2 inches to 10 inches:

        1) 3 to 14 inches: 24 gage.
        2) 15 to 26 inches: 22 gage.
        3) 27 to 50 inches: 20 gage.
        4) 52 to 60 inches: 18 gage.
        5) 62 to 84 inches: 16 gage.

    d. 90-Degree, 2-Piece, Mitered Elbows: Use only for supply systems, or exhaust systems for material handling classes A and B; and only where space restrictions do not permit the use of 1.5 bend radius elbows. Fabricate with a single-thickness turning vanes.

2. Round Elbows - 8 Inches and Smaller: Die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend angle configurations or 1/2-inch-diameter (e.g. 3-1/2- and 4-1/2-inch) elbows with gored construction.
3. Round Elbows - 9 Through 14 Inches: Gored or pleated elbows for 30, 45, 60, and 90 degrees, except where space restrictions require a mitered elbow. Fabricate nonstandard bend angle configurations or 1/2-inch-diameter (e.g. 9-1/2- and 10-1/2-inch) elbows with gored construction.
4. Round Elbows - Larger Than 14 Inches and All Flat Oval Elbows: Gored elbows, except where space restrictions require a mitered elbow.
5. Die-Formed Elbows for Sizes Through 8 Inches and All Pressures: 20 gage with 2-piece welded construction.
6. Round Gored Elbows Gages: Same as for nonelbow fittings specified above.
7. Pleated Elbows Sizes Through 14 Inches and Pressures Through 10 Inches: 26 gage.

D. Double-Wall (Insulated) Fittings: Fabricate double-wall insulated fittings with an outer shell, insulation, and an inner liner as specified below. Dimensions indicated on internally insulated ducts are nominal inside dimensions.

1. Thermal Conductivity: 0.27 Btu/sq.ft./deg F/inch thickness at 75 deg F mean temperature.
2. Outer Shell: Base outer shell gage on actual outer shell dimensions. Provide outer shell lengths 2 inches longer than inner shell and insulation. Gages for outer shell shall be same as for uninsulated fittings specified above.
3. Insulation: Unless otherwise indicated, provide 1-inch-thick fiber-glass insulation. Provide insulation ends where internally insulated duct connects to single-wall duct or noninsulated components. The insulation end shall terminate the insulation and reduce the outer shell diameter to the nominal single-wall size.
4. Solid Inner Liner: Construct round and flat oval inner liners with solid sheet metal of the gages listed below. For flat oval ducts, the diameter indicated in the table below is the "basic round diameter."
5. Perforated Inner Liner: Construct round and flat oval inner liners with perforated sheet metal of the gages listed below. Provide 3/32-inch-diameter perforations, with an overall open area of 23 percent. For flat oval ducts, the diameter indicated in the table below is the "basic round diameter."

    a. 3 to 34 inches: 24 gage.
    b. 35 to 58 inches: 22 gage.
    c. 60 to 88 inches: 20 gage.

6. Maintain concentricity of liner to outer shell by mechanical means. Retain insulation from dislocation by mechanical means.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION, GENERAL

A. Duct System Pressure Class: Construct and install each duct system for the specific duct pressure classification indicated.

B. Install ducts with the fewest possible joints.

C. Use fabricated fittings for all changes in directions, changes in size and shape, and connections.

D. Install couplings tight to duct wall surface with projections into duct at connections kept to a minimum.

E. Locate ducts, except as otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs. Install duct systems in shortest route that does not obstruct useable space or block access for servicing building and its equipment.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Provide clearance of 1 inch where furring is shown for enclosure or concealment of ducts, plus allowance for insulation thickness, if any.

H. Install insulated ducts with 1-inch clearance outside of insulation.

I. Conceal ducts from view in finished and occupied spaces by locating in mechanical shafts, hollow wall construction, or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown.

J. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

K. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

L. Non-Fire-Rated Partition Penetrations: Where ducts pass interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2 inches.

3.2 HANGING AND SUPPORTING

A. Install rigid round, rectangular, and flat oval metal duct with support systems indicated in SMACNA "HVAC Duct Construction Standards," Tables 4-1 through 4-3 and Figures 4-1 through 4-8.

B. Support horizontal ducts within 2 feet of each elbow and within 4 feet of each branch intersection.

C. Support vertical ducts at a maximum interval of 16 feet and at each floor.

D. Upper attachments to structures shall have an allowable load not exceeding 1/4 of the failure (proof test) load but are not limited to the specific methods indicated.

E. Install concrete insert prior to placing concrete.

F. Install powder actuated concrete fasteners after concrete is placed and

completely cured.

3.3 CONNECTIONS

A. Equipment Connections: Connect equipment with flexible connectors in accordance with Division 15 Section "Duct Accessories."

B. Branch Connections: Comply with SMACNA "HVAC Duct Construction Standards," Figures 2-7 and 2-8.

C. Outlet and Inlet Connections: Comply with SMACNA "HVAC Duct Construction Standards," Figures 2-16 through 2-18.

D. Terminal Units Connections: Comply with SMACNA "HVAC Duct Construction Standards," Figure 2-19.

3.4 FIELD QUALITY CONTROL

A. Disassemble, reassemble, and seal segments of the systems as required to accommodate leakage testing, and as required for compliance with test requirements. **Verify test is required in walk through with Project Manager.**

B. Conduct tests, in the presence of the Project Manager, at static pressures equal to the maximum design pressure of the system or the section being tested. If pressure classifications are not indicated, test entire system at the maximum system design pressure. Do not pressurize systems above the maximum design operating pressure. Give 7 days' advanced notice for testing.

C. Determine leakage from entire system or section of the system by relating leakage to the surface area of the test section.

D. Maximum Allowable Leakage: As described in ASHRAE 1989 Handbook, "Fundamentals" Volume, Chapter 32, Table 6 and Figure 10. Comply with requirements for leakage classification 3 for round and flat oval ducts, leakage classification 12 for rectangular ducts in pressure classifications less than and equal to 2 inches water gage (both positive and negative pressures), and leakage classification 6 for pressure classifications greater than 2 inches water gage and less than and equal to 10 inches water gage.

E. Remake leaking joints as required and apply sealants to achieve specified maximum allowable leakage.

F. Leakage Test: Perform volumetric measurements and adjust air systems as described in ASHRAE 1987 "HVAC Systems and Applications" Volume, Chapter 57 and ASHRAE 1989 "Fundamentals" Volume, Chapter 13, and Division 15 Section "TESTING, ADJUSTING, AND BALANCING."

3.5 ADJUSTING AND CLEANING

A. Adjust volume control devices as required by the testing and balancing procedures to achieve required air flow. Refer to Division 15 Section "TESTING, ADJUSTING, AND BALANCING" for requirements and procedures for adjusting and balancing air systems.

B. Vacuum ducts systems prior to final acceptance to remove dust and debris.

END OF SECTION 15891

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15910 - DUCT ACCESSORIES – 233300 CSI 2004

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. This Section includes the following:

1. Backdraft dampers.
2. Manual volume control dampers.
3. Fire and smoke dampers.
4. Actuators.
5. Turning vanes.
6. Duct-mounted access doors and panels.
7. Flexible connectors.
8. Flexible ducts.
9. Accessories hardware.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 15 Section "Air Outlets and Inlets" for diffusers, registers, and grilles.
2. Division 15 Section "Air Terminals" for constant and variable air volume units.
4. Division 15 Section "Electric Control Systems" for electric dampers actuators.
5. Division 16 Section "Fire Alarm Systems" for duct-mounted fire and smoke detectors.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data including details for materials, dimensions of individual components, profiles, and finishes for the following items:

1. Backdraft dampers.
2. Manual volume control dampers.
3. Fire and smoke dampers.
4. Duct-mounted access panels and doors.
5. Flexible ducts.

C. Shop drawings from manufacturer detailing assemblies. Include dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Detail the following:

1. Special fittings and volume control damper installation (both manual and automatic) details.
2. Fire and smoke damper installations, including sleeves and duct-mounted access door and panel installations.

D. Product Certification: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static pressure loss, and dimensions and weights.

1.4 QUALITY ASSURANCE

A. NFPA Compliance: Comply with the following NFPA Standards:

1. NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems."

1.5 EXTRA MATERIALS

A. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 BACKDRAFT DAMPERS

A. Description: Suitable for horizontal or vertical installation.

B. Frame: 18-gage galvanized steel, with welded corners and mounting flange.

C. Blades: 0.050-inch-thick 6063T extruded aluminum.

D. Blade Seals: Neoprene.

E. Blade Axles: Galvanized steel.

F. Tie Bars and Brackets: Galvanized steel.

G. Return Spring: Adjustable tension.

H. Wing-Nut Operator: Galvanized steel, with 1/4-inch galvanized-steel rod.

2.2 MANUAL VOLUME CONTROL DAMPERS

A. General: Provide factory-fabricated volume-control dampers, complete with required hardware and accessories. Stiffen damper blades to provide stability under operating conditions. Provide locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class. Provide end bearings or other seals for ducts with pressure classifications of 3 inches or higher. Extend axles full length of damper blades. Provide bearings at both ends of operating shaft.

B. Standard Volume Control Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside of air stream, and suitable for horizontal or vertical applications.

C. Low-Leakage Volume Control Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, low-leakage rating, with linkage outside of air stream, and suitable for horizontal or vertical applications.

D. Jackshaft: 1-inch-diameter, galvanized-steel pipe rotating within a pipe bearing assembly mounted on supports at each mullion and at each end of multiple damper assemblies. Provide appropriate length and number of mounting to connect linkage of each damper of a multiple damper assembly.

E. Damper Control Hardware: Zinc-plated, die-cast core with a heavy-gage dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Provide center hole to suit damper operating rod size. Provide elevated platform for insulated duct mounting.

2.3 FIRE DAMPERS

A. General: UL labeled according to UL Standard 555 "Standard for Fire Dampers."

Refer to Fire Damper Schedule at the end of this Section.

B. Fire Rating: 1-1/2 or 3 hours, as indicated. Walls are 1 and 2 hour rated in the facility .

C. Frame: Type A or Type B; fabricated with roll-formed, 21-gage, galvanized-steel; with mitered and interlocking corners.

D. Mounting Sleeve: Factory-installed or field-installed galvanized steel.

1. Minimum Thickness: 0.056-inch (16-gage) or 0.138-inch (10-gage) thick as indicated, and length to suit application.
2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of the wall or floor, and thickness of damper frame meets sleeve requirements.

E. Mounting Orientation: Vertical or horizontal as indicated.

F. Blades: Roll-formed, interlocking, 21-gage galvanized steel. In place of interlocking blades, provide full-length, 21-gage, galvanized-steel blade connectors.

G. Horizontal Dampers: Include a blade lock and stainless steel negator closure spring.

H. Fusible Link: Replaceable, 165 deg F rated as indicated.

2.4 SMOKE DAMPERS

A. General: UL-labeled according to UL Standard 555S, "Standard for Leakage Rated Dampers for Use in Smoke Control Systems." Combination fire and smoke dampers shall also be UL-labeled for 1-1/2 hour rating according to UL Standard 555 "Standard for Fire Dampers." Refer to the Smoke Damper Schedule at the end of this Section for leakage classification, temperature category, and other characteristics.

B. Fusible Link: Replaceable, 165 deg F rated as indicated.

C. Frame and Blades: 16-gage galvanized steel.

D. Mounting Sleeve: Factory-installed, 18-gage galvanized steel, length to suit wall or floor application.

2.5 ACTUATORS

A. Damper Motors: Provide motors for smooth modulating or 2-position action.

1. Permanent-Split-Capacitor or Shaded-Pole Motors: Provide with oil-immersed and sealed gear trains.
2. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 inch-pounds and breakaway torque rating of 150 inch-pounds.
3. Outdoor Motors and Motors in Outside Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F (minus 40 deg C).
4. Non-Spring Return Motors: For dampers larger than 25 square feet, size motor for running torque rating of 150 inch-pounds and breakaway torque rating of 300 inch-pounds.
5. 2-Position Motor: 115 V, single phase, 60 Hz.
6. Modulating, Spring Return Motor: 115 V, single phase, 60 Hz.

2.6 TURNING VANES

A. Fabricate turning vanes according to SMACNA HVAC Duct Construction Standards, Figures 2-2 through 2-7.

B. Manufactured Turning Vanes: Fabricate of 1-1/2-inch-wide, curved blades set at 3/4 inch on center, support with bars perpendicular to blades set at 2 inches on center, and set into side strips suitable for mounting in ducts.

C. Acoustic Turning Vanes: Fabricate of airfoil-shaped aluminum extrusions with perforated faces and fiber glass fill.

2.7 DUCT-MOUNTED ACCESS DOORS AND PANELS

A. General: Refer to the Access Door Materials Schedule at the end of this Section for frame and door thickness, number of hinges and locks, and location of locks. Provide construction and airtightness suitable for duct pressure class.

B. Frame: Galvanized sheet steel. Provide with bend-over tabs and foam gaskets.

C. Door: Double-wall, galvanized sheet metal construction with insulation fill and thickness, number of hinges and locks as indicated for duct pressure class. Provide vision panel where indicated. Provide 1-inch by 1-inch butt hinge or piano hinge and cam latches.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber seals.

E. Insulation: 1-inch thick fiber glass or polystyrene foam board.

2.8 FLEXIBLE CONNECTORS

A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL Standard 181, Class 1.

B. Standard Metal-Edged Connectors: Factory-fabricated with a strip of fabric 3-1/2 inches wide attached to 2 strips of 2-3/4-inch-wide, 24-gage, galvanized sheet steel or 0.032-gage aluminum sheets. Select metal compatible with connected duct system. Fold and crimp metal edge strips onto fabric as illustrated in SMACNA HVAC Duct Standard, 1st Edition, Figure 2-19.

C. Extra-Wide Metal-Edged Connectors: Factory-fabricated with a strip of fabric 5-3/4 inches wide attached to 2 strips of 2-3/4-inch-wide, 24-gage, galvanized sheet steel or 0.032-gage aluminum sheets. Select metal compatible with connected duct system. Fold and crimp metal edge strips onto fabric as illustrated in SMACNA HVAC Duct Standard, 1st Edition, Figure 2-19.

D. Transverse Metal-Edged Connectors: Factory-fabricated with a strip of fabric 3-1/2 inches wide attached to 2 strips of 4-3/8-inch-wide, 24-gage, galvanized sheet steel or 0.032-gage aluminum sheets. Select metal compatible with connected duct system. Fold and crimp metal edge strips onto fabric as illustrated in SMACNA HVAC Duct Standard, 1st Edition, Figure 2-19.

E. Conventional, Indoor System Flexible Connectors Fabric: Glass fabric double coated with polychloroprene.

1. Minimum Weight: 26 oz. per sq yd.
2. Tensile Strength: 480 lb per inch in the warp and 360 lb per inch in the filling.

F. Conventional, Outdoor System Flexible Connectors Fabric: Glass fabric double coated with Du Pont's HYPALON or other synthetic-rubber weatherproof coating resistant to the sun's ultraviolet rays and ozone environment.

1. Minimum Weight: 26 oz. per sq yd.
2. Tensile Strength: 530 lb per inch in the warp and 440 lb per inch in the filling.
3. High-Temperature System Flexible Connectors: Glass fabric coated with silicone rubber and having a minimum weight of 16 oz. per sq yd and tensile strength of 285 lb per inch in the warp, and 185 lb per inch in the filling.
4. High-Corrosive-Environment System Flexible Connectors: Glass fabric coated with a chemical-resistant coating.
5. Minimum Weight: 14 oz. per sq yd.
6. Tensile Strength: 450 lb per inch in the warp and 340 lb per inch in the filling.

2.9 FLEXIBLE DUCTS

A. General: Comply with UL 181, Class 1.

B. Flexible Ducts - Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch-thick, glass fiber insulation around a continuous inner liner.

1. Reinforcement: Steel-wire helix encapsulated in the inner liner.
2. Outer Jacket: Glass-reinforced, silver mylar with a continuous hanging tab, integral fiber glass tape, and nylon hanging cord.
3. Outer Jacket: Polyethylene film.
4. Inner Liner: Polyethylene film.

2.10 ACCESSORIES HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket and a flat mounting gasket. Size to allow insertion of pitot tube and other testing instruments and provide in length to suit duct insulation thickness.

B. Splitter Damper Accessories: Zinc-plated damper blade bracket, 1/4-inch, zinc-plated operating rod, and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.

C. Flexible Duct Clamps: Stainless steel band with cadmium-plated hex screw to tighten band with a worm-gear action. Provide in sizes from 3 to 18 inches to suit duct size.

D. Adhesives: High strength, quick setting, neoprene based, waterproof and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of duct accessories. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install duct accessories according to manufacturer's installation instructions and applicable portions of details of construction as shown in SMACNA standards.

B. Install volume control dampers in lined duct with methods to avoid damage to liner and to avoid erosion of duct liner.

C. Provide test holes at fan inlet and outlet and elsewhere as indicated.

D. Install fire and smoke dampers according to the manufacturer's UL-approved printed instructions.

E. Install fusible links in fire dampers.

F. Label access doors according to Division 15 Section "Mechanical Identification."

3.3 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Adjust fire and smoke dampers for proper action.

C. Final positioning of manual dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

ACCESS DOOR MATERIALS SCHEDULE

DUCT PRESSURE CLASS	DOOR SIZE INCHES BACK	NUMBER OF HINGES	NUMBER OF LOCKS	FRAME	METAL GAGE DOOR	
2 INCHES & LESS	12X12	2	1-S	24	26	26
	16x20	2	2-S	22	24	26
	24X24	3	2-S	22	22	26
3INCHES	12X12	2	1-S	22	22	26
	16X20	2	1-S,1-T,1-B	20	20	26
	24X24	3	2-S,1-T,1-B	20	20	24
4 TO 10 INCHES	12X12	2	1-S,1-T,1-B	20	20	26
	16X20	3	2-S,1-T,1-B	20	18	24
	24X24	3	2-S,2-T,2-B	18	18	24

S: SIDE
T: TOP
B: BOTTOM

END OF SECTION 15910

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15932 - AIR OUTLETS AND INLETS – 233700 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section. Provide new screens in all existing reused louvers.

B. Types of outlets and inlets required for project include the following:

1. Ceiling air diffusers.
2. Wall registers and grilles.
3. Louvers.

C. Refer to other Division-15 sections for ductwork and duct accessories required in conjunction with air outlets and inlets; not work of this section.

D. Refer to other Division-15 sections for balancing of air outlets and inlets; not work of this section.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air outlets and inlets of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. ARI Compliance: Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets".
2. ASHRAE Compliance: Test and rate air outlets and inlets in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".
3. ADC Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 "Certification, Rating and Test Manual".
4. ADC Seal: Provide air outlets and inlets bearing ADC Certified Rating Seal.

5. AMCA Compliance: Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".
6. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.
7. NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following:

1. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
2. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.
3. Performance data for each type of air outlet and inlet furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.

B. Samples: 3 samples of each type of finish furnished.

C. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air outlet and inlet, indicating materials and methods of assembly of components.

D. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver air outlets and inlets wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.1 CEILING AIR DIFFUSERS

A. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

C. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.

D. Types: Provide ceiling diffusers of type, capacity, and with accessories and finishes as listed on diffuser schedule. The following requirements shall apply to nomenclature indicated on schedule.

E. Manufacturer: Subject to compliance with requirements, provide diffusers of one of the following:

1. Price Mfg. Co.
2. Titus Products Co..
3. Metal aire Co.
4. or equal

.

2.2 WALL REGISTERS AND GRILLES

A. General: Except as otherwise indicated, provide manufacturer's standard wall registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide wall registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.

C. Wall Compatibility: Provide registers and grilles with border styles that are compatible with adjacent wall systems, and that are specifically manufactured to fit into wall construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of wall construction which will contain each type of wall register and grille.

D. Types: Provide wall registers and grilles of type, capacity, and with accessories and finishes as listed on register and grille schedule. The following requirements shall apply to nomenclature indicated on schedule:

E. Manufacturer: Subject to compliance with requirements, provide registers and grilles of one of the following:

1. Price Manufacturing Co. .
2. Metal aire Co. .
3. Titus Mfg
4. or equal .

2.3 LOUVERS

A. General: Except as otherwise indicated, provide manufacturer's standard louvers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide louvers that have minimum free area, and maximum pressure drop of each type as listed in manufacturer's current data, complying with louver schedule.

C. Substrate Compatibility: Provide louvers with frame and sill styles that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to general construction drawings and specifications for types of substrate which will contain each type of louver.

D. Materials: Construct of aluminum extrusions, ASTM B 221, Alloy 6063-T52. Weld units or use stainless steel fasteners.

E. Louver Screens: On inside face of exterior louvers, provide 1/2" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.

F. Manufacturer: Subject to compliance with requirements, provide louvers of one of the following:

1. Louvers & Dampers, Inc.
2. Greenheck Co.
3. Ruskin Mfg. Co.
4. or equal

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function.

B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

C. Locate ceiling air diffusers, registers, and grilles, as indicated on general construction plans. Unless otherwise indicated, locate units in center of acoustical ceiling module.

3.3 SPARE PARTS

A. Furnish to Owner, with receipt, 3 operating keys for each type of air outlet and inlet that require them.

END OF SECTION 15932

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15933 - AIR TERMINALS – 233600 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of air terminals work required by this section is indicated on drawings and schedules, and by requirements of this section.

B. Types of air terminals specified in this section include the following:

1. Central Air Terminals

a. Shutoff Single Duct
b. Reheat

C. Refer to other Division-15 sections for external insulation of air terminals; not work of this section.

D. Refer to other Division-15 sections for testing, adjusting and balancing of air terminals; not work of this section.

E. Refer to other Division-15 sections for temperature controls which are to be furnished by others but installed as work of this section. ALL CONTROLS SHALL BE INSTALLED AND PROGRAMMED BY AUTOMATED LOGIC .

F. Refer to Division-16 sections for the following work; not work of this section.

1. Power supply wiring from power source to power connection on air terminals. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

G. Provide the following electrical work as work of this section, complying with requirements of Division-16 sections:

1. Control wiring between field-installed controls and air terminals.

   c. Control wiring specified as work of Division-15 for Automatic Temperature Controls is work of that section.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of air terminals with characteristics, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. ADC Compliance: Provide air terminals which have been tested and rated in accordance with ADC standards, and bear ADC Seal.
2. ARI Compliance: Provide air terminals which have been tested and rated in accordance with ARI 880 "Industry Standard for Air Terminals" and bear ARI certification seal.
3. NFPA Compliance: Construct air terminals using acoustical and thermal insulations complying with NFPA 90A "Air Conditioning and Ventilating Systems".

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including performance data for each size and type of air terminal furnished; schedule showing drawing designation, room location, number furnished, model number, size, and accessories furnished; and installation and start-up instructions.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.

C. Wiring Diagrams: Submit ladder-type wiring diagrams for electric power and control components, clearly indicating required field electrical connections.

D. Maintenance Data: Submit maintenance data and parts list for each type of air terminal; including "trouble-shooting" maintenance guide. Include this data, product data, shop drawings, and maintenance data in maintenance manual; in accordance with requirements of Division 1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver air terminals wrapped in factory-fabricated fiberboard type containers. Identify on outside of container type of air terminal and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in boxes.

B. Store air terminals in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide air terminals of one of the following:

1. Titus Products Div.; Philips Industries, Inc.
2. Carrier Corp.; Sub. of United Technologies Corp.
3. Trane (The) Co.
4. Envirotec Mfg. Div of Johnson Controls
5. or equal

2.2 AIR TERMINALS

A. General: Provide factory-fabricated and tested air terminals as indicated, selected with performance characteristics which match or exceed those indicated on schedule.

B. Casings: Construct of die-cast aluminum or sheet metal of the following minimum thicknesses:

	Steel	Aluminum
Upstream Pressure Side:	24-ga	0.032"
Downstream Pressure Side:	26-ga	0.025"

1. Provide hanger brackets for attachment of supports.
2. Linings: Line inside surfaces of casings with lining material to provide acoustic performance, thermal insulation, and to prevent condensation on outside surfaces of casing. Provide minimum thickness of 1/2". Secure lining to prevent delamination, sagging, or settling.

   a. Cover liner surfaces and edges with coating or perforated metal.

3. Access: Provide removable panels in casings to permit access to air dampers and other parts requiring service, adjusting, or maintenance.

   a. Provide airtight gasket and quarter-turn latches.

4. Leakage: Construct casings such that when subjected to 0.5-in w.g. pressure for low pressure units, and 3.0-in w.g. pressure for high pressure units, total leakage does not exceed 4% of specified air flow capacity with outlets sealed and inlets wide open. Construct air dampers such that when subjected to 6.0-in w.g. inlet pressure with damper closed, total leakage does not exceed 10% of specified air flow capacity.
5. Multiple Duct Connectors: For air terminals serving more than one air outlet, provide lined outlet plenum with duct collar, butterfly-type damper, and locking device in each outlet.

C. Air Dampers: Construct of materials that cannot corrode, do not require lubrication, nor require periodic servicing. Provide maximum volume dampers, both pressure dependent and pressure compensated, that are calibrated in cfm, factory-adjusted, and marked for specified air capacities. Provide mechanism to vary air volume thru damper for minimum to maximum, in response from signal from thermostat.

D. Controls: Provide controls accurate to 1.5 degrees F (0.8 degrees C) and adjustable from 65 degrees F (22 degrees C) to 85 degrees F (29 degrees C).

1. Provide duct pressure powered controls, designed to operate with duct pressures 1.0 to 5.0-in w.g.
2. Provide electric powered controls, compatible with electric temperature control system specified in other Division-15 sections.

E. Identification: Provide label on each unit indicating Plan Number, cfm range, cfm factory-setting, and calibration curve (if required).

F. Central Air Terminals: Provide the following features and accessories indicated on Drawings and schedule:

1. Electric Heating Coils: Provide heating coils constructed of electric resistance elements in galvanized steel casing with control box and factory-wiring. Provide over-temperature protection and UL-listing as duct heater.
2. Hardware: Provide hardware as detailed and required to complete ceiling system including unit mounting brackets, trim pieces, alignment channels, return air diffusers, dummy diffusers, etc.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which air terminals are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF AIR TERMINALS

A. General: Install air terminals as indicated, and in accordance with manufacturer's installation instructions.

B. Location: Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

C. Duct Connections: Connect ductwork to air terminals in accordance with Division-15 ductwork sections.

3.3 FIELD QUALITY CONTROL

A. Upon completion of installation and prior to initial operation, test and demonstrate that air terminals, and duct connections to air terminals, are leak-tight.

B. Repair or replace air terminals and duct connections as required to eliminate leaks, and retest to demonstrate compliance.

3.4 CLEANING

A. Clean exposed factory-finished surfaces. Repair any marred or scratched surfaces with manufacturers touch-up paint.

END OF SECTION 15933

SECTION 15971 - ELECTRIC CONTROL SYSTEMS – 230933 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of electric control systems work required by this section is indicated on drawings and schedules, and by requirements of this section.

1. Control sequences are specified in the plans.

B. Refer to other Division-15 sections for installation of dampers in mechanical systems; not work of this section.

C. Refer to electrical plans for the following work; not work of this section.

1. Power supply wiring for power source to power connection on controls and/or unit control panels. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
2. Interlock wiring between electrically-operated equipment units; and between equipment and field-installed control devices.

a. Interlock wiring specified as factory-installed is work of this section.

D. Provide the following electrical work as work of this section, complying with requirements of Division-16 sections:

1. Control wiring between field-installed controls, indicating devices, and unit control panels.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of electric control equipment, of types and sizes required, whose products have been in

satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms specializing and experienced in electric control system installations for not less than 5 years.

C. Codes and Standards:

1. Electrical Standards: Provide electrical products which have been tested, listed and labeled by UL and comply with NEMA standards.
2. NEMA Compliance: Comply with NEMA standards pertaining to components and devices for electric control systems.
3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for each control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials, and including installation instructions and start-up instructions.

B. Shop Drawings: Submit shop drawings for each electric control system, containing the following information:

1. Schematic flow diagram of system showing fans, pumps, coils, dampers, valves, and control devices.
2. Label each control device with setting or adjustable range of control.
3. Indicate all required electrical wiring. Clearly differentiate between portions of wiring that are factory- installed and portions to be field-installed.
4. Provide details of faces of control panels, including controls, instruments, and labeling.
5. Include verbal description of sequence of operation.

C. Samples: Submit sample of each type of furnished thermostat cover, in accordance with requirements of Division 1.

D. Maintenance Data: Submit maintenance instructions and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Provide factory shipping cartons for each piece of equipment, and control device.

Maintain cartons through shipping, storage and handling as required to prevent equipment damage, and to eliminate dirt and moisture from equipment. Store equipment and materials inside and protected from weather.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide electric control systems of one of the following:

1. Automated Logic ; the County has a contractual agreement with Automated Logic to provide services and equipment. The placement of this equipment other than this manufacturer would cause additional cost of operation and maintenance.

2.2 MATERIALS AND EQUIPMENT

A. General: Provide electric control products in sizes and capacities indicated, consisting of valves, controls, sensors, main DDC control panels, local DDC control panels, sensors, controllers, software, modems, and other components as required for a complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer. Provide electric control systems with following functional and construction features as indicated.

B. Control Valves: Provide factory-fabricated electrical control valves of type, body material and pressure class indicated. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature rating of piping system. Except as otherwise indicated, provide valves which mate and match material of connecting piping. Equip control valves with control valve motors, and with proper shutoff ratings for each individual application.

(1) Water Service Valves: Equal percentage characteristics with rangeability of 50 to 1, and maximum full flow pressure drop of 5 psig..
(2) Single-Seated Valves: Cage type trim, providing seating and guiding surfaces for plug on "top and bottom" guided plugs.
(3) Double-Seated Valves: Balanced plug-type, with cage type trim providing seating and guiding surfaces for plugs on "top and bottom" guided plugs.
(4) Valve Trim and Stems: Polished stainless steel.
(5) Packing: Spring-loaded Teflon, self-adjusting.

ii. Remote-Bulb Thermostats: Provide remote-bulb thermostats of on- off or modulating type, as required by sequence of operation. Provide liquid-filled units

designed to compensate for changes in ambient temperature at instrument case. Provide capillary and bulb of copper unless otherwise indicated. Equip bulbs in water lines with separate wells of same material as bulb. Support bulbs installed in air ducts securely, to prevent damage and noise from vibrations. Provide averaging bulbs where shown or specified in operational sequence, consisting of copper tubing not less than 8'-0" in length with either single or multiple-unit elements. Extend tubing to cover full width of duct or unit, and support adequately.

(1) Provide scale settings and differential settings where applicable, which are clearly visible and adjustable from front of instrument.
(2) Equip on-off remote-bulb thermostats with precision snap switches, and with electrical rating as required by application.
(3) Provide modulating remote-bulb thermostats of potentiometer type constructed so that complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.

iii. Electronic Sensors: Provide electronic temperature and relative humidity sensors of supersensitive resistance type, which are vibration and corrosion-resistant, and of wall mounted immersion, duct mounting, averaging or bulb type as required for application.

iv. Electronic Controllers: Provide electronic controllers of "Wheatstone Bridge" amplifier type, designed as individual components and fully protected by steel enclosures. Provide individual controllers of multiple-input type with provisions for remote resistance type readjustment. Identify adjustments clearly on controllers, including proportional band, authority, etc.

(1) Where single electronic controller is required for specific application, it can be built-in as integral part of control motor, but only where provided with easily accessible control readjustment potentiometer.
(2) Provide 2-position of proportional electric controller power output as required by specified sequence of operations.

v. Valve Motors: Size each motor to operate dampers or valves with sufficient reserve power to provide smooth modulating action or 2-position action as specified.

1. Provide permanent split-capacitor or shaded pole type motors with gear trains completely oil-immersed and sealed. Equip spring-return motors, where indicated on drawings or in operational sequence, with integral spiral-spring mechanism. Furnish entire spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.

2. Equip motors for outdoor locations and for outside air intakes with "O ring" gaskets designed to make motors completely weatherproof, and equip with internal heaters to permit normal operation at -40 degrees F (-40 degrees C).
3. Furnish non-spring return motors for dampers larger than 25 sq. ft., and for valves larger than 2-1/2", sized for running torque rating of 150 inch-pounds, and breakaway torque rating of 300 inch-pounds. Size spring-return motors for running torque rating of 150 inch-pounds, and breakaway torque rating of 150 inch-pounds.

vi. Water Flow Switches: Provide water flow switches of stainless steel or bronze paddle types. Where flow switches are used in chilled water applications, provide vapor-proof type to prevent condensation of electrical switch. Provide pressure-flow switches of bellows actuated mercury type or snap-acting type, with appropriate scale range and differential adjustment for service indicated.

vii. Local Control Panels: Provide control panels with suitable brackets for either wall or floor mounting, for each supply fan and miscellaneous control system. Locate panel adjacent to systems served.

(1) Fabricate panels of 14-ga furniture-quality steel, or 6063-T5 extruded aluminum alloy, totally enclosed, with hinged doors and keyed lock, with manufacturer's standard shop-painted finish and color. Provide UL-listed cabinets for use with line voltage devices.
(2) Panel Mounted Equipment: Include temperature and humidity controllers, relays and automatic switches, except exclude low-temperature protection thermostats, firestats, and other devices excluded in sequence of operation. Fasten devices with adjustments accessible through front of panels.
(3) Door-Mounted Equipment: Flush-mount (on hinged door) manual switches, including damper "minimum-off" positioning switches, "summer-winter" switches, and "manual-automatic" switches; and including dial thermometers.
(4) Graphics: Where specified, provide color-coded graphic laminated plastic displays on doors, to schematically show system being controlled. Provide protective sheet of clear plastic bonded to entire door to prevent damage to symbols.
(5) Provide standard steel cabinets as required to contain temperature controllers, relays, switches, and similar devices, except limit controllers and other devices excluded in sequence of operations. Provide full-enclosure cabinets, with painted gray finish.

viii. Central (Master) Control Panels: Provide central control panels of fully-enclosed steel cubical type, with locking doors and/or locking removable backs. Match finish of panels and provide multi- color graphic displays, schematically showing system being controlled.

J. Standalone Controllers: Provide stand-alone distributed processing DDC units capable of being fully user-programmable and executing the sequence of operations and other software functions as specified hereinandindicated on the plans. The use of a separate computer or special software shall not be required to generate user-defined programs. The DDC shall be capable of executing standard mathematical and Boolean functions and provide for PID control algorithms.

Provide software graphical Displays, Reports, Alarms and other Operator Interface Features for these systems for the Front-End Color Graphics User Interface.

The DDC shall provide as minimum all digital inputs, analog inputs, digital outputs, and analog outputs as required to execute the sequence of operations. The system shall be capable of expansion to 1,024 digital inputs, 1,024 analog inputs,1,024 digital outputs and 1,024 analog outputs without changing (upgrading) software or front-end hardware.Expansion shall not require removal of any existing hardware.

Main or master control panels (MCU) shall be the central controllers, with local control units(LCU) shall have the smaller standalone processors. The main control units shall have 7-day battery back -up, while the LCU shall have 24 hour battery back-up.

MCU s and LCU s shall be able ot communicate with standard peripherial equipment devices suchas crt s, computers, modems and printers using a stnadard RS232 communications.

MCU s and LCU s shall receive analog inputs 0-10vdc, digital inputs contact closures, and voltage level transitions and pulse accumulator inputs, and totlaized inputs. Digital outputs shall include contacxt closureand maintained operation of field devices. Analog outputs shall measure 0-20vdc, 0-20 ma control input.

All software shall be provided for the MCU and LCU.

K. User interface: Windows user text interface software; for time of day scheduling, alarm screen, trend screen, access, operator point groups, individual area/ space trends, provisions of holidays, and unoccupied periods, along with time reset and hold.

L. Software Programs: The types of programs used in this system are: 1.Time of day scheduling

All software to be output indicated areas in engineering units.

All printouts shall be time dated. Provied PID control algorithms for all modulating devices. No floating or hunting of systems unless reset programs are

reviewing and adjusting so as to not overheat or overcool areas.

M. Surge protection:
Provide power, data line, and modem surge protection for each MCU panels, and power and data line for all LCUs.

N. Power supplies: Provide and supply power supply trnasoformers for all LCUs and MCUs and smaller controllers used on valves from the power supplied by DIV 16.

O. Step Controllers: Provide step controllers for control sequencing or for control of electric heat power loads, of 6- or 10-stage type, with heavy-duty switching rated to handle loads, UL-listed and operated by electric motors of quality specified for valve and damper actuation.

P. Electronic Sensors: Provide electronic temperature and relative humidity sensors of supersensitive resistance type, which are vibration and corrosion-resistant, and of wall mounted immersion, duct mounting, averaging or bulb type as required for application.

Q. Electronic Controllers: Provide electronic controllers of "Wheatstone Bridge" amplifier type, designed as individual components and fully protected by steel enclosures. Provide individual controllers of multiple-input type with provisions for remote resistance type readjustment. Identify adjustments clearly on controllers, including proportional band, authority, etc.

1. Where single electronic controller is required for specific application, it can be built-in as integral part of control motor, but only where provided with easily accessible control readjustment potentiometer.
2. Provide 2-position of proportional electric controller power output as required by specified sequence of operations.

R. Water Flow Switches: Provide water flow switches of stainless steel or bronze paddle types. Where flow switches are used in chilled water applications, provide vapor-proof type to prevent condensation of electrical switch. Provide pressure-flow switches of bellows actuated mercury type or snap-acting type, with appropriate scale range and differential adjustment for service indicated.

S. Central (Master) Control Panels: Provide central control panels of fully-enclosed steel cubical type, with locking doors and/or locking removable backs. Match finish of panels and provide multi- color graphic displays, schematically showing system being controlled.

T. Control Relays: Relays shall be 24 vdc coils, and be provied with varistors across the coil, be DIN rail mounted, and be spade type.
Relays shall not be used for control of motors greater than 1/6 hp.
Starters with 120 v control pwer shall be controlled externally.

U. Conductors/conduit: Provide not less than a # 18 awg stranded copper plenum rated and high temp. wire for control and signal. Provide EMT conduit with compression type fittings below th ceiling and in exposed and in equipment compartments. Provide insulated ground bushings at conduit connections to all boxes and panels.Maximum liquid tite lengths are 6 -0 . All control wiring shall be home runs without any splices. Provide spare conductors for each conduit running to the main panel areas.

V. Temperature sensors: Use thermistors or rtds which are compatible with software. Thumb wheel range 50 degrees f to 85 degrees f.

W. Humidity sensors: Unit shall have 0 to 95% RH span with +/- 3 %.
Output shall be 0-20ma. Input 24 vdc. Unit shall have a lockable guard.

X. End switches: Provide and install end switches on valves, dampers, and areas which need minimum positioning and calibration of set points. Provide the units integral with the actuators.

Y. All valves, meters, drive output systems, miscellaneous

switches, and flow sensors have been specified in other Div 15 and DIV 16 sections. Belimo actuators and Bray valves are allowed on the project.

3.0 PART - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which electric control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRIC CONTROL SYSTEMS

A.General: Install systems and materials in accordance with manufacturer's instructions and roughing-in drawings, and details on drawings. Install electrical components and use electrical products complying with requirements of applicable Division-16 sections of these specifications. Mount controllers at convenient locations and heights.

B.Control Wiring: The term "control wiring" is defined to include providing of wire, conduit and miscellaneous materials as required for mounting and connecting electric control devices.

C.Wiring System: Install complete control wiring system for electric control systems. Conceal wiring except in mechanical rooms and areas where other conduit and piping are exposed. Provide multi- conductor instrument harness (bundle) in place of single conductors where number of conductors can be run along common path. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.

D.Number-code or color-code conductors, excluding those used for local individual room controls, appropriately for future identification and servicing of control system.

E.Reset Limit Controls: Install manual-reset limit controls to be independent of power controllers; automatic duct heater resets may, at Contractor's option, be installed in interlock circuit of power controllers.

F.Unit-Mounted Equipment: Where control devices are indicated to be unit-mounted, ship electric relays, electric switches, valves, dampers, and damper motors to unit manufacturer for mounting and wiring at factory.

3.3 ADJUSTING AND CLEANING

A.Start-Up: Start-up, test, and adjust electric control systems in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

B.Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

C.Final Adjustment: After completion of installation, adjust thermostats, control valves, motors and similar equipment provided as work of this section.

(1) Final adjustment shall be performed by specially trained personnel in direct employ of manufacturer of primary temperature control system.

3.4 CLOSEOUT PROCEDURES

A. Owner's Instructions: Provide services of manufacturer's technical representative for one 8-hour day to instruct Owner's personnel in operation and maintenance of electric control systems.

(1) Schedule instruction with Owner, provide at least 7-day notice to Contractor and Project Manager of training date.

END OF SECTION 15971

Manatee County
4th and 5th Floor Hensley Wing WA# 32

SECTION 15990 - TESTING, ADJUSTING, AND BALANCING 230593 CSI 2004

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Related Sections:

1. General requirements for testing agencies are specified in the Division-1 Section Quality Control Services.
2. Other Division-15 Sections specify balancing devices and their installation, and materials and installations of mechanical systems.
3. Individual Division-15 system sections specify leak testing requirements and procedures.

1.2 SUMMARY

A. This Section specifies the requirements and procedures total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

B. Test, adjust, and balance the following mechanical systems:

1. Supply air systems, all pressure ranges; including variable volume systems:
2. Return air systems;
3. Exhaust air systems;
4. Hydronic systems;
5. Verify temperature control system operation.

C. Test systems for proper sound and vibration levels.

D. This Section does not include:

1. testing boilers and pressure vessels for compliance with safety codes;
2. specifications for materials for patching mechanical systems;
3. specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.
4. requirements and procedures for piping and ductwork systems leakage tests.

1.3 DEFINITIONS

A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:

1. the balance of air and water distribution;
2. adjustment of total system to provide design quantities;
3. electrical measurement;
4. verification of performance of all equipment and automatic controls;
5. sound and vibration measurement.

B. Test: To determine quantitative performance of equipment.

C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

F. Report forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.

G. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

H. Main: Duct or pipe containing the system's major or entire fluid flow.

I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.

J. Branch main: Duct or pipe serving two or more terminals.

K. Branch: Duct or pipe serving a single terminal.

1.4 SUBMITTALS

A. Agency Data:

1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.

B. Engineer and Technicians Data:

1. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.

C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

D. Maintenance Data: Submit maintenance and operating data that include how to test, adjust, and balance the building systems. Include this information in maintenance data specified in Division 1 and Section 15010.

E. Sample Forms: Submit sample forms, if other than those standard forms prepared by the NEBB are proposed.

F. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

1. Draft reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.
3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:

a. General Information and Summary
b. Air Systems
c. Hydronic Systems

d. Temperature Control Systems
e. Special Systems
f. Sound and Vibration Systems

4. Report Contents: Provide the following minimum information, forms and data:

a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC and NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.

G. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

1.5 QUALITY ASSURANCE

A. Test and Balance Engineer's Qualifications: A Professional Engineer (either on the installer's staff or and independent consultant), registered in the State in which the services are to be performed, and having at least 3-years of successful testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

B. Agency Qualifications:

1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
2. The independent testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project, and having at least one Professional Engineer registered in the State in which the services are to be performed, certified by NEBB as a Test and Balance Engineer.

C. Codes and Standards:

1. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
2. AABC: "National Standards For Total System Balance".
3. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.

D. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Architect/Engineer and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.

1.6 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

1.7 SEQUENCING AND SCHEDULING

A. Test, adjust, and balance the air systems before hydronic, steam, and refrigerant systems.

B. Test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 5 deg. F wet bulb temperature of maximum summer design condition, and within 10 deg. F dry bulb temperature of minimum winter design condition. Take final temperature readings during seasonal operation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

A. Before operating the system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.
3. Compare design to installed equipment and field installations.

4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
5. Check filters for cleanliness.
6. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
8. Determine best locations in main and branch ductwork for most accurate duct traverses.
9. Place outlet dampers in the full open position.
10. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
11. Lubricate all motors and bearings.
12. Check fan belt tension.
13. Check fan rotation.

3.2 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

A. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean all strainers.
3. Examine hydronic systems and determine if water has been treated and cleaned.
4. Check pump rotation, adjust plant pumps with TCC contractor. .
5. Clean and set automatic fill valves for required system pressure.
6. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
7. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
8. Set temperature controls so all coils are calling for full flow.
9. Check operation of automatic bypass valves.
10. Check and set operating temperatures of chillers to design requirements.
11. Lubricate all motors and bearings.

3.3 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use only those instruments which have the maximum field measuring accuracy

and are best suited to the function being measured.

D. Apply instrument as recommended by the manufacturer.

E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

G. Take all reading with the eye at the level of the indicated value to prevent parallax.

H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

I. Take measurements in the system where best suited to the task.

3.4 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.

B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Patch insulation, ductwork, and housings, using materials identical to those removed.

D. Seal ducts and piping, and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.5 TESTING FOR SOUND AND VIBRATION

A. Test and adjust mechanical systems for sound and vibration in accordance with the detailed instructions of the referenced standards.

3.6 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

3.7 DEMONSTRATION

A. Training:

1. Train the Owner's maintenance personnel on troubleshooting procedures and testing, adjusting, and balancing procedures. Review with the Owner's personnel, the information contained in the Operating and Maintenance Data specified in Division 1 and Section 15010.
2. Schedule training with Owner through the Project Manager with at least 7 days prior notice.

END OF SECTION 15990

Division 16000 - SECTION 26 00 00 - ELECTRICAL SYSTEMS DESCRIPTIONS

A. PROJECT INCLUDES

1. Electrical Systems for the Following Applications:

   a. Power and distribution.
   b. Empty conduit system.
   c. Power connections for air handling equipment.
   d. Modifications to existing systems.
   e. Variable Frequency Drives.
   f. Facility Lighting.

2. Preliminary Connected Loads:

   a. See electrical drawings for loads being disconnected.
   b. See electrical drawings for loads being added.

3. Additional Requirements:

   a. On site factory training for all switchboards, motor control centers and variable frequency drives.

4. Additional information is included in the construction documents and shall be included in this project. It is the responsibility of the contractor to obtain the latest and most updated set of documents.

B. PRODUCTS

1. Systems, products, and standards are listed in individual specification sections, which follow.

END OF SECTION

Division 16110 SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL: ELECTRICAL RACEWAYS, CABLE TRAYS, AND BOXES

A. PROJECT INCLUDES

1. Electrical conduit, tubing, surface raceways, wireways, cable trays, boxes, and cabinets for electrical power and signal distribution.

B. PRODUCTS

1. Wiring Methods:

   a. Exposed Indoor Wiring: Electrical metallic tubing, rigid nonmetallic conduit, and/or galvanized steel conduit.
   b. Concealed Indoor Wiring: Electrical metallic tubing, electrical nonmetallic tubing, or rigid nonmetallic conduit.
   c. Exposed Outdoor Wiring: GRC steel conduit.
   d. Concealed Outdoor Wiring: GRC steel conduit.
   e. Underground Wiring, Single Run: Rigid nonmetallic conduit.
   f. Underground Wiring, Grouped: Rigid nonmetallic conduit.
   g. Connection to Vibrating Equipment: Flexible liquidtight conduit.

2. Metal Conduit and Tubing:

   a. Rigid Steel Conduit: ANSI C80.1.
   b. PVC Externally Coated Rigid Steel Conduit and Fittings: ANSI C80.1 and NEMA RN 1.
   c. Electrical Metallic Tubing (EMT) and Fittings: ANSI C80.3.
   d. PVC Externally Coated Electrical Metallic Tubing and Fittings: ANSI C80.3 and NEMA RN 1.
   e. Liquidtight Flexible Metal Conduit and Fittings: UL 360.

3. Nonmetallic Conduit and Ducts:

   a. Electrical Nonmetallic Tubing (ENT): NEMA TC 13.
   b. Rigid Nonmetallic Conduit (RNC): NEMA TC 2 and UL 651, Schedule 40 or 80 PVC.
   c. Underground PVC and ABS Plastic Utilities Duct: NEMA TC 6, Type I for encased burial in concrete, Type II for direct burial.
   d. PVC and ABS Plastic Utilities Duct Fittings: NEMA TC9.
   e. Liquidtight Flexible Nonmetallic Conduit and Fittings: UL 1660.

4. Raceway Accessory Materials:

   a. Conduit Bodies: NEC requirements.
   b. Wireways: NEC requirements.
   c. Surface Raceways, Metallic: Galvanized steel, with snap-on covers.
   d. Surface Raceways, Nonmetallic: Rigid PVC, UL 94.

5. Boxes and Fittings:
   a. Cabinet Boxes: UL 50, sheet steel, NEMA 1 or NEMA 3 dependent on location.
   b. Pull and Junction Boxes: UL 50, steel boxes, NEMA 1 or NEMA 3 dependent upon location.
   c. Metal Outlet, Device and Small Wiring Boxes: UL 514A and OS 1.
   d. Nonmetallic Outlet, Device and Small Wiring Boxes: NEMA OS 2.

6. Identification of Electrical Systems: Systems shall have a clearly marked schedule, typed, and given to the Owner's Representative. All disconnects shall be clearly marked with an engraved type plastic placard as described in the electrical documents. The electrical input and output shall be clearly marked.
7. Specifications: The electrical drawings have specifications. Review all specifications on the electrical drawings.

END OF SECTION

Division 16120 SECTION 26 05 19 – ELECTRICAL WIRES AND CABLES

A. PROJECT INCLUDES

1. Wires, cables, and connectors for power, lighting, signal, control and related systems rated 600 volts and less.

B. QUALITY ASSURANCE

2. Compliance: National Electrical Code; UL 4, 83, 486A, 486B, 854; NEMA/ICEA WC-5, WC-7, WC-8; IEEE 82.

C. PRODUCTS

1. Wire Components:

   a. Conductors for Power and Lighting Circuits: Solid or Stranded conductors for No. 10 AWG and smaller; stranded conductors for No. 8 AWG and larger.

   b. Conductor Material: Copper.

   c. Insulation: THHN/THWN for conductors size 500MCM and larger and No. 8 AWG and smaller, THW, THHN/THWN or XHHW insulation for other sizes based on location.

   d. Jackets: Factory-applied nylon or PVC.

2. Cables:

   a. Portable Cord for Flexible Pendant Leads to Outlets and Equipment: UL Type SO.

   b. Control/Signal Transmission Media: Single conductor, coaxial type, or others as required by the equipment manufacture.

   c. Fiber Optic Cables: Single channel low-loss glass type, fiber optic multimode graded-index cables, including connectors, couples, transmitters, receivers, sources and detectors.

3. Connectors: UL listed connectors for the appropriate cable type with appropriate temperature ratings.

END OF SECTION 26 05 19

Division 16140 SECTION 26 27 26 – ELECTRICAL WIRING DEVICES

A. PROJECT INCLUDES

1. Wiring devices for electrical service.

B. QUALITY ASSURANCE

1. Compliance: National Electrical Code, NEMA WD 1, and UL.

C. PRODUCTS

1. Wiring Devices and Components:

   a. Receptacles: UL 498 and NEMA WD 1, exterior are NEMA 3 with covers.

   b. Industrial Receptacles: UL 498 pin and sleeve type; UL 1010 at hazardous locations.

   c. Ground-Fault Interrupter (GFI) Receptacles: Feed-thru type ground-fault circuit interrupter with integral duplex receptacles.

   d. Plugs: 15 amperes, 125 volts, 3 wire, grounding, armored cap plugs.

   e. Plug Connectors: 15 amperes, 125 volts, bakelite-body armored connectors, 3 wire, grounding with cord clamp.

   f. Snap Switches: UL 20 and NEMA WD 1, AC switches.

   g. Combination Switch and Receptacles: 3-way switch, 20 amperes, AC with toggle switch handle, 3 wire grounding receptacle, 15 amperes, 120 volts.

   h. Wall Plates: Single and combination types, match existing types.

END OF SECTION

Division 16400 SECTION 26 20 00 – ELECTRICAL SERVICE AND DISTRIBUTION

A. PROJECT INCLUDES

1. Electrical service and distribution including service entrance, switchboards, low-voltage power switchgear, grounding, transformers, busways, panelboards, overcurrent protective devices, and motor controllers.

B. PRODUCTS

1. Service Entrance: Service and Distribution Requirements: Refer to project “E” series drawings.

   a. Circuit Breakers: Solid-state trip circuit breakers.

   b. Meter Sockets: Acceptable to local utility company.

   c. Switches: Heavy-duty safety switches with NEMA Type 4X enclosure.

2. Switchboards:

   a. Refer to: SECTION 26 27 00 – LOW VOLTAGE GROUP MOUNTED DISTRIBUTION

3. Low-Voltage Power Switchgear:

   a. Refer to: SECTION 26 27 00 – LOW VOLTAGE GROUP MOUNTED DISTRIBUTION

4. Grounding:

   a. Grounding Equipment: UL 467; copper conductors; NEC Table 8, and article 250 wire and cable conductors; connectors.

   b. Grounding Electrodes: Copper-clad steel ground rods; copper plate electrodes.

5. Transformers if shown:

   a. Control and Signal Transformers: NEMA ST 1, UL 506, self-cooled, two-winding dry type; continuous duty rating.

6. Busways if shown:

   a. Busways: General-purpose plug-in type, ANSI/UL 857, NEMA BU 1, enclosed, non-ventilated, suitable for indoor installation, copper conductors.

b. Plug-In Devices: Circuit breaker plugs, fusible switch plugs, fuse plugs, combination starter plugs; compatible with connected busway.

7. Panelboards:

a. Panelboards: NEMA PB 1, UL 50, 61, with overcurrent protective devices, enclosure suitable for use, copper bus, compression type main and neutral lugs, IEEE C62.1 surge arresters.

b. Panelboard Type: Load-center-type panelboards; lighting and appliance branch circuit panelboards; distribution panelboards.

8. Overcurrent Protective Devices:

a. Overcurrent Protective Devices: Integral to panelboards, switchboards, and motor control centers.

b. Cartridge Fuses: NEMA FU 1, class suitable for use.

c. Fusible Switches: UL 98, NEMA KS 1, rating suitable for use.

d. Fused Power Circuit Devices: UL 977, operation suitable for use; ground fault protection; open fuse trip device; minimum fault current rating suitable for use.

e. Molded Case Circuit Breakers: UL 489, NEMA AB 1; combination circuit breaker and ground fault circuit interrupters type; current-limiting circuit breaker type; integrally fused circuit breaker type; solid-state trip device circuit breaker type; rating suitable for use.

f. Insulated Case Circuit Breakers: UL 489, NEMA AB 1; rating suitable for use.

9. Fuses:

a. Cartridge Fuses: ANSI/IEEE FU 1, nonrenewable cartridge type, non-interchangeable type.

10. Motor Controllers: (NOT USED)

END OF SECTION

Division 16402
SECTION 26 27 00-LOW VOLTAGE SWITCHBOARDS GROUP MOUNTED DISTRIBUTION

A. SECTION INCLUDES

1. Low Voltage, Front-Accessible and Front/Rear-Accessible switchboards with circuit breaker for mains and feeders and/or fusible switches for mains as specified below and shown on the contract drawings.

B. RELATED SECTIONS

1. 26 43 00 Transient Voltage Suppression Systems.

C. REFERENCES

1. The low voltage switchboards and protection devices in this specification are designed and manufactured according to latest revision of the following standards (unless otherwise noted).

   a. ANSI 61

   b. ANSI/NEMA PB 2, Deadfront Distribution Switchboards

   c. ANSI/NEMA PB 2.1, General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less

   d. ANSI/NFPA 70, National Electrical Code

   e. NEMA AB 1, Molded Case Circuit Breakers and Molded Case Switches

   f. NEMA KS 1, Fused and Non - fused Switches

   g. UL 489, Molded Case Circuit Breakers and Circuit Breaker Enclosures

   h. UL 891, Dead Front Switchboards

   i. UL 98, Enclosed and Dead Front Switches

   j. UL 977, Fused Power Circuit Devices

D. DEFINITIONS

1. Front-Accessible only shall be as defined by UL 891 standard which requires that all line and load connections for phase, neutral, and ground conductors can be made and maintained from the front of the switchboard without access to the rear.

E. SYSTEM DESCRIPTION

1. The power system feeding the Switchboards is 277/480 volts, 60 Hertz, 3 phase, 4-wire, solidly grounded Wye.

2. Switchboard(s) shall have front access and rear alignment for mounting against a wall.

F. SUBMITTALS

1. Manufacturer shall provide 3 copies of the following documents to owner for review and evaluation in accordance with general requirements of Division 16.

a. Product Data on specified product;

b. Shop Drawings on specified product;

c. Trip curves for each specified product.

G. INSTALLATION, OPERATION AND MAINTENANCE DATA

1. Manufacturer shall provide 3 copies of installation, operation and maintenance procedures to owner in accordance with general requirements of Division 16.

H. QUALITY ASSURANCE (QUALIFICATIONS)

1. Manufacturer shall have specialized in the manufacture and assembly of low voltage switchboards for 25 years or more.

2. Low voltage switchboards shall be listed and/or classified by Underwriters Laboratories in accordance with standards listed in Article C-1 of this specification.

3. Equipment shall be qualified for use in seismic areas as follows:

a. High seismic loading as defined in IEEE Std 693-1997, with 1.33 amplification factor.

I. DELIVERY, STORAGE, AND HANDLING

1. Contractor shall store, protect, and handle products in accordance with recommended practices listed in manufacturer's Installation and Maintenance Manuals.

2. Ship each switchboard section in individual shipping splits for ease of handling. Each section shall be mounted on shipping skids and wrapped for protection.

3. Contractor shall inspect and report concealed damage to carrier within 48 hours.

4. Contractor shall store in a clean, dry space. Cover with heavy canvas or plastic to keep out dirt, water, construction debris, and traffic. Heat enclosures to prevent condensation.

5. Contractor shall handle in accordance with manufacturer's recommendations to avoid damaging equipment, installed devices, and finish.

J. PROJECT CONDITIONS (SITE ENVIRONMENTAL CONDITIONS)

1. Follow (standards) service conditions before, during and after switchboard installation.

2. Low voltage switchboards shall be located in well - ventilated areas, free from excess humidity, dust and dirt and away from hazardous materials. Ambient temperature of area will be between minus 30 and plus 40 degrees C. Indoor locations shall be protected to prevent moisture from entering enclosure.

K. WARRANTY

1. Manufacturer warrants equipment to be free from defects in materials and workmanship for 1 year from date of installation or 18 months from date of purchase, whichever occurs first.

L. FIELD MEASUREMENTS

1. Contractor shall make all necessary field measurements to verify that equipment shall fit in allocated space in full compliance with minimum required clearances specified in National Electrical Code.

M. MANUFACTURER

1. General Electric Company products have been used as the basis for design. Other manufacturers' products of equivalent quality, dimensions and operating features may be acceptable, at the Engineer's discretion, if they comply with all requirements specified or indicated in these Contract documents.

N. EQUIPMENT

1. The equipment shall contain the following components and features.

   a. Refer to Contract Drawings for actual layout and location of equipment and components; current ratings of devices, bus bars, and components; voltage ratings of devices, components and assemblies; interrupting and withstand ratings of devices, buses, and components; and other required details.

   b. Furnish GE Type Spectra Bolt-On™ Switchboards (or approved equal).

   c. Switchboards shall be fully self-supporting structures with 90 inch tall vertical sections (excluding lifting eyes and pull boxes) bolted together to form required arrangement.

   d. Switchboard frame shall be die formed, 12 gauge steel with reinforced corner gussets. Frame shall be rigidly bolted to support cover plates (code gauge steel), bus bars and installed devices during shipment and installation.

   e. All sections may be rolled, moved or lifted into position. Switchboards shall be capable of being bolted directly to the floor without the use of floor sills.

   f. All switchboard sections shall have open bottoms and removable top plate(s) to install conduit.

   g. Front-Access only switchboard sections shall be rear aligned for placement against a wall.

   h. Switchboards shall be UL listed, and MSB-3 shall be Service Entrance rated.

   i. Switchboards that are series rated to short circuit requirements shall be appropriately labeled. Tested UL listed combination ratings shall be included in UL recognized Component Directory (DKSY2).

   j. All covers shall be fastened by hex or standard screw head bolts. No special tools shall be required to access this equipment.

   k. Provide hinged doors over metering compartments and individually mounted device compartments. All doors shall have concealed hinges and be fastened by hex or standard screw head bolts.

l. Switchboard protective devices shall be furnished as listed on drawings and specified herein, including interconnections, instrumentation and control wiring. Switchboards and devices shall be rated for the voltage and frequency listed on the drawings.

m. Switchboard current ratings, including all devices, shall be based on a maximum ambient temperature of 25 degree C per UL Standard 891. With no derating required, temperature rise of switchboards and devices shall not exceed 65 degrees C in a 25 degree C ambient environment.

n. Switchboard Service Entrance sections shall comply with UL Service Entrance requirements including a UL service entrance label, incoming line isolation barriers, and a removable neutral bond to switchboard ground for solidly grounded Wye systems.

o. The group mounted feeder breaker and/or main devices within switchboards shall be circuit breakers only. Mounting for the group mounted devices shall be by bolted connections. No plug-in type connections shall be used for current carrying components.

2. Incoming Section

a. Incoming section shall be direct cable connection to main breaker.

b. Furnish switchboard arranged for bottom entry of incoming cable.

c. Provide mechanical lugs in the quantity and size required per the contract drawings. All lugs shall be tin-plated aluminum and UL listed for use with copper cable. Lugs shall be rated for 75 degree C. Cable.

3. Bus Bars

a. All bus bars shall be silver plated copper. The bus bars shall have sufficient cross sectional area to meet UL 891 temperature rise requirements. Phase and neutral bus ampacity shall be as shown on the plans. The neutral bus shall have the same ampacity as the phase bus.

b. Bus bars shall be mounted on high impact, non-tracking insulated supports. Joints in the vertical bus are not permitted.

c. Bus bars shall be braced to withstand mechanical forces exerted during short circuit conditions as indicated in drawings, but in no case less than 100KA RMS SYM.

d. Bus joints shall be bolted with high tensile steel Grade 5 bolts. Belleville type washers shall be provided with aluminum bus. Welded connections are unacceptable.

e. Ground Bus shall be sized to meet UL 891. Ground bus shall extend full length of switchboard. Ground bus shall be copper.

f. A-B-C bus arrangement left to right, top to bottom, front to rear shall be used throughout to assure convenient and safe testing and maintenance. Where special circuitry precludes this arrangement, bus bars shall be labeled.

g. All feeder device line and load connection straps shall be rated to carry current rating of device frame (not trip rating).

h. The main incoming bus bars shall be rated for the main protection device frame size or main incoming conductors, if there is no main device.

i. Main horizontal bus bars shall be fully rated and arranged for future extensions.

4. Enclosure

a. Switchboard shall be NEMA 1 non walk-in deadfront construction or as indicated on drawings.

5. User Metering

a. Provide a UL listed and digital multifunction power monitor. The monitor case shall be fully enclosed and shielded

b. The monitor shall accept a voltage monitoring range of up to 600 volts, phase to phase. Monitor shall withstand 200% rated current continuously. It shall withstand 10X rated current for at least 3 seconds. Isolation shall be no less than 2500V AC. Surge withstand shall conform to IEEE C37.90.1,62.41 and IEEE 1000-4Shall have a standard ANSI C39.1 case mount.

c. The Monitor shall provide true RMS measurements of voltage, phase to neutral and phase to phase; current, per phase and neutral; real power, reactive power, apparent power, power factor and frequency. The Monitor must be capable of providing readings for both instantaneous and average readings.

1. The Monitor must also be capable of providing all single phase real, apparent, reactive power and power factor values.

2. The Monitor shall record and store total bi-directional energy. It shall include separate registers for positive and negative energy.

3. The Monitor shall record and store total bi-directional accumulated energy and total accumulated apparent energy.

4. The Monitor shall monitor max/min average demand values for all current and power readings. The demand interval shall be user programmable. Meter shall be model EPM6000 or approved equal.

6. Main Devices

a. Main device shall be individually mounted, draw out type, insulated case or AIR type circuit breaker, and 100% rated.

b. Tie device(s), if included, shall be the same as the main device.

c. Where indicated provide the following with the main device:

1. Electronic ground fault detection

2. Shunt trip

3. Undervoltage release

4. Auxiliary contacts

7. Feeder devices

a. Feeder devices shall be group mount molded case circuit breakers or when larger than 1200 amps shall be individually mounted insulated case circuit breakers. Provide devices as indicated on drawings.

b. All circuit protective devices shall have the following minimum symmetrical current interrupting capacity: 100kA, or as listed on the contract drawings.

c. Where indicated provide the following with the feeder device(s):

1. Shunt trip

2. Undervoltage release

3. Auxiliary contacts

4. Bell alarm

8. Molded Case Circuit Breakers

a. Furnish GE Spectra RMS™ Molded Case Circuit Breakers. Thermal magnetic molded case circuit breakers may be provided for trip ratings 150 amps and below.

b. Group mounted breakers shall be connected to the vertical bus by bolted connections.

c. Individually mounted molded case circuit breakers shall be stationary mounted.

d. Circuit breaker frames shall be constructed of a high-strength, molded, glass-reinforced polyester case and cover. Breakers shall have an overcenter, toggle handle-operated, trip free mechanism with quick make, quick break action independent of the speed of the toggle handle operation. The design shall provide common tripping of all poles. Breakers shall be suitable for reverse feeding.

e. Breakers shall have ON and OFF position clearly marked on escutcheon. Breakers shall include a trip-to-test means on the escutcheon for manually tripping the breaker and exercising the mechanism and trip latch.

f. Breakers shall include factory installed mechanical lugs. Lugs shall be UL listed and rated 75 or 60/75 degrees C as appropriate. Breakers shall be standard, or 80 percent rated.

g. Breakers larger than 400 amps shall use digital true RMS sensing trip units and a rating plug to determine the breaker trip rating. The breaker shall be adjusted to the proper trip settings by electrical contractor to meet the inrush of the largest piece of equipment. The time and trip settings shall be obtained from the manufacturer of the equipment by the electrical contractor.

h. Each main, feeder, and tie breaker with a frame size 400 amps and larger shall have digital electronic trip units.

i. Where indicated on the drawings, circuit breakers with trip ratings greater than 250 amperes to 1000 amperes shall be UL listed as 100 percent continuous duty rated.

9. Insulated Case Circuit Breakers

a. Insulated case circuit breakers shall be individually mounted.

b. Main and tie breakers shall be manually operated, draw out type mounting. Feeder breakers (larger than 1200 amps) shall be manually operated, stationary mounted.

c. Breakers shall be constructed of a high dielectric strength, glass reinforced insulating case. The interrupting mechanism shall be arc chutes. Steel vent grids shall be used to suppress arcs and cool vented gases. Interphase barriers shall be furnished as to isolate completely each pole.

d. Breakers shall contain a true two-step stored energy operating mechanism, which shall provide quick make, quick break operation with a maximum five-cycle closing time. Breakers shall be trip free at all times. Common tripping of all poles shall be standard.

e. Insulated Case circuit breakers shall be rated to carry 100 percent of their frame ampacity continuously.

f. A charging handle, close push-button, open push-button, and Off/On/Charge indicator shall be located on the breaker escutcheon and shall be visible with the breaker compartment door closed.

g. Where drawout breakers are specified, the drawout design shall permit the breaker to be withdrawn from an engaged position, to a test position, and to a disengaged position.

h. Breaker digital electronic trip units shall be as described in Article 10 below.

10. Digital Electronic Trip Unit For Circuit Breakers

a. Furnish GE MicroVersaTrip® Plus, or PM, or approved equal, digital electronic trip units as specified below.

b. Each main, feeder, and tie circuit breaker shall be equipped with a digital electronic trip unit. The trip unit shall provide protection from overloads, short circuits and ground faults (for Main circuit breaker). The protective trip unit shall consist of a solid state, microprocessor based programmer, tripping means, current sensors, power supply and other devices as required for proper operation.

c. As a minimum, the trip unit shall have the following protective functions:

1. Adjustable current setting or long time pickup;

2. Adjustable long time delay;

3. Adjustable instantaneous pickup;

4. Adjustable ground fault pickup and delay for main.

5. Adjustable short time pickup and delay.

d. As a minimum, the trip unit shall include the following features:

1. Long time and short time protective functions, if provided, shall have true RMS sensing technology.

2. Ground fault protective function, if provided, shall contain a memory circuit to integrate low level arcing fault currents with time, to sum the intermittent ground fault spikes.

3. High contrast liquid crystal display (LCD) unit shall display settings, trip targets, and the specified metering displays.

4. Multi-button keypad to provide local setup and readout of all trip settings on the LCD.

5. UL Listed interchangeable rating plug. It shall not be necessary to remove the trip unit to change the rating plug.

6. An integral test jack for testing via a portable test set and connection to a battery source.

7. A mechanism for sealing the rating plug and the trip unit.

8. Noise immunity shall meet the requirements of IEEE C37.90.

9. Display trip targets for long time, short time, and ground fault, if included.

10. The trip unit shall include the following metering functions, which shall be displayed on the LCD (if the manufacturers trip unit can not incorporate the specified functions, separate device(s) with equal function shall be provided for each breaker): Current, RMS, each phase.

11. Finish

a. All steel surfaces shall be chemically cleaned prior to painting.

b. Exterior paint color shall be ANSI 61 Light Gray over phosphate - type rust inhibitor.

12. Accessories

a. Provide the following UL listed accessories:

1. Integral, self-powered ground fault protection relay with mechanical ground fault indicator, test function, adjustable current pick - up and time delay, and current sensors as required. Ground fault relay shall have an internal memory circuit that integrates intermittent arcing ground faults with time.

2. Furnish nameplates for each device as indicated in drawings.
Color schemes shall be as indicated on drawings.

3. Provide Transient Voltage Surge Suppression system as specified in Section 16479.

13. EXAMINATION

a. The following procedures shall be performed by the Contractor.

1. Examine installation area to assure there is enough clearance to install switchboard.

2. Check concrete pads for uniformity and level surface.

3. Verify that Spectra Series™ switchboards are ready to install.

4. Verify field measurements that are as shown on Drawings and instructed by manufacturer.

5. Verify that required utilities are available, in proper location and ready for use.

6. Beginning of installation means installer accepts conditions.

14. INSTALLATION

a. Installation shall be performed by the Contractor.

1. Install per manufacturer's instructions.

2. Install required safety labels.

END OF SECTION

Division 16425 Section 262923 Variable Frequency Drives

I. PART 1- GENERAL

A. DESCRIPTION

1. This specification covers complete a variable frequency drives (VFDs) designated on the drawing schedules to be variable speed. All standard and optional features shall be included within the VFD panel. The VFD shall be UL Type 1 or UL Type 12 as required on the schedule. The VFD shall have been evaluated by UL and found acceptable for mounting in a plenum or other air handling compartment. Manufacturer shall supply a copy of the UL plenum evaluation upon request.
2. The VFD shall be tested to UL 508C. The appropriate UL label shall be applied. When the VFDs are to be located in Canada, C-UL certifications shall apply. VFD shall be manufactured in ISO 9001, 2000 certified facilities.
3. The VFD shall be CE marked and conform to the European Union ElectroMagnetic Compatibility directive.
4. The VFD shall be UL listed for a short circuit current rating of 100 kAIC and labeled with this rating.
5. To ensure adequate technical and factory support, VFDs manufactured by others and brand labeled shall not be acceptable.
6. The VFD manufacturer shall supply the VFD and all necessary controls as herein specified. The manufacturer shall have been engaged in the production of this type of equipment for a minimum of twenty years.

II. PART 2 - PRODUCTS

A. The VFD shall convert incoming fixed frequency three-phase AC power into an adjustable frequency and voltage for controlling the speed of three-phase AC motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for the driven load and to eliminate the need for motor derating. When properly sized, the VFD shall allow the motor to produce full rated power at rated motor voltage, current, and speed without using the motor's service factor. VFDs utilizing sine weighted/coded modulation (with or without 3rd harmonic injection) must provide data verifying that the motors will not draw more than full load current during full load and full speed operation.

B. The VFD shall include an input full-wave bridge rectifier and maintain a fundamental (displacement) power factor near unity regardless of speed or load.

C. The VFD shall have a dual 5% impedance DC link reactor on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. Swinging chokes that do not provide full harmonic filtering throughout the entire load range are not acceptable. VFDs with saturating (non-linear) DC link reactors shall require an additional 3% AC line reactor to provide acceptable harmonic performance at full load, where harmonic performance is most critical.

D. The VFD's full load output current rating shall meet or exceed NEC Table 430-150. The VFD shall be able to provide full rated output current continuously, 110% of rated current for 60 seconds and 120% of rated torque for up to 0.5 second while starting.

E. The VFD shall provide full motor torque at any selected frequency from 20 Hz to base speed while providing a variable torque V/Hz output at reduced speed. This is to

allow driving direct drive fans without high speed derating or low speed excessive magnetization, as would occur if a constant torque V/Hz curve was used at reduced speeds. Breakaway current of 160% shall be available.

F. A programmable automatic energy optimization selection feature shall be provided standard in the VFD. This feature shall automatically and continuously monitor the motor's speed and load to adjust the applied voltage to maximize energy savings.

G. The VFD must be able to produce full torque at low speed to operate direct drive fans.

H. Output power circuit switching shall be able to be accomplished without interlocks or damage to the VFD.

I. An automatic motor adaptation algorithm shall measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to run the motor or de-couple the motor from the load to perform the test.

J. Galvanic isolation shall be provided between the VFD's power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents. VFDs not including either galvanic or optical isolation on both analog I/O and discrete digital I/O shall include additional isolation modules.

K. VFD shall minimize the audible motor noise through the used of an adjustable carrier frequency. The carrier frequency shall be automatically adjusted to optimize motor and VFD operation while reducing motor noise. VFDs with fixed carrier frequency are not acceptable.

L. All VFDs shall contain integral EMI filters to attenuate radio frequency interference conducted to the AC power line.

III. PROTECTIVE FEATURES

A. A minimum of Class 20 I2t electronic motor overload protection for single motor applications shall be provided. Overload protection shall automatically compensate for changes in motor speed.

B. Protection against input transients, loss of AC line phase, output short circuit, output ground fault, over voltage, under voltage, VFD over temperature and motor over temperature. The VFD shall display all faults in plain language. Codes are not acceptable.

C. Protect VFD from input phase loss. The VFD should be able to protect itself from damage and indicate the phase loss condition. During an input phase loss condition, the VFD shall be able to be programmed to either trip off while displaying an alarm, issue a warning while running at reduced output capacity, or issue a warning while running at full commanded speed. This function is independent of which input power phase is lost.

D. Protect from under voltage. The VFD shall provide full rated output with an input voltage as low as 90% of the nominal. The VFD will continue to operate with reduced output, without faulting, with an input voltage as low as 70% of the nominal voltage.

E. Protect from over voltage. The VFD shall continue to operate without faulting with a momenary input voltage as high as 130% of the nominal voltage.

F. The VFD shall incorporate a programmable motor preheat feature to keep the motor warm and prevent condensation build up in the motor when it is stopped in a damp environment by providing the motor stator with a controlled level of current.

G. VFD shall include a *"*signal loss detection*"* algorithm with adjustable time delay to sense the loss of an analog input signal. It shall also include a programmable time

delay to eliminate nuisance signal loss indications. The functions after detection shall be programmable.

H. VFD shall function normally when the keypad is removed while the VFD is running. No warnings or alarms shall be issued as a result of removing the keypad.

I. VFD shall catch a rotating motor operating forward or reverse up to full speed without VFD fault or component damage.

J. Selectable over-voltage control shall be provided to protect the drive from power regenerated by the motor while maintaining control of the driven load.

K. VFD shall include current sensors on all three output phases to accurately measure motor current, protect the VFD from output short circuits, output ground faults, and act as a motor overload. If an output phase loss is detected, the VFD will trip off and identify which of the output phases is low or lost.

L. If the temperature of the VFD's heat sink rises to 80C, the VFD shall automatically reduce its carrier frequency to reduce the heat sink temperature. It shall also be possible to program the VFD so that it reduces its output current limit value if the VFD's temperature becomes too high.

M. In order to ensure operation during periods of overload, it must be possible to program the VFD to automatically reduce its output current to a programmed value during periods of excessive load. This allows the VFD to continue to run the load without tripping.

N. The VFD shall have temperature controlled cooling fan(s) for quiet operation, minimized losses, and increased fan life. At low loads or low ambient temperatures, the fan(s) may be off even when the VFD is running.

O. The VFD shall store in memory the last 10 alarms. A description of the alarm, and the date and time of the alarm shall be recorded.

P. When used with a pumping system, the VFD shall be able to detect no-flow situations, dry pump conditions, and operation off the end of the pump curve. It shall be programmable to take appropriate protective action when one of the above situations is detected.

IV. INTERFACE FEATURES

A. Hand, Off and Auto keys shall be provided to start and stop the VFD and determine the source of the speed reference. It shall be possible to either disable these keys or password protect them from undesired operation.

B. There shall be an *"*Info*"* key on the keypad. The Info key shall include *"*on-line*"* context sensitive assistance for programming and troubleshooting.

C. The VFD shall be programmable to provide a digital output signal to indicate whether the VFD is in Hand or Auto mode. This is to alert the Building Automation System whether the VFD is being controlled locally or by the Building Automation System.

D. Password protected keypad with alphanumeric, graphical, backlit display can be remotely mounted. Two levels of password protection shall be provided to guard against unauthorized parameter changes.

E. All VFDs shall have the same customer interface. The keypad and display shall be identical and interchangeable for all sizes of VFDs.

F. To set up multiple VFDs, it shall be possible to upload all setup parameters to the VFD's keypad, place that keypad on all other VFDs in turn and download the setup parameters to each VFD. To facilitate setting up VFDs of various sizes, it shall be possible to download from the keypad only size independent parameters. Keypad shall provide visual indication of copy status.

G. Display shall be programmable to communicate in multiple languages including English, Spanish and French.
H. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
I. A quick setup menu with factory preset typical HVAC parameters shall be provided on the VFD. The VFD shall also have individual Fan, Pump, and Compressor menus specifically designed to facilitate start-up of these applications.
J. A three-feedback PID controller to control the speed of the VFD shall be standard.

1. This controller shall accept up to three feedback signals. It shall be programmable to compare the feedback signals to a common setpoint or to individual setpoints and to automatically select either the maximum or the feedback signal as the controlling signal. It shall also be possible to calculate the controlling feedback signal as the average of all feedback signals or the difference between a pair of feedback signals.
2. The VFD shall be able to apply individual scaling to each feedback signal.
3. For fan flow tracking applications, the VFD shall be able to calculate the square root of any or all individual feedback signals so that a pressure sensor can be used to measure air flow.
4. The VFD's PID controller shall be able to actively adjust its setpoint based on flow. This allows the VFD to compensate for a pressure feedback sensor which is located near the output of the pump rather than out in the controlled system.

K. The VFD shall have three additional PID controllers which can be used to control damper and valve positioners in the system and to provide setpoint reset.
L. Floating point control interface shall be provided to increase/decrease speed in response to contact closures.
M. Five simultaneous meter displays shall be available. They shall include at a minimum, frequency, motor
current, motor voltage, VFD output power, VFD output energy, VFD temperature in degrees, among others.
N. Programmable Sleep Mode shall be able to stop the VFD. When its output frequency drops below set *"*sleep*"* level for a specified time, when an external contact commands that the VFD go into Sleep Mode, or when the VFD detects a no-flow situation, the VFD may be programmed to stop. When the VFD's speed is being controlled by its PID controller, it shall be possible to program a *"*wake-up*"* feedback value that will cause the VFD to start. To avoid excessive starting and stopping of the driven equipment, it shall be possible to program a minimum run time before sleep mode can be initiated and a minimum sleep time for the VFD.
O. A run permissive circuit shall be provided to accept a *"*system ready*"* signal to ensure that the VFD does not start until dampers or other auxiliary equipment are in the proper state for VFD operation. The run permissive circuit shall also be capable of initiating an output *"*run request*"* signal to indicate to the external equipment that the VFD has received a request to run.
P. VFD shall be programmable to display feedback signals in appropriate units, such as inches of water column (in-wg), pressure per square inch (psi) or temperature (°F).
Q. VFD shall be programmable to sense the loss of load. The VFD shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. To ensure against nuisance indications, this feature must be

based on motor torque, not current, and must include a proof timer to keep brief periods of no load from falsely triggering this indication.

R. Standard Control and Monitoring Inputs and Outputs

1. Four dedicated, programmable digital inputs shall be provided for interfacing with the systems control and safety interlock circuitry.
2. Two terminals shall be programmable to act as either as digital outputs or additional digital inputs.
3. Two programmable relay outputs, Form C 240 V AC, 2 A, shall be provided for remote indication of VFD status.
   a) Each relay shall have an adjustable on delay / off delay time.
4. Two programmable analog inputs shall be provided that can be either direct-or-reverse acting.
   a) Each shall be independently selectable to be used with either an analog voltage or current signal.
   b) The maximum and minimum range of each shall be able to be independently scalable from 0 to 10 V dc and 0 to 20 mA.
   c) A programmable low-pass filter for either or both of the analog inputs must be included to compensate for noise.
   d) The VFD shall provide front panel meter displays programmable to show the value of each analog input signal for system set-up and troubleshooting,
5. One programmable analog current output (0/4 to 20 mA) shall be provided for indication of VFD status. This output shall be programmable to show the reference or feedback signal supplied to the VFD and for VFD output frequency, current and power. It shall be possible to scale the minimum and maximum values of this output.
6. It shall be possible through serial bus communications to read the status of all analog and digital inputs of the VFD.
7. It shall be possible to command all digital and analog output through the serial communication bus.

S. Optional Control and Monitoring Inputs and Outputs

1. It shall be possible to add optional modules to the VFD in the field to expand its analog and digital inputs and outputs.
2. These modules shall use rigid connectors to plug into the VFD's control card.
3. The VFD shall automatically recognize the option module after it is powered up. There shall be no need to manually configure the module.
4. Modules may include such items as:
   a) Additional digital outputs, including relay outputs
   b) Additional digital inputs
   c) Additional analog outputs
   d) Additional analog inputs, including Ni or Pt temperature sensor inputs
5. It shall be possible through serial bus communications to control the status of all analog and digital outputs of the VFD.

T. Standard programmable firefighter's override mode allows a digital input to control the VFD and override all other local or remote commands. It shall be possible to program the VFD so that it will ignore most normal VFD safety circuits including motor overload. The VFD shall display FIREMODE whenever in firefighter's override mode. Firemode shall allow selection of forward or reverse operation and the selection of a speed source or preset speed, as required to accommodate local fire codes, standards and conditions.

U. A real-time clock shall be an integral part of the VFD.

1. It shall be possible to use this to display the current date and time on the VFD's display.

2. Ten programmable time periods, with individually selectable ON and OFF functions shall be available. The clock shall also be programmable to control start/stop functions, constant speeds, PID parameter setpoints and output relays. Is shall be possible to program unique events that occur only during normal work days, others that occur only on non-work days, and others that occur on specific days or dates. The manufacturer shall provide free PC-based software to set up the calendar for this schedule.
3. All VFD faults shall be time stamped to aid troubleshooting.
4. It shall be possible to program maintenance reminders based on date and time, VFD running hours, or VFD operating hours.
5. The real-time clock shall be able to time and date stamp all faults recorded in the VFD fault log.

V. The VFD shall be able to store load profile data to assist in analyzing the system demand and energy consumption over time.

W. The VFD shall include a sequential logic controller to provide advanced control interface capabilities. This shall include:
1. Comparators for comparing VFD analog values to programmed trigger values
2. Logic operators to combine up to three logic expressions using Boolean algebra
3. Delay timers
4. A 20-step programmable structure

X. The VFD shall include a Cascade Controller which allows the VFD to operate in closed loop set point (PID) control mode one motor at a controlled speed and control the operation of additional constant speed motor starters.

V. SERIAL COMMUNICATIONS

A. The VFD shall include a standard EIA-485 communications port and capabilities to be connected to the
following serial communication protocols at no additional cost and without a need to install any additional hardware or software in the VFD: Johnson Controls Metasys N2; Modbus RTU; Siemens FLN

B. Option boards for the following protocols shall be available: LonWorks Free Topology (FTP) certified to LonMark standard 3.3; BACnet MS/TP

C. VFD shall have standard USB port for direct connection of Personal Computer (PC) to the VFD. The manufacturer shall provide no-charge PC software to allow complete setup and access of the VFD and logs of VFD operation through the USB port. It shall be possible to communicate to the VFD through this USB port without interrupting VFD communications to the building management system.

D. The VFD shall have provisions for an optional 24 V DC back-up power interface to power the VFD's control card. This is to allow the VFD to continue to communicate to the building automation system even if power to the VFD is lost.

VI. ADJUSTMENTS

A. The VFD shall have a manually adjustable carrier frequency that can be adjusted in 0.5 kHz increments to
allow the user to select the desired operating characteristics. The VFD shall also be programmable to automatically reduce its carrier frequency to avoid tripping due to thermal loading.

B. Four independent setups shall be provided.

C. Four preset speeds per setup shall be provided for a total of 16.

D. Each setup shall have two programmable ramp up and ramp down times. Acceleration and deceleration ramp times shall be adjustable over the range from 1 to 3,600 seconds.
E. Each setup shall be programmable for a unique current limit value. If the output current from the VFD reaches this value, any further attempt to increase the current produced by the VFD will cause the VFD to reduce its output frequency to reduce the load on the VFD. If desired, it shall be possible to program a timer which will cause the VFD to trip off after a programmed time period.
F. If the VFD trips on one of the following conditions, the VFD shall be programmable for automatic or manual reset: external interlock, under-voltage, over-voltage, current limit, over temperature, and VFD overload.
G. The number of restart attempts shall be selectable from 0 through 20 or infinitely and the time between attempts shall be adjustable from 0 through 600 seconds.
H. An automatic "start delay" may be selected from 0 to 120 seconds. During this delay time, the VFD shall
be programmable to either apply no voltage to the motor or apply a DC braking current if desired.
I. Four programmable critical frequency lockout ranges to prevent the VFD from operating the load at a speed that causes vibration in the driven equipment shall be provided. Semi-automatic setting of lockout ranges shall simplify the set-up.

VII. OPTIONAL FEATURES

A. All optional features shall be built, mounted and tested by the VFD manufacturer. The VFD manufacture's warranty shall apply to the entire assembly as shipped. Packages built by third parties and do not carry the VFD manufacture's warranty shall not be allowed. All options shall carry a UL / C-UL Enclosed Industrial Control Panel label.
B. All panels shall be marked for 100,000 amp short circuit current rating.
C. The enclosure rating of the VFD w/ options shall be consistent with the VFD rating of either NEMA/UL type 1 or NEMA/UL type 12, as required for the installation location and/or as called for on the schedule. The package shall include ALL optional devices and shipped as a complete factory tested assembly.
D. Three-Contactor bypass shall be provided that allows operation of the motor via line power in the event of a failure of the VFD. Motor control selection shall be though either a VFD output contactor or a bypass contactor that are electrically interlocked to ensure that both contactors are not energized simultaneously. A third contactor, the drive input contactor, shall be supplied as standard. This allows the powering of the VFD with the motor off or operating in bypass mode for testing, programming and troubleshooting purposes.
E. The Three-Contactor bypass shall include the following interface and control features:
1. Mode selection via a four position DRIVE/OFF/BYPASS/TEST switch.
   a) DRIVE Mode: Both the drive input and output contactors are closed and the motor is operated via VFD power
   b) OFF mode: DRIVE input, drive output and bypass contactors are all open.
   c) Bypass mode: Bypass contactor is closed and motor is operating from line power. Both the drive input and drive output contactors are open for servicing of the VFD without power.
   d) Test mode: Bypass contactor is closed and the motor is operated from line power. The drive

input contactor is closed but the drive output contactor is open. This allows for the testing and programming of the VFD while the motor is operated via line power.

2. Contactors shall operate from a 24vdc power supply that shall function off of any two legs of the AC line and shall maintain power on the loss of any one of the AC lines.
3. A Bypass pilot light is supplied to indicate that the motor is operating from line power.
4. Common start/stop command when operating in either Bypass or VFD mode.
5. Selectable Run Permissive logic shall operate in either VFD or bypass operation. When activated, any command to start the motor, in either Hand Bypass, Remote Bypass, Hand VFD or Remote VFD shall not start the motor, but instead close a relay contact that is used to initiate operation of another device, such as an outside air damper. A contact closure from this device shall confirm that it is appropriately actuated and the motor shall then start.
6. Bypass package shall include an External Safety interlock that will disable motor operation in either bypass or VFD when open.
7. Firemode bypass operation shall be standard. When activated via a contact closure, the motor shall transfer to bypass (line power) regardless of the mode selected. All calls to stop the motor shall be ignored. These include the opening of the start command, an external safety trip or the tripping of the motor overload. Firemode operation will take precedence over all other commands.
8. The bypass must include a selectable time delay of 0 to 60 seconds before the initiation of bypass operation. When transferring from VFD to bypass modes, the time delay starts after the motor has decelerated to zero speed. This delay allows the BAS to prepare for bypass operation. Bypass packages that do not include a time delay, or do not include a selectable delay period, will not be acceptable.
9. Automatic bypass shall be selectable. When active, the motor shall be transferred to line power on a VFD fault condition. The bypass time delay shall be activate prior to this transfer to line power to allow the VFD time to attempt to recover from the fault condition prior to running in bypass.
10. An external bypass and disconnect shall be included in the price of the VFD.

F. Protective features

1. Main input disconnect shall be provided that removes power from both the bypass and VFD.
2. Main input motor rated fuses that protect the entire package.
3. VFD only fast acting input fuses shall be provided. Packages that include only main input motor rated fusing or circuit breaker are not acceptable.
4. Overload protection shall be supplied in bypass mode.
   a) This overload shall supply minimum class 20 protection as well as wide adjustable current setting for complete motor protection when operating on line power. Those overloads that are not class 20 or current selectable will not be acceptable.
   b) Overload protection shall include phase loss and phase imbalance protection.
5. Low voltage contactor operation shall be maintained to 70% the of packages nominally rated voltage. This will ensure VFD operation on low voltage conditions that would otherwise be interrupted due to contactor dropout.
6. The VFD shall be able to operate the motor at a reduced load with the loss of any one of the three phases of power. Contactors shall remain closed regardless of which phase is lost. This will ensure VFD operation on single phase conditions that would otherwise be interrupted due to contactor dropout.

G. Line/load conditioners

1. VFDs that do not include 5% DC link impedance shall include 5% AC line reactors in the options enclosure. Lower levels of impedance will not be acceptable.
2. When the installation requires additional motor dV/dT protection it shall be via a dV/dT filter mounted in the options enclosure. Packages that include only load reactors or filters supplied separately will not be accepted.

VIII. SERVICE CONDITIONS

A. Ambient temperature, continuous, full speed, full load operation:
1. -10 to 45°C (14 to 113°F) through 125 HP @ 460 and 600 volt, through 60 HP @ 208 volt
2. -10 to 40°C (14 to 104°F) 150 HP and larger

B. 0 to 95% relative humidity, non-condensing.
C. Elevation to 3,300 feet without derating.
D. AC line voltage variation, -10 to +10% of nominal with full output.
E. No side clearance shall be required for cooling.
F. All power and control wiring shall be done from the bottom.
G. All VFDs shall be plenum rated.

IX. QUALITY ASSURANCE
A. To ensure quality, the complete VFD shall be tested by the manufacturer. The VFD shall drive a motor
connected to a dynamometer at full load and speed and shall be cycled during the automated test procedure.
B. All optional features shall be functionally tested at the factory for proper operation.

X. SUBMITTALS

A. This specification lists the minimum VFD performance requirements for this project. Each supplier shall list any exceptions to the specification. If no departures from the specification are identified, the supplier shall be bound by the specification.

XI. PART 3 - EXECUTION

A. Start-up Service
1. The manufacturer shall provide start-up commissioning of the VFD and its optional circuits by a factory certified service technician who is experienced in start-up and repair services. Sales personnel and other agents who are not factory certified shall not be acceptable as commissioning agents. Start-up services shall include checking for verification of proper operation and installation for the VFD, its options and its interface wiring to the building automation system.
2. Harmonic filtering. The VFD supplier shall, with the aid of the buyer's detailed electrical power single line diagram showing all impedances in the power path to the VFDs, perform an analysis to initially demonstrate the supplied equipment will met the IEEE recommendations after installation. If, as a result of the analysis, it is determined that additional filter equipment is required to meet the IEEE recommendations, then the cost of such equipment shall be included in the drive supplier quotation.

B. WARRANTY

1. The complete VFD shall be warranted by the manufacturer for a period of 36 months from date of shipment. The warranty shall include parts, labor, travel costs and living expenses incurred by the manufacturer to provide factory authorized on-site service. The warranty shall be provided by the VFD manufacturer and not a third party. A written warranty statement shall be provided with the submittals.
2. The manufacturer shall offer an optional, extended warranty allowing the VFD warranty to be extended to up to 6 years.

END OF SECTION

Division 16479 SECTION 26 43 00 – TRANSIENT VOLTAGE SURGE SUPPRESSION

A. SECTION INCLUDES

1. Transient voltage surge suppression systems integrated into electrical distribution equipment.

B. RELATED SECTIONS

1. 26 20 00 (16400) Low Voltage Switchgear

2. 26 27 00 (16402) Low Voltage Group Mounted Switchboards

3. 26 29 19 Motor Control Centers (Not Used)

C. REFERENCES

1. The equipment and components in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted).

   a. ANSI/IEEE C62.41.1-2002, Guide on the Surge Environment in Low Voltage AC Power Circuits.

   b. ANSI/IEEE C62.41.2-2002, Recommended Practice on Characterization of Surges in Low Voltage AC Power Circuits.

   c. ANSI/IEEE C62.45-2002, Recommended Practice on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits.

   d. UL 1449, Third Edition - Transient Voltage Surge Suppressors

   e. UL 1283, Electromagnetic Interference Filters

   f. UL 67, Panelboards

   g. UL 891, Dead-Front Switchboards

   h. NEMA LS-1 (1992), Low Voltage Surge Protective Devices

   i. NFPA 70 National Electrical Code – Article 285

D. SYSTEM DESCRIPTION

1. Transient voltage surge suppression devices shall be applied on a 277/ 480 volt or 120/208 volt, 60 Hertz, 3 phase, 4- wire, solidly grounded WYE system, as indicated on drawings.

E. SUBMITTALS

1. Manufacturer shall provide 3 copies of the following documents to owner for review and evaluation.

   a. Product Data on specified product:

      1. Maximum surge current rating
      2. Repetitive surge current rating
      3. UL1449 Third Edition Suppressed Voltage Ratings

   b. Upon request, provide copies of third party test reports for maximum surge current rating and repetitive surge current rating.

F. INSTALLATION, OPERATION AND MAINTENANCE DATA

1. Manufacturer shall provide 3 copies of installation, operation and maintenance procedures to owner.

2. Transient voltage surge suppression systems shall be listed/or recognized by Underwriters Laboratories in accordance with the applicable standards found in Section C-1 of this specification. UL recognized TVSS assemblies are allowed provided they have been investigated by UL as suitable for use within the specified electrical panel or gear and do not require additional testing or field investigation to maintain the equipment’s UL listing.

3. Manufacturer warrants equipment to be free from defects in materials and workmanship for 5 years from date of purchase.

G. PRODUCTS

1. General Electric Company products have been used as the basis for design. Other manufacturers' products of equivalent quality, dimensions and operating features may be acceptable, at the Engineer's discretion; if they comply with all requirements specified or indicated in these Contract documents.

2. Furnish General Electric internally or equal external mounted TVSS systems as indicated in drawings.

3. Refer to Drawings for: actual layout and location of equipment and components; current ratings of devices, bus bars, and components; voltage ratings of devices, components and assemblies; and other required details.

a. Electrical Requirements

1. The maximum surge current rating shall be based on testing of a complete TVSS unit including fuses and all components that make up the TVSS system. Devices that derive a maximum surge current rating by adding test results of individual components are not acceptable.

2. The TVSS device repetitive surge current capacity shall be tested utilizing an 8x20us, 10kA short circuit Category C High test waveform (as defined by ANSI/IEEE C62.41.2-2002) at one-minute intervals. A failure is defined as either performance degradation or more than 10% deviation of clamping voltage at the specified surge current

3. Maximum surge current and repetitive surge current ratings shall be as follows:

For Switchgear and switchboards rated 1600A and greater:

a. Maximum surge current rating: 150/300kA per mode.
b. Repetitive surge current rating: 20,000 C High impulses.

For Motor Control Centers rated 1200A and below:

a. Maximum surge current rating: 150 kA SCCR.
b. Repetitive surge current rating: 5,000 C High impulses

For Lighting panels rated 1200A and below:

a. Maximum surge current rating: 65 kA per mode.
b. Repetitive surge current rating: 5,000 C High impulses

4. The Suppression Voltage Rating (SVR) shall be tested in accordance with UL-1449, Third Edition. Where an integral disconnect is provided, the TVSS SVR shall be determined with the integral disconnect. The SVR values shall not exceed the following: L-N, N-G, L--G-800; L-L--1500.

5. The TVSS fault current rating shall be marked on the TVSS in accordance with the requirements of UL1449 and NEC Article 285.

6. The use of electronic grade MOV's is not acceptable. Systems using gas tubes, silicon avalanche diodes, selenium rectifiers, or printed circuit board technology in surge current path are not acceptable.

7. The TVSS shall provide protection in each of the following modes: L-N, L-G, N-G, and L-L for WYE Systems. L-G and L-L for Delta Systems.

8. The Maximum Continuous Operating Voltage (MCOV) for all voltage configurations shall be at least 115% of nominal on 480/277 volt systems and 125% of nominal on 240-208/120 volt systems.

9. The fusing system shall be capable of allowing the rated maximum surge current to pass through without fuse operation. Systems utilizing a fusing system that opens below the maximum surge current level are unacceptable. The complete TVSS fusing system shall be included in the surge current testing.

10. TVSS systems shall include integral fusing for all suppression components. TVSS designs that rely solely on an electrical panel's main breaker to interrupt phase currents resulting from a shorted suppression component are not allowed.

11. Use of plug-in modules, gas discharge devices or selenium rectifiers is unacceptable.

12. TVSS installed in switchgear, switchboards, and power panels shall have an integral non-fused disconnect, tested to the maximum surge current rating of the device. TVSS installed in lighting panels shall be direct connected to the main bus.

13. Standard Monitoring features
    a. One operational status indicating light per each protected phase.
    b. Audible alarm and alarm indicating light and test switch, enabled via a front panel pushbutton switch.
    c. Dry contacts for remote monitoring purposes, 1NO & 1NC contact. Change in state on MOV failure.
    d. Transient voltage surge counter with battery backup.

b. Mounting

1. TVSS shall be mounted integral or external, and shall not violate the equipment manufacturer's UL label.

END OF SECTION

Division 16660 SECTION 26 28 00 - GROUND-FAULT PROTECTION SYSTEMS

A. PROJECT INCLUDES

1. Ground-fault sensing, relaying, tripping, and alarm devices for installation in distribution switchboards and panelboards rated 600 volts and less.

B. PRODUCTS

1. Ground-Fault Sensing Devices:

   a. Outgoing-Circuit Current Sensors: Current transformer with circuits requiring outgoing-circuit sensing method.
   b. Ground-Return Current Sensors: Current transformer for encircling main bonding jumper connection.
   c. Short Circuit Rating: 200,000 amperes RMS symmetrical.
   d. Outputs: Compatible with relay inputs.

2. Ground-Fault Relays and Monitors:

   a. Ground-Fault Relay: Solid-state type without external electrical power supply required for relay.
   b. Monitor Panels: Ground-fault indicators, control-power indicators, test and reset buttons.

END OF SECTION

DIVISION 16720 SECTION 281328 ELECTRICAL SECURITY LOCKS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01330 – Submittal Procedures.

.2 Section 01770 – Closeout Submittals.

.3 Section 16000 – Electrical Systems

.4 Section 16110 – Raceways, Cables Trays, and Boxes

.5 Section 16140 – Wiring Devices

1.2 SYSTEM DESCRIPTION

.1 Entrance control systems.

.1 System has a contactless smart card reader to allow entry.

.2 Tenant may operate switch to release building entrance door magnetic lock to admit a person.

.3 Systems shall unlock during fire alarm situations in specified areas.

.4 System shall be compatible with existing fire alarm and other control systems.

1.3 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for building entrance control system for incorporation into manual specified in Section 01770 Closeout Submittals.

.2 Include description of system operation.

.3 Include parts list, using component identification numbers standard to electronics industry.

1.4 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with Section 01770 Closeout Submittals.

PART 2 PRODUCTS

2.1 ENTRANCE AREAS

.1 Control and card reader panel at entrance location as indicated on plans.

.1 Buzzer- with emergency response.

.2 Delayed Egress Magnetic Lock – Locknetics M490DE or equal.

.3 Request to exit motion sensor and trim plate- Bosch DS150i or equal.

.4 Remote Door Release button- RCI 909SMOW or equal

.5 Door Position Switch- UTC Security 1078C or equal

.6 Panel Alarm, Desk Mounted- Sentrol 3045 or equal

.7 Card Reader- HID iClass R40 Standard or equal

2.2 DOOR OPENER

.1 Door unlock indication: buzzer, tone, or none- refer to Owner's Representative.

.2 Magnetic door opener for controlled building entrance doors, reversible for left or right hand doors. Materials: compatible with door load and NFPA requirements.

2.3 ADDITIONAL FEATURES

.1 Door open indicating buzzer/tone.

.2 Security alarm.

.3 Panel alarm.

.4 Signalling to office- optional.

.5 Card Readers with contactless smart cards, HID iClass R40 or equal

.6 System/readers that are compatible with existing building locks and control systems.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install system in accordance with manufacturer's instructions.

.2 Connect system to emergency power – unlock specified areas under fire alarm.

3.2 FIELD QUALITY CONTROL

.1 Perform manufacturer's required testing and field verify that all components are working.

.2 Field verify the components are working with the Owner's Representative.

END OF SECTION

Section 16721- Fire Alarm Systems, 28 31 00 Fire Detection and Alarm

1.0 GENERAL

1.1. SUMMARY, SCOPE, & RELATED DOCUMENTS

A. The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the installation of the Fire Alarm System as shown on the drawings and as herein specified.

B. The requirements of the conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.

C. The complete installation is to conform to the applicable sections of NFPA-72, Local Code Requirements and National Electrical Code with particular attention to Article 760, ADA, and all other applicable regulatory requirements.

D. The work covered by this section of the specifications is to be coordinated with the related work as specified elsewhere under the project specifications provided by the Owner's Purchasing Department.

1.2. REGULATORY REQUIREMENTS

A. The system and all associated operations shall be installed in accordance with the following:

1. Guidelines of the following Building Code:
2. NFPA 72, National Fire Alarm Code
3. NFPA 70, National Electrical Code
4. NFPA 101, Life Safety Code
5. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems
6. Other applicable NFPA standards
7. Local Jurisdictional Adopted Codes and Standards
8. ADA Accessibility Guidelines

B. Equipment: All devices, combinations of devices, notification appliances, and equipment, shall be listed for for what they are used and shall be installed in compliance with applicable codes and standards.

C. Type of System: The control panel shall be Listed for power-limited applications per NEC 760 and for compliance with the National Fire Protection Association Standards NFPA 72; for Protected Premises, Public Reporting, and/or Supervising Station fire alarm systems.

D. Type of Service: The control panel shall be Listed for the applicable types of service, i.e.; Manual Alarm, Automatic Alarm, Waterflow Alarm and/or Sprinkler Supervisory Service.

E. Type of Signaling: The control panel shall be Listed for the applicable types of signaling methods used, i.e.; Temporal Coded, Non-Coded, March Time and/or Digital Alarm Communicator (DACT) Signaling.

1.3. SYSTEM DESCRIPTION

A. Fire Alarm System: Provide a complete, supervised, power-limited with backup, fire detection, and evacuation system.

1. All equipment herein depicts the type and quality of the equipment to be furnished. Refer to Submittals, Products/Manufacturers, and Products/Substitutions sections in this specification for further information and qualifications.

B. System Supervision: The fire alarm system shall be an electrically supervised system; which shall monitor the integrity of circuit conductors and power supplies. Performance of fire alarm system circuits shall be in accordance with Class B(Style B) operation for Initiating Device Circuits, and Class B (Style Y) operation for Notification Appliance Circuits. Remote annunciator LEDs and associated wiring and remote emergency control wiring shall be supervised; whereas, an open condition in the circuit shall cause a trouble indication at the control panel.

C. The fire alarm control panel shall allow for loading or editing special instructions and operating sequences as required. The system is to be capable of on-site programming to accommodate facility expansion, building parameter changes, or changes as required by local codes. All software operations are to be stored in a non-volatile, programmable memory resident within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.

D. The ability for selective input/output control functions based on ANDing, ORing, NOTing, and special coded operations is to also be incorporated in the resident software programming of the system.

E. To accommodate and facilitate job site changes, initiation circuits shall be individually configurable on-site to provide either alarm/trouble operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non-latching circuit, or a alarm verification circuit.

F. The control panel shall provide a minimum of 4 amps of power for notification appliances and auxiliary devices. Provisions shall be available for expanding the standard power to provide an additional 5 amps of power for notification appliances and auxiliary devices.

G. The control panel will work with all equipment that will be supplied by the fire alarm contractor to install as new or that is existing at the facility.

H. If equipment of various manufacturers is submitted for approval, the contractor shall state what, if any, specific points of system operation differ from the specified points of the system operation. This differentiation report is to reference every paragraph of this specification. All equipment shall be approved by the Owner's Representative.

1.4. OPERATION

A. Under normal condition, the front panel shall display a "SYSTEM NORMAL" message and the current time and date.

B. Should an abnormal condition be detected, the appropriate LED (Alarm, Supervisory, or Trouble) shall flash. The panel audible signal shall pulse for alarm conditions and sound steadily for trouble and supervisory conditions.

C. The following three characteristics relative to an abnormal condition shall be displayed simultaneously in alphanumeric format. Systems not capable of such a display on the panel faceplate shall include a CRT display meeting the above requirements and must provide a secondary power supply to maintain CRT operation for the duration of the standby requirements of the panel. Information shall include:

1. Custom location label (40 characters minimum).
2. Type of device (i.e. smoke, pull station, waterflow).
3. Status (i.e. alarm, trouble).

D. Pressing the appropriate acknowledge button shall acknowledge the alarm or trouble condition. The acknowledge functions may be passcode protected if the user has insufficient privilege to acknowledge such conditions. A message shall indicate insufficient

privilege but allow the user to view the points without acknowledging them. Should the user have sufficient privilege to acknowledge, a message shall be displayed informing the user that the condition has been acknowledged.

1. Systems not capable of password protected manual command operations shall provide key operated switches for these functions. Function key switches shall be keyed differently from any other keyed switches or locks used within the system.

E. After all the points have been acknowledged, the LEDs shall glow steady and the panel audible signal shall be silenced. The total number of alarms, supervisory, and trouble conditions shall be displayed along with a prompt to review each list chronologically. The end of the list shall be indicated. The first 10 fire alarm zones shall be displayed simultaneously in chronological order.

F. Alarm Silencing

1. Pressing the "Alarm Silence" button shall cause all notification appliances programmed for "On-Until-Silenced" to be deactivated. A separate panel mounted yellow LED shall illuminate to indicate the “alarm silenced” mode.
2. All NACs programmed for "On-Until-Reset" shall remain activated until the system is Reset.
3. Alarm Silence Inhibit Timer
   a) Operation shall include a programmable duration timer that specifies the length of time that notification appliances shall not be deactivated during alarm silence inhibit mode.
   b) The inhibit timer shall be programmable from 0 to 60 minutes in duration.

G. System Reset

1. The "System Reset" button shall be used to return the system to its normal state after an alarm condition has been remedied. The display shall step the user through the reset process with simple English language messages. Messages shall provide operator assurance of the sequential steps (i.e.: "IN PROGRESS", "RESET COMPLETED", and "SYSTEM NORMAL") as they occur, should all alarm conditions be cleared.
2. Should an alarm condition continue to exist, the system shall remain in an abnormal state. System control relays shall not reset. The panel audible signal and the Alarm LED shall be on.

The display shall indicate the total number of alarms, supervisories, and troubles present in the system along with a prompting to review the points. These points shall not require acknowledgment if they were previously acknowledged.

3. Should the Alarm Silence Inhibit function be active, the "System Reset" key press shall be ignored and a message shall be displayed for a short time to indicate that the reset was inhibited. For operator assurance, a message indicating that reset is no longer inhibited shall be displayed when the inhibit function time expires.

H. History Logging.

1. The control panel shall have the ability to store a minimum of (50) events in an alarm log plus a minimum of one hundred (100) events in a separate trouble log. These events shall be stored in a battery protected random access memory (RAM). Systems not having discrete alarm and trouble logging memory shall include an alternate supervised (e.g.: floppy drive, tape cassette) historic recording method with battery backup. Real time and date shall accompany all history event recording.
2. History logs shall be capable of being viewed separately or shall be selectable for viewing as a combined history log that displays both alarm and trouble events in chronological order.

I. Walk Test System Testing

1. The system shall be capable of being tested by one person. While in the test mode, the system shall display a trouble condition.
   a) While in the walk test mode, the activation of an initiating device shall be silently logged as an alarm in the historical log. The panel shall automatically reset after logging the alarm.
   b) The momentary disconnection of an initiating device or notification appliance shall be silently logged as a trouble condition in the historical log. The panel shall automatically reset itself after logging of the trouble condition.
   c) Integrity of the installation conductors of IDCs and NACs shall be verified by momentarily opening any circuit.
   d) Walk Test of ground fault circuit testing shall be verified by operating the Notification Appliances for 4

seconds.

2. Optionally, the Walk Test sequence shall have the capability of activating NACs to signal with a code associated with the alarmed zone. If this option is selected, any momentary opening of initiating or NAC wiring shall cause the notification appliances to sound for 4 seconds to indicate the trouble condition. The Walk Test feature shall automatically revert to the normal operating mode after eight (8) hours if it is not manually activated.
3. Suppliers of systems not having this feature as functionally specified above shall include a testing agreement meeting the requirements of NFPA-72 in their base bid quotation. As a minimum, two (2) years of scheduled testing shall be included.

J. LED Supervision

1. All slave module LEDs shall be supervised for burnout or disarrangement. Should a problem occur, the panel shall display the module and the LED location numbers to facilitate location of that LED.

K. Active Status Reminder

1. Should any Alarm, Supervisory, or Trouble condition be present within the system and the audible signal silenced, the local tone alert shall resound every 8 hours (each change of work shift) to act as a reminder that the fire alarm system is not 100% operational.

L. Access Levels

1. There shall be a minimum of four (4) access levels. Passcodes shall consist of up to four (4) digits. Changes to passcodes shall only be made by authorized personnel.
    a) Systems not capable of password protected manual command operations shall provide key operated switches for these functions. Function key switches shall be keyed differently from any other keyed switches or locks used within the system.
2. In order to maintain security when entering a passcode, the entered digits shall not be displayed.
3. When a correct passcode is entered, a message indicating acceptance shall be displayed. The new access level shall be in effect until the operator manually logs out or leaves the keypad inactive for ten (10) minutes.
4. When an incorrect passcode is entered, a message shall be

displayed indicating that the passcode was invalid

5. Access to a level shall only allow the operator to perform all actions within that level and all actions of lower levels, not higher levels.
6. The following keys/switches shall have access levels associated with them:
   a) Alarm Acknowledge
   b) Supervisory Acknowledge
   c) Trouble Acknowledge
   d) Alarm Silence
   e) System Reset

1.5. ALARM SEQUENCE

A. The system alarm operation subsequent to the alarm activation of any manual station, automatic detection device, or sprinkler flow switch is to be as follows:

1. Audible alarm notification appliances shall sound a Temporal Code audible fire alarm signal until silenced by the alarm silence switch at the control panel or the remote annunciator.
2. Visible alarm notification appliances:
   a) Strobes shall display a continuous synchronized pattern until extinguished by the Alarm Silence Switch or a successful System reset.
3. All doors normally held open by door control devices shall release.
4. A supervised signal to notify the local fire department or an approved central station is to be activated. To accommodate and facilitate job site changes, the type of "city connection circuit" is to be on-site configurable to provide either a "reverse polarity", "local energy", or dry contact connection.
5. An alarm is to be displayed on the panel display as defined in the OPERATION section of these specifications. The alarm LED shall flash on the control panel until the alarm has been acknowledged.. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone after acknowledged shall flash the alarm LED on the control panel and the panel display shall show the new alarm information.
6. A pulsing alarm tone shall occur within the control panel and any required remote annunciators until acknowledged.

B. The alarm activation of any elevator lobby smoke detector shall, in addition to the operations listed above, cause the elevator cabs to be recalled according to the following sequence:

1. If the alarmed detector is on any floor other than the main level of egress, the elevator cabs shall be recalled to the main level of egress.
2. If the alarmed detector is on the main egress level, the elevator cabs shall be recalled to the predetermined alternate recall level as determined by the local authority having jurisdiction.

C. The control panel is to have a dedicated supervisory service LED and a dedicated supervisory service acknowledge switch.

1. The activation of any standpipe or sprinkler valve tamper switch shall activate the system supervisory service audible signal and illuminate the LED at the control panel and any required remote annunciators. Differentiation between valve tamper activation and opens and/or grounds on fire alarm initiation circuit wiring shall be provided.
2. A combination waterflow/sprinkler supervisory switch IDC type shall allow a single pair of wires to monitor both conditions. Waterflow monitor shall have priority over sprinkler supervisory monitoring.
3. Activating the Supervisory Service Acknowledge Switch shall silence the supervisory audible signal while maintaining the Supervisory Service LED on indication that the tamper contact is still in the off-normal state.
4. Restoring the valve to the normal position shall cause the Supervisory Service LED to extinguish, indicating restoration to normal.

D. A manual evacuation means shall be provided to activate the system NACs.

E. Activation of an auxiliary bypass means shall override the automatic functions either selectively or throughout the system.

F. Alarm and trouble conditions shall be immediately displayed on the control panel front alphanumeric display. If more alarms or troubles are in the system, the operator shall be able to manually scroll to display new alarms. The first 10 fire alarm zones in alarm shall be displayed simultaneously in chronological order.

G. The system shall have an alarm list means that shall allow the operator to display all alarms, troubles, and supervisory service conditions with the time of occurrence. This shall allow for the

determination of the most recent alarm and may also indicate the path that the fire is taking.

H. All doors normally held open by door control devices shall release upon AC power failure.

I. The control panel shall be capable of supplying 9 Amps @ 24 VDC power output for external system use including power for NACs.

1.6. SUPERVISION

A. The system shall contain up to 36 Class B(Style B) independently supervised initiation circuits so that a fault in any one zone shall not affect any other zone. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit.

B. There shall be sprinkler supervisory initiation device circuits for connection of all sprinkler valve tamper switches to perform the Supervisory Service Operation. This independent initiation circuit shall be labeled Supervisory Service and shall differentiate between tamper switch activation and wiring faults.

C. Notification Appliance Circuits shall be independently supervised and fused. Disarrangement conditions of any circuit shall not affect the operation of other circuits.

D. Each independently supervised circuit shall include a discrete panel readout to indicate disarrangement conditions per circuit.

E. The incoming power to the system shall be supervised so that any power failure must be audibly and visibly indicated at the control panel and at any required remote annunciators. A green "power on" LED shall be displayed continuously while incoming power is present.

F. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visibly indicated at the control panel and any required remote annunciators.

1. Additional monitoring shall be provided to initiate a depleted battery warning at the panel when battery operation has exceeded the battery capacity.

G. The System Expansion Modules shall be electrically supervised for module placement. Should a module become disconnected from the controls, the system trouble indicator must illuminate and

audible trouble signal must sound.

H. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes. Restoration of a disabled circuit displays the status of the circuit and initiates a count down timer allowing the operator to "Abort the Enable" to prevent unwanted activation of notification appliances, off-premise reporting, and emergency controls.

1. The count down timer shall be programmable from the front panel to be from 0 to 60 minutes.

1.7. POWER REQUIREMENTS

A. The control panel shall receive AC power (as noted on the plans) via a dedicated, fused disconnect circuit.

B. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC mains power in a normal supervisory mode for a period of 24 hours with 5 minutes of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.

C. All circuits requiring system operating power shall be 24 VDC and shall be individually fused at the control panel.

1.8. QUALIFICATIONS

A. Manufacturer: The Manufacturer shall be a nationally recognized company specializing in detection and alarm systems. This organization shall employ factory trained and NICET certified technicians, and shall maintain a service organization within 100 miles of this project location. The Manufacturer and service organization shall have a minimum of 10 years experience in the fire detection and alarm systems industry.

B. Installer: The installation organization shall be a company specializing in the installation of detection and alarm systems. This organization shall have a minimum of 10 years experience with installation of fire detection and alarm systems. The fire alarm system shall be installed by NICET certified or factory trained installers.

C. The organization supplying final check-out, contractual service and testing, shall be Listed and Authorized by UL to provide services for alarm system Certification as a means of identifying compliance with applicable NFPA Standards.

1.9. SUBMITTALS

A. Submit Manufacturer product data sheets for all proposed devices and equipment.

B. Provide wiring diagrams, equipment ratings, dimensions, and finishes for all proposed devices and equipment.

C. Submittals must include a time frame for the installation of all the systems and the system outages. System outages must be coordinated with the Owner's Representative.

D. If submittals, upon review by the Owner and/or the Owners Representative, are found not to conform with the performance, type and quality of products as well as all other requirements of these specifications; the Contractor shall be required to resubmit. The Contractor shall be responsible for the Owner's extra expenses for subsequent review(s) of rejected submittals. Such extra fees shall be deducted from payments by the Owner to the Contractor. Approval of the submittals by the Owner shall, in no case, relieve the Contractor of the responsibility to meet the requirements of this specification.

1.10. PROJECT RECORD (AS-BUILT) DRAWINGS

A. The Contractor shall provide and maintain on the site an up-to-date record set of approved shop drawings.

B. Record drawings shall include location of end-of-line device locations.

C. Upon completion of the work, and final acceptance by the local authority, the Contractor shall submit record drawings to the Owner and the Engineer.

1.11. OPERATION AND MAINTENANCE DATA

A. Submit Manufacturer data sheets for all equipment installed in hard copies (3) and electronic (PDF) formats.

B. Include operating, installation, and routine maintenance instructions in hard copies (3) and electronic (PDF) formats.

C. Include Manufacturer letter stating the date of installation on which the system is operational with the hard copies and the electronic (PDF) formats.

PART 2 – PRODUCTS

2.1. MANUFACTURERS

A. Manufacturers: All Manufacturers that meet or exceed the requirements stated in this document shall be able to bid the design. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

1. Simplex Grinnell or Owner Approved Equal

2.2. SUBSTITUTIONS

A. Other equipment may be substituted as long as the level of quality and performance of operation is equal to, or greater than, that which is specified. The Owner and/or Owners Representative shall make the determination as to whether or not the equipment is acceptable.

2.3. FIRE DETECTION AND CONTROL PANEL

A. Where shown on the plans, provide and install a Fire Alarm Control Panel. Construction shall be modular with solid state, microprocessor based electronics.

1. A local audible device shall sound during Alarm, Trouble or Supervisory conditions. This audible device shall pulse to indicate alarm conditions and shall be on steadily for Supervisory or Trouble conditions.

B. Primary Keys & Panel Display

1. The Control Panel's display shall be backlit for enhanced readability. So as to conserve battery standby power, it shall not be lit during an AC power failure unless an alarm condition occurs or there should be keypad activity.

C. The display shall support both upper and lower case letters. Lowercase letters shall be used for softkey titles and prompting the user. Uppercase letters shall be used for System Status Information. A cursor shall be visible when entering information.

D. The fire alarm control panel cabinet shall provide the following features:

1. The fire alarm control panel shall be housed in a single cabinet capable of housing the maximum of expansion and optional modules required for system feature upgrading or system expansion.
2. The cabinet shall be equipped with lock and transparent door panel providing freedom from tampering yet allowing full view of the various displays and pertinent operator controls.
3. The printed circuit board assemblies of the control panel shall be mounted such that removal of a common, single piece mounting chassis shall provide access for installing the cabinet and for pulling wires into the cabinet.
4. Provisions for semi-flush mounting between 2-foot center stud wall construction.
5. Cabinet color shall be the Owner's Representative's Choice.
6. To facilitate installation, the cabinet shall provide:
   a) Built-In depth gauges for 1/2 " thick drywall installation.
   b) Built-In knockouts for nail holes and wiring conduit entrance.
   c) A built-in trim band to allow semi-flush mounting into rough-cut wall openings.

PART 3 – EXECUTION

3.1. INSTALLATION, GENERAL

A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.

B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:

1. Factory trained and certified personnel.
2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.
3. Personnel licensed or certified by state or local authority.

3.2. EQUIPMENT INSTALLATION

A. Furnish and install a complete Fire Alarm System as described herein. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.

B. Existing Fire Alarm Equipment shall be maintained fully operational until the new equipment has been tested and accepted. The Owner's Representative with the AHJ will make the decision on which components need to be replaced. Some components may be re-used on the existing systems.

C. Equipment Removal: After acceptance of the new fire alarm system, disconnect and remove the existing fire alarm equipment and restore damaged surfaces. Package operational fire alarm and detection equipment that has been removed and deliver to the Owner. Remove from the site and legally dispose of the remainder of the existing material.

D. Water-Flow and Valve Supervisory Switches: Connect for each sprinkler valve required to be supervised.

E. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.

3.3. WIRING INSTALLATION

A. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AH and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).

B. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Engineer of Record, Owner's Representative, and Fire Alarm System Manufacturer.

C. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.

3.4. FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:

1. Factory trained and certified.
2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
3. International Municipal Signal Association (IMSA) fire alarm certified.
4. Certified by a state or local authority.
5. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

C. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

D. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.

E. Minimum System Tests: Test the system according to the procedures outlined in NFPA 72.

F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.

H. Final Test, Certificate of Completion, and Certificate of Occupancy:

1. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy.

3.5. CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.

B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.6. TRAINING

A. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.

1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 8 hours' training.
2. Schedule training with the Owner at least seven days in advance.

END OF SECTION

DIVISION 16782 SECTION 283100 SECURITY CAMERAS

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Video cameras.

.2 Video handling- if necessary – consult with Owner's Representative-

.3 Recording devices- if necessary – consult with Owner's Representative-

.4 Transmission methods.

1.2 RELATED SECTIONS

.1 Section 01330 – Submittal Procedures.

.2 Section 01770 – Closeout Submittals.

.3 Section 16000 – Electrical Systems

.4 Section 16110 – Raceways, Cables Trays, and Boxes

.5 Section 16140 – Wiring Devices

1.3 Reference Standards

.1 Electronic Industries Association (EIA)

.1 REC 12749, Power Supplies.

.2 RS 16051, Sound Systems.

.2 National Fire Protection Association (NFPA)

.1 NFPA 70, National Electric Code.

.2 NFPA 101, Life Safety Code.

.3 Underwriters' Laboratories (UL)

.1 UL 294, Standard for Safety for Access Control System Units.

.2 UL 1076, Standard for Safety for Proprietary Burglar Alarm Units and Systems.

1.4 DEFINITIONS

.1 CCTV: Closed Circuit Television.

.2 CCVC: Closed Circuit Video.

.3 CCD: Charge Coupled Device.

.4 FOV: Field of View.

1.5 DESIGN PERFORMANCE REQUIREMENTS

.1 Support: Camera functions such as pan/tilt and zoom fully supported by the existing CCTV system.

.1 Provide operator with ability to control all camera functions.

.2 Alarm point monitoring: System capable, upon alarm recognition, of switching CCTV cameras associated with alarm point.

.3 Switching:

.1 Provision to switch any camera in system to any monitor in system, manually or automatically.

.2 Provision to switch system video recorders to selective monitor outputs in system.

.4 Control: Provision for any camera equipped with pan, tilt, and/or motorized zoom lens:

.1 Two Way Audio Streaming Capable

.2 Varible focus with remote zoom and focus.

.3 IR corrected

.4 Megapixel resolution

.5 Video Compression JPEG

.6 Video Streaming with individually configurable streams in H.264 and Motion JPEG. Controllable frame rate and bandwidth.

.5 Enter and edit CCTV programs and save them for future use.

.6 Set dwell time for viewing of any camera picture.

.7 Define sequence for viewing cameras on each monitor.

.8 Bypass cameras in system during sequencing to monitor.

.9 Provide ability to display stored 'video image' of cardholder, and switch real-time camera to card reader location for specific card usage.

.10 Overall control of CCTV provided through software control, which provides complete integration of security components.

.11 Environment: Design video components and systems to operate with all specified requirements under following ambient temperatures:

.1 Indoor installations:

.1 Temperature: 0°C to 50°C.

.2 Humidity: 15 to 85%.

.2 Outdoor installations:

.1 Temperature: -40°C to 55°C.

.2 Humidity: 10 to 100%.

1.6 SUBMITTALS

.1 Product Data: Submit manufacturer's printed product literature, specifications and datasheet.

.2 Submit shop drawings to indicate project layout, camera locations, point-to-point diagrams, cable schematics, risers, mounting details and identification labeling scheme including:

.1 Functional description of equipment.

.2 Technical data sheets of all devices.

.3 Device location plans and cable lists.

.4 Video camera surveillance chart.

.5 Video interconnection detail drawings.

.3 Submit one sample of each camera selected complete with housing, brackets and mounting hardware.

.4 Camera will be returned for incorporation into work as appropriate.

.5 Test Reports: Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.6 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.1 Submit UL Product safety Certificates.

.2 Submit verification Certificate that service company is "UL List alarm service company".

.3 Submit verification Certificate that monitoring facility is "UL Listed central station".

.4 Submit verification Certificate that video surveillance system is "Certified alarm system".

.7 Instructions: Submit manufacturer's installation instructions.

.8 Manufacturer's Field Services: Submit copies of manufacturer's field reports.

.9 Maintenance Data: Submit maintenance data for incorporation into manual specified in Section 01110- Closeout Submittals. Include following:

.1 System configuration and equipment physical layout.

.2 Functional description of equipment.

.3 Instructions on operation, adjustment and cleaning.

.4 Illustrations and diagrams to supplement procedures.

.5 Manufacturer's operation instructions

1.7 WARRANTY

.1 Manufacturer's Warranty: Submit, for Owner’s Representative's acceptance, manufacturer's warranty document executed by authorized company official, stating that the video surveillance system is warranted against defects in operation, material and workmanship for a period of 24 months from the date the Owner’s Representative has given the written final approval on the total project. See Division 01770 for warranty information.

1.8 TRAINING

.1 Arrange and pay for on-site lectures and demonstrations by system manufacturer to train operational personnel in the use and maintenance of the system.

.2 See section 01770 for information on the training.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Video Camera Characteristics: Axis IP Video Camera model P3346 or equal.

.1 Black and White or Colour as required.

.2 Sensitivity: Lighting requirements. Measured in LUX for useable video image.

.3 Resolution: Lines of resolution:.

.1 Colour: High resolution 800x600

.2 Frame Rate: 30 fps in all resolution

.4 Environment: Indoor or outdoor as required.

.5 Mounting: Visible.

.6 Lens functions: Motorized auto electronic iris.

.7 Addition features: Backlight compensation.

.8 Operational voltage: Standard 24 AC, 12 DC.

.9 Power Supply: Power over IEEE 802.3af

.10 Operation temperature $0^{o}C$ - $50^{o}C$.

.11 Connectors: RJ-45 Cat 5 or 6 cables – 1 terminal block for 1 alarm input and 1 output - 3.5mm line in and 3.5mm line out.

.12 Audio Streaming: Two-Way, Internal microphone input line with microphone supplied by manufacturer.

.2 Video Handling – Optional – Consult with Owner's Representative

.1 Sequential Switcher: Supporting 4, 8 or 16 cameras as required rack mounted.

.2 Performance attributes:

.1 Sequential switcher: 480 mm (19") rack mounted, with each video input selectable, from front panel, for continuous viewing, sequencing or for removal from the sequencing cycle.

.2 Sequential switching: Silent in operation and occur during picture vertical interval.

.3 Switcher: Automatically and sequentially switch video inputs to one monitor output (output #1).

.4 Sequential switcher's second video output (output #2) to automatically display alarmed camera input or manually

selected camera input. This unit can be consolidated with the Digital Control System.

.5 Switcher position number: To coincide with camera display number.

.3 Technical Characteristics

.1 Impedance: 75 Ohms UNBAL.

.2 Input: 1 V pp +/- 0.1 V pp (one for each signal, plus spares).

.3 Output: Two, 1.0 V pp.

.4 Frequency response: Zero to 6.0 mHz + 0.5 dB.

.5 Sequencing speed: Variable, 1.0 to 45 SEC.

.4 Quad Splitter:

.1 Performance attributes: Capable of processing four individual video inputs into one composite video signal consisting of original four signals displayed in four quadrants of output composite signal. Unit to contain front panel controls which, when selected, will produce full screen display of selected input signal or freeze selected quadrant.

.2 Technical characteristics

.1 Video inputs: 1.0 V pp +/- 0.3 V.

.2 Video outputs: 1.0 V pp +/- 0.5 V.

.3 H resolution: 300 Lines, B/W.

.5 Multiplexer: Support groups of 4, 8, 9, 16 cameras as required ;

.1 Features:

.1 Permit multi-screen display of live camera images as they are being recorded.

.2 Video loss detection.

.3 Video motion detection.

.4 Security lock.

.5 Call monitor output.

.6 Multi display formats e.g.: 4x4, 3x3, 2x2 etc.

.2 Multi-screen display: Permit screen to split to show 1, 4, 7, 10, 13 or 16 images at same time.

.3 Live-on-playback and play-back-live: Permit live camera images while monitoring so that image can be shown on screen at same time.

.1 Permit live camera image to be shown during playback.

.4 Auto sequential switching: Permit switching between cameras one field at a time to allow smooth flowing of multi-screen displays.

.5 Electronic image functions: Permit capability to zoom or freeze images from live and recorded sources.

.6 Camera title indicator: Permit an 8 character title to be accorded to each channel.

.7 Alarm function: Provide 16 alarm inputs and 2 alarm outputs for each camera.

.8 I.D./time-date generator: Provide as built-in calendar function with capability to display time and date on monitor or not, and in recording or playback mode.

.9 On-screen setup menus: Provide on-screen menus and accessible push buttons permitting quick and easy setup and operation.

.10 Alarm log function: 100 events.

.11 Provide S-video input/output terminal.

.6 Matrix Switcher.

.1 As required.

.7 Digital control system, multiple stations

.1 Performance attributes:

.1 Multiple station digital control system -- Computer Operable: Solid-state, provide remote control of multiple camera, pan and tilt units, lenses.

.2 Designed to select each camera station individually and provide full remote control of all functions at that camera station.

.3 Operate in conjunction with homing video switcher to automatically assume control of camera that has been "homed" in on.

.4 Capable of being consolidated with the Sequential Switcher.

.2 Control functions required

.1 Power: On and off.

.2 Station select: Individual station (labeled).

.3 Pan and tilt: Left to right and up and down.

.4 Focus: Near, far.

.5 Zoom: In, out.

.3 Recording: Digital Recording- Consult with Owner’s Representative-

.1 Features:

.1 Recording speed mode: as required.

.2 Either a DVR or internet/computer based recording device

.3 Fast forward/rewind time: as required

.4 Recording speeds; standard.

.5 Playback control: Jog and shuttle

.6 Alarm recording:

.1 Alarm recording: Provide system with capability to switch to alarm recording when an externally

connected alarm sensor is triggered and begin to record situation that triggered alarm.

.2 Alarm display: Equip unit to flash AL on screen during alarm recording and display number of alarms.

.3 Alarm scan: Provide scan feature to search whole tape for alarm recordings and play the first 15 seconds of each alarm.

.7 I.D./time and date generator: Provide built-in microprocessor equipped with calendar capable of setting internal timer, display current time and manage other clock-related functions on monitor and on digital display.

.8 Time recording: Provide unit with capability to preset time recording on daily or weekly basis and special holidays. Settings to be performed and confirmed on monitor.

.4 Camera Housings

.1 Indoor: Wall, ceiling or corner mount.

.2 Domes: Indoor and Outdoor.

.3 Outdoor: Equipped with heater/blower.

.4 Covert

.5 Transmission Methods: IEEE 802.3af – Cat 5 or 6 ethernet Cable.

2.2 CAMERA POWER SUPPLY

.1 Power supply: Power over ethernet IEEE 802.3af

2.3 JUNCTION BOX

.1 Metal, sized to handle all system conduit interconnections with appropriate expansion.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install video surveillance equipment and components in accordance with current NFPA 70 NEC.

.2 Install cable, boxes, mounting hardware, brackets, video cameras and system components in accordance with manufacturer's written installation instructions.

.3 Install components secure, properly aligned and in locations shown on reviewed shop drawings.

.4 Connect cameras to cabling in accordance with installation instructions.

.5 Install UL labels where required.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Services:

.1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.

.2 Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, at stages listed:

.1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.

.2 During progress of Work at 50% and 90% complete.

.3 Commissioning of the work.- see section 3.4.

.4 Obtain reports, within 14 days of review, and submit, immediately, to the Owner’s Representative and the Engineer.

3.4 VERIFICATION & COMMISSIONING

.1 Perform verification inspections and test in the presence of Owner’s Representative.

.1 Provide all necessary tools, ladders and equipment.

.2 Ensure appropriate subcontractors, and manufacturer's representatives and security specialists are present for verification.

.2 Visual verification: Objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:

.1 Sturdiness of equipment fastening.

.2 Non-existence of installation related damages.

.3 Compliance of device locations with reviewed shop drawings.

.4 Compatibility of equipment installation with physical environment.

.5 Inclusion of all accessories.

.6 Device and cabling identification.

.7 Application and location of UL approval decals.

.3 Technical verification: Purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:

.1 Measurements of tension and power.

.2 Connecting joints and equipment fastening.

.3 Measurements of signals (dB, lux, baud rate, etc).

.4 Compliance with manufacturer's specification, product literature and installation instructions.

.4 Operational verification: Purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:

.1 Operation of each device individually and within its environment.

.2 Operation of each device in relation with programmable schedule and or/specific functions.

.3 Operation control of camera lens, pan, tilt and zoom.

.4 Switching of camera to any monitor.

.5 Switching of system video recorder to selective monitor.

.6 Set dwell times.

.7 Demonstrate:

.1 Sequence viewing of cameras on each monitor.

.2 Bypass capability.

.3 Display of stored image to cardholder.

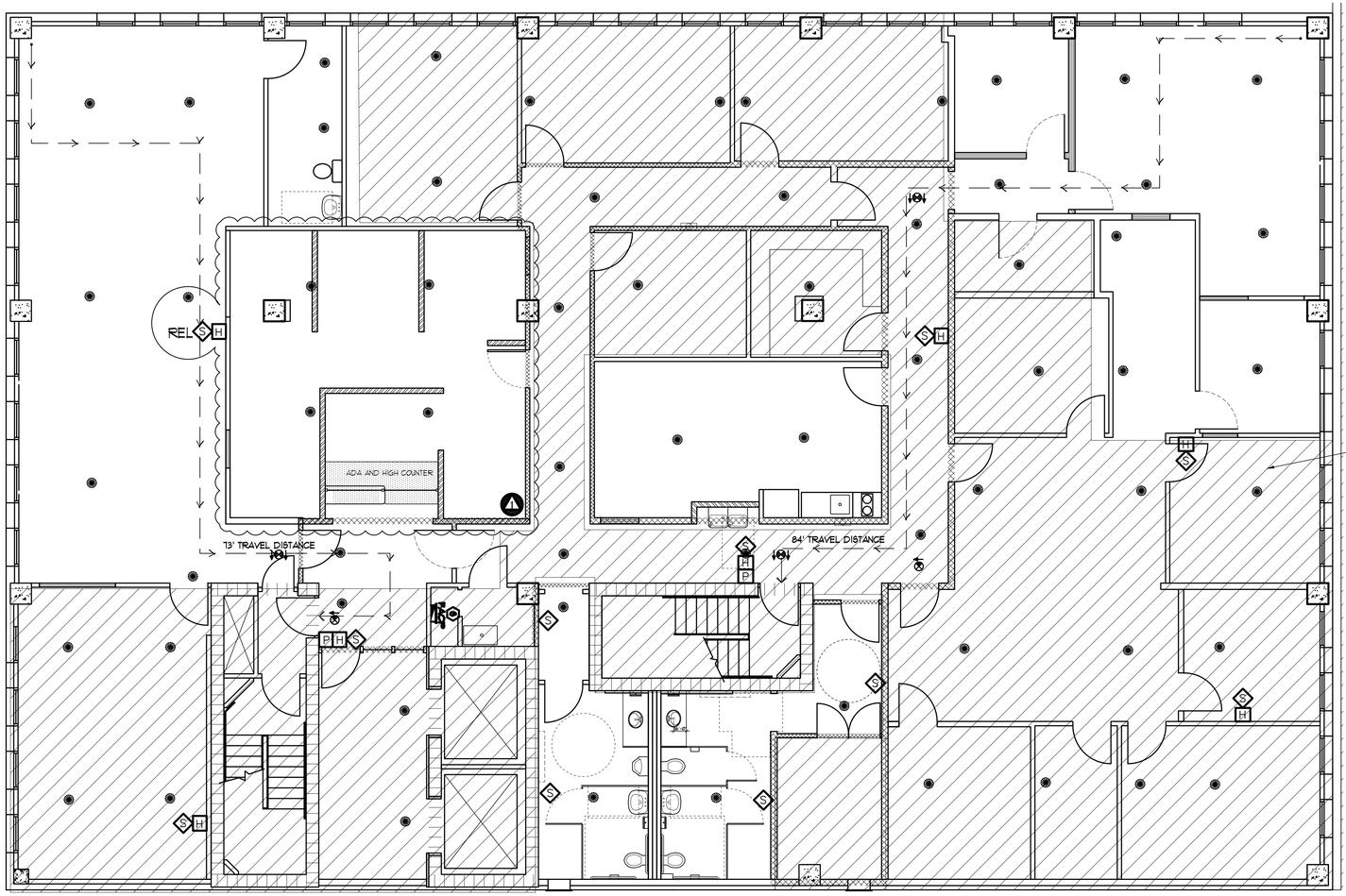
3.5 CLEANING AND ADJUSTING

.1 Remove protective coverings from cameras and components.

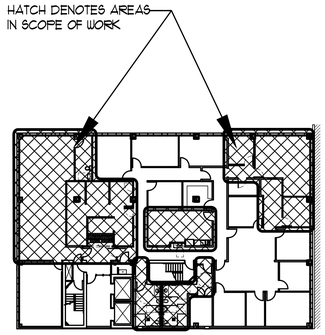
.2 Adjust cameras for correct function.

.3 Clean camera housing, system components and lens, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

END OF SECTION



HATCH DENOTES AREAS NOT IN SCOPE OF WORK

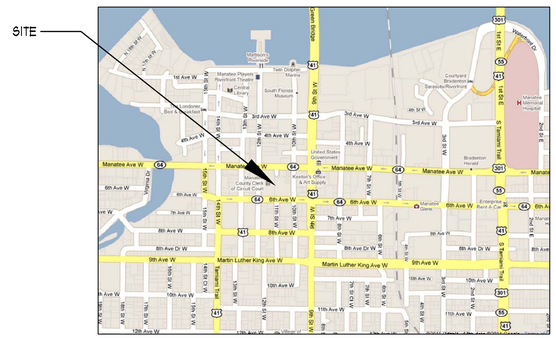


ADDRESS: 1051 W MANATEE AVE BRADENTON 34205
PID: 3302600006

NORTH

5 KEY PLAN

N.T.S.



NORTH

4 VICINITY MAP

1" = 1,000'-0"

BUILDING FACTORS

CLASSIFICATION OF BUILDING BY OCCUPANCY:	BUSINESS
CLASSIFICATION OF BUILDING BY CONSTRUCTION TYPE:	III B (UNPROTECTED)
SPRINKLERED:	YES
CODES IN EFFECT and YEAR:	2007 FLORIDA BUILDING CODE EXISTING BUILDING, ALTERATION LEVEL 2 2008 NEC 2007 FLORIDA FIRE PREVENTION CODE

BUILDING HEIGHT & AREA / AREA MODIFICATION (TABLE 503)

BUILDING HEIGHT	(ALLOWABLE / ACTUAL)	NO CHANGE
NUMBER OF STORIES	(ALLOWABLE / ACTUAL)	NO CHANGE
MAXIMUM ALLOWABLE FLOOR AREA PER STORY:		NO CHANGE
ACTUAL FLOOR AREA per FLOOR:		NO CHANGE
FLOOR AREA ENTIRE BUILDING:		NO CHANGE

FIRE RESISTANCE RATING OF BUILDING COMPONENTS AND PERCENTAGE OF OPENINGS (TABLES 601 AND 602)

INTERIOR BEARING WALL RATING REQUIREMENTS:	0 HOUR NO CHANGE
INTERIOR NON- BEARING WALL RATING REQUIREMENTS:	0 HOUR NO CHANGE
FLOOR CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS):	0 HOUR NO CHANGE
ROOF CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS):	0 HOUR NO CHANGE
EXIT ACCESS ENCLOSURES / CORRIDORS (Table 1017.1):	1 HOUR NO CHANGE
EXIT ENCLOSURES / STAIRS:	N/A

DESIGN LOADS AND STRESSES (FBC Table 1607.1)

FLOOR:	LL = 100 PSF - SLAB ON GRADE (DL)

SCOPE OF WORK

Scope of work consists of reconfiguration of interior walls of office spaces. Reconfiguration of existing toilet rooms to an ADA compliant condition, and installation of ADA compliant Hi/Lo Drinking Fountain. Modifications to existing power, lighting, fire protection systems as depicted in plans.

3 BUILDING CODE ANALYSIS

GENERAL CONTRACTOR SHALL COORDINATE MODIFICATIONS TO THE FIRE SUPPRESSION AND ALARM SYSTEMS WITH THE FIRE PROTECTION CONTRACTOR AND BUILDING OWNER

BUSINESS OCCUPANT LOAD
73
GROSS FLOOR AREA
7,245 SF

THE CONTRACTOR IS REQUIRED TO IDENTIFY FIRE RATED WALLS WITH SIGNS OR STENCILING, SUCH IDENTIFICATION SHALL BE ABOVE ANY DECORATIVE CEILING AND IN CONCEALED SPACES. SUGGESTED WORDING: (FIRE AND SMOKE BARRIER PROTECT ALL OPENINGS)

LIFE SAFETY LEGEND

A	EMERGENCY LIGHT FIXTURE W/ BATTERY PACK	S	STROBE
	EMERGENCY CAN LIGHT FIXTURE W/ BATTERY PACK	H S	HORN STROBE
	EMERGENCY LIGHT FIXTURE W/ BATTERY PACK		SMOKE DETECTOR
	SPRINKLER HEAD	ANN	FIRE ALARM PANEL
	EXIT LIGHT FACES AS REQUIRED	2A10BC	FIRE EXTINGUISHER
	EXIT LIGHT WITH DIRECTION		1-HOUR FIRE RATED WALL
P	FIRE ALARM PULL STATION		2-HOUR FIRE RATED WALL
NOTE: NOT ALL ARE SYMBOLS USED		←	EGRESS PATH

EMERGENCY EXIT AND EGRESS LIGHTS SHALL BE CONNECTED TO THE LOCAL LIGHTING CIRCUIT AHEAD OF ANY SWITCHING

2 LIFE SAFETY PLAN

3/16" = 1'-0"

1 INDEX OF DRAWINGS

1/4" = 1'-0"

JERRY N. ZOLLER AIA P.A.
ARCHITECT / PLANNER
AA C000557
914 14th STREET W, BRADENTON, FL 34205 TEL: (941) 748-4465
FL. REG. 5926

OLD MANATEE COUNTY SHERIFFS OFFICE REMODEL
5TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

JOB NO	0202C
DATE	MAR 04, 2011
DRAWN	DAB
CHECKED	DA
REVISIONS	
1	8/31/11 - ADD REC. DESK & SHUTTER
2	11/10/11 - CHANGE SCOPE AND CORRECTIONS

A-0

P:\Active\2000\2002C - Old Judicial Center 5th floor\0202C Coversheet and Plans.dwg, A-0 Coversheet, 11/17/2011 10:18:17 AM, dbutrey

WALL LEGEND

- INDICATES EXISTING BLOCK WALLS
- INDICATES ORIGINAL INTERIOR WALLS
- INDICATES EXISTING TO BE REMOVED
- INDICATES EXISTING PARTITION WALLS WITH 3-5/8" LIGHT GAUGE METAL STUDS @ 16" ON CENTER. APPLY 5/8" GYPSUM BOARD EACH SIDE AND SOUND BATT INSULATION, FILL, TAPE, AND PAINT TO MATCH EXISTING.
- INDICATES PARTITION WALLS WITH 3-5/8" LIGHT GAUGE METAL STUDS @ 16" ON CENTER WITH 5/8" GYPSUM BOARD EACH SIDE AND SOUND BATT INSULATION FILL, TAPE, AND PAINT TO MATCH EXISTING.

GENERAL NOTES

1. ALL DEMOLITION SHALL BE PERFORMED IN A SOUND, GOOD WORKMANLIKE FASHION & IN ACCORDANCE WITH ALL CODE REQUIREMENTS.
2. OWNER SHALL VERIFY THAT THE BUILDING IS FREE OF ANY ASBESTOS CONTAINING MATERIALS PRIOR TO DEMOLITION. IF ASBESTOS IS FOUND TO BE PRESENT, CONTRACTOR SHALL PROCEED IN STRICT COMPLIANCE WITH PROCEDURES OUTLINED BY THE ASBESTOS ABATEMENT CONSULTANT.
3. SALVAGE EXISTING SECURITY SYSTEM COMPONENTS FOR RE-USE.
4. SALVAGE EXISTING FLUORESCENT LIGHT COMPONENTS FOR RE-USE.
5. CONTRACTOR SHALL PROPERLY SHORE EXISTING CONSTRUCTION AS NECESSARY PRIOR TO ALL DEMOLITION.
6. ALL NEW AND REPLACEMENT INTERIOR FINISHES SHALL BE CLASS C FLAME SPREAD RATED OR BETTER.
7. DIMENSIONS ARE FROM FACE OF EXISTING WALLS AND TO FINISH OF STUD WALL

DEMOLITION / CONSTRUCTION TAG LEGEND :

1. REMOVE DOOR & FRAME
2. REMOVE PORTION OF EXISTING FRAMED NON-BEARING WALLS
3. REMOVE EXISTING CEILING GRID AND ACCOUSTIC TILE AS REQUIRED
4. REMOVE EXISTING FLOORING
5. REMOVE EXISTING PLUMBING FIXTURES AND PARTITIONS
6. REMOVE, RELOCATE, OR SALVAGE EXISTING LIGHT FIXTURES REPLACE AS SHOWN ON ELECTRICAL PLAN

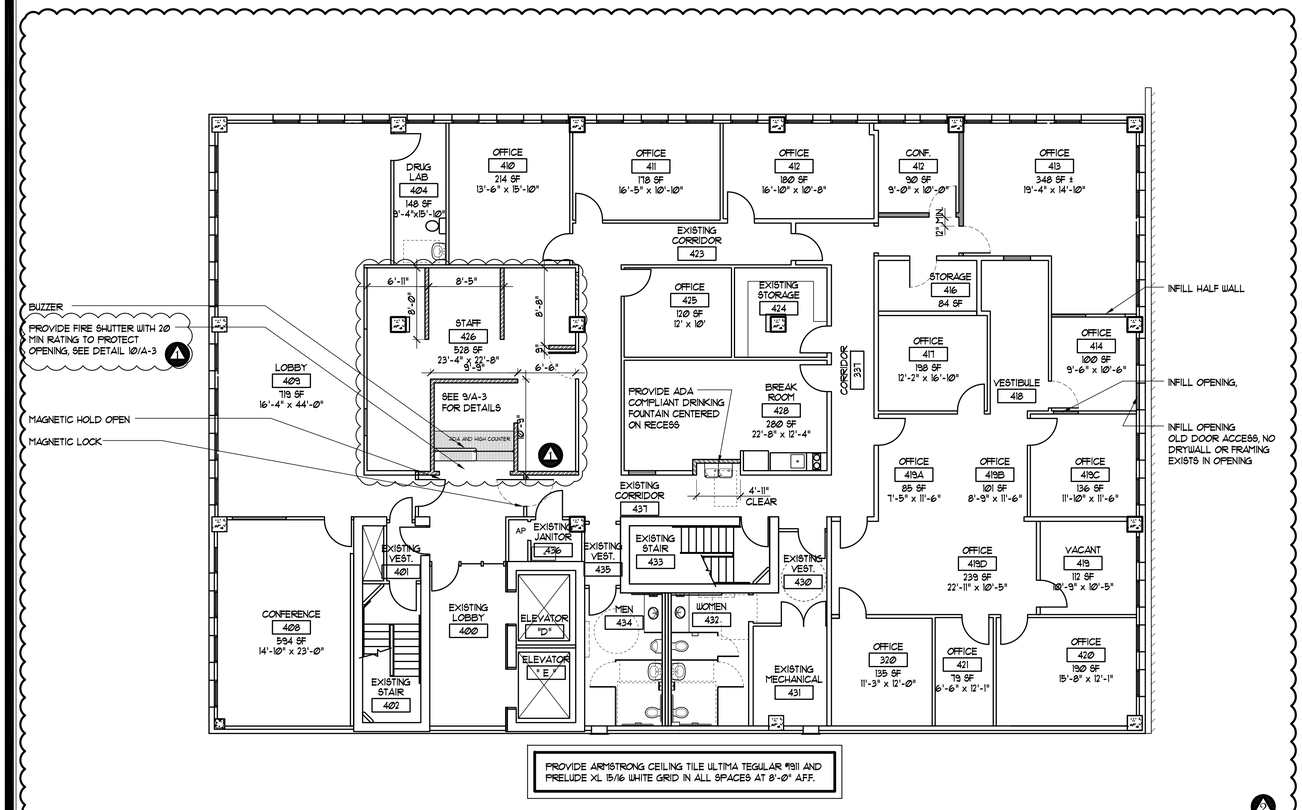
NOTE:
ALL DEMOLITION WORK IS COMPLETE, PLAN SHOWN FOR REFERENCE ONLY

DEMOLITION NOTES :

AS PART OF THE DEMOLITION PROCESS, ALL AREAS IN WHICH DEMOLITION IS TAKING PLACE IS TO BE ISOLATED FROM THE BUILDING'S AIR CONDITIONING SYSTEM AND THE SPACE IS TO BE ISOLATED AND UNDER NEGATIVE PRESSURE WITH RESPECT TO THE MAIN BUILDING. THE CONTRACTOR SHALL PROVIDE A DEMOLITION PROTOCOL TO THE ARCHITECT FOR REVIEW PRIOR TO COMMENCING CONSTRUCTION. THE AIR CONDITIONING SYSTEM IN THE AREA BEING DEMOLISHED IS TO BE TURNED OFF AND THE DUCT WORK SEALED TO PREVENT ANY DUST OR DEBRIS FROM ENTERING THE SYSTEM.

1. ELECTRICAL: REMOVE / RELOCATE ANY ELECTRICAL / DATA OUTLETS IN ALL WALLS & PARTITIONS TO BE REMOVED, TYPICAL.
2. CEILING: EXISTING CEILING MOUNTED DEVICES (IE: FIRE ALARM, DIFFUSERS, SELECTED LIGHT FIXTURES, PHONE, ELECTRICAL RECEPTACLES, EMERGENCY LIGHT UNITS, EXIT SIGNS, SPEAKERS & ENERGY MANAGEMENT CONTROL SYSTEMS) ARE TO REMAIN, PROVIDE TEMPORARY SUPPORT BY STEEL WIRE CAPABLE OF SUPPORTING THE DEVICES FULL WEIGHT AFTER CEILING SYSTEMS ARE REMOVED. ALL TROFFER FLUORESCENT FIXTURES SHALL HAVE TWO SUPPORTING WIRES LOCATED ON OPPOSITE CORNERS. REMOVE ALL FLEX CONDUIT FROM DEMOLISHED LIGHT FIXTURES BACK TO JUNCTION BOX(ES).
3. MECHANICAL: EXISTING HVAC DUCTWORK/ RETURN & SUPPLY GRILLES, ETC. ARE TO REMAIN, PROVIDE TEMPORARY SUPPORT BY STEEL WIRE CAPABLE OF SUPPORTING THE DEVICES FULL WEIGHT AFTER CEILING SYSTEMS ARE REMOVED.
4. PLUMBING: REMOVE EXISTING PLUMBING FIXTURES AND CAP ALL WATER LINES & PLUG ALL SANITARY LINES BELOW SLAB/ IN WALLS / ABOVE FINISHED CEILING.
5. FIRE PROTECTION: THE EXISTING FIRE SPRINKLER SYSTEM SHALL REMAIN INTACT & FULLY OPERATIONAL.

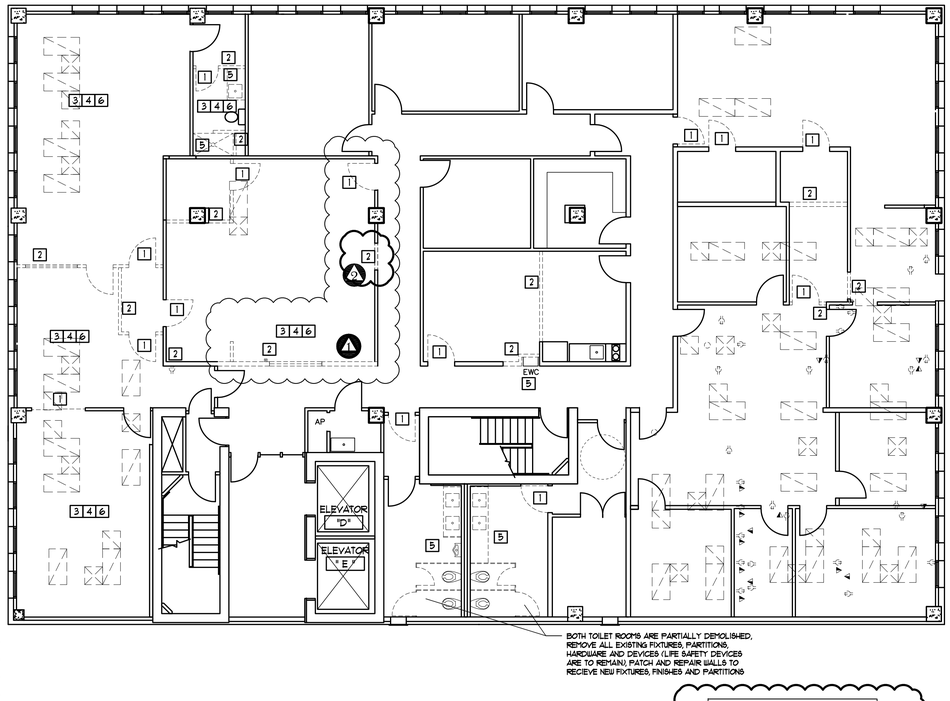
   WARNING: EXTREME CARE SHALL BE EXERCISED WHILE REMOVING ADJACENT CEILING SYSTEM(S) FROM AROUND FIRE SPRINKLER HEADS TO ENSURE THAT THEY ARE NOT ACTIVATED. CONTRACTOR SHALL LOCATE FIRE SPRINKLER EMERGENCY SHUT-OFF VALVE(S) PRIOR TO COMMENCING DEMOLITION



NORTH

2 PROPOSED PLAN

1/4" = 1'-0"



NOTE:
ALL DEMOLITION WORK IS COMPLETE, PLAN SHOWN FOR REFERENCE ONLY

NORTH

1 EXISTING / DEMO PLAN

1/4" = 1'-0"

JERRY N. ZOLLER AIA
ARCHITECT / PLANNER P.A.
AA C000557
914 14th STREET W. BRADENTON, FL 34205 TEL: (941) 748-4465 FL. REG. 5926

OLD MANATEE COUNTY SHERIFFS OFFICE REMODEL

5TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

JOB NO	0202C
DATE	MAR 04, 2011
DRAWN	DAB
CHECKED	DA

REVISIONS
1 8/2011/22/2011 REC. DESK & SHUTTER
2 11/10/11 - CHANGE SCOPE AND CORRECTIONS

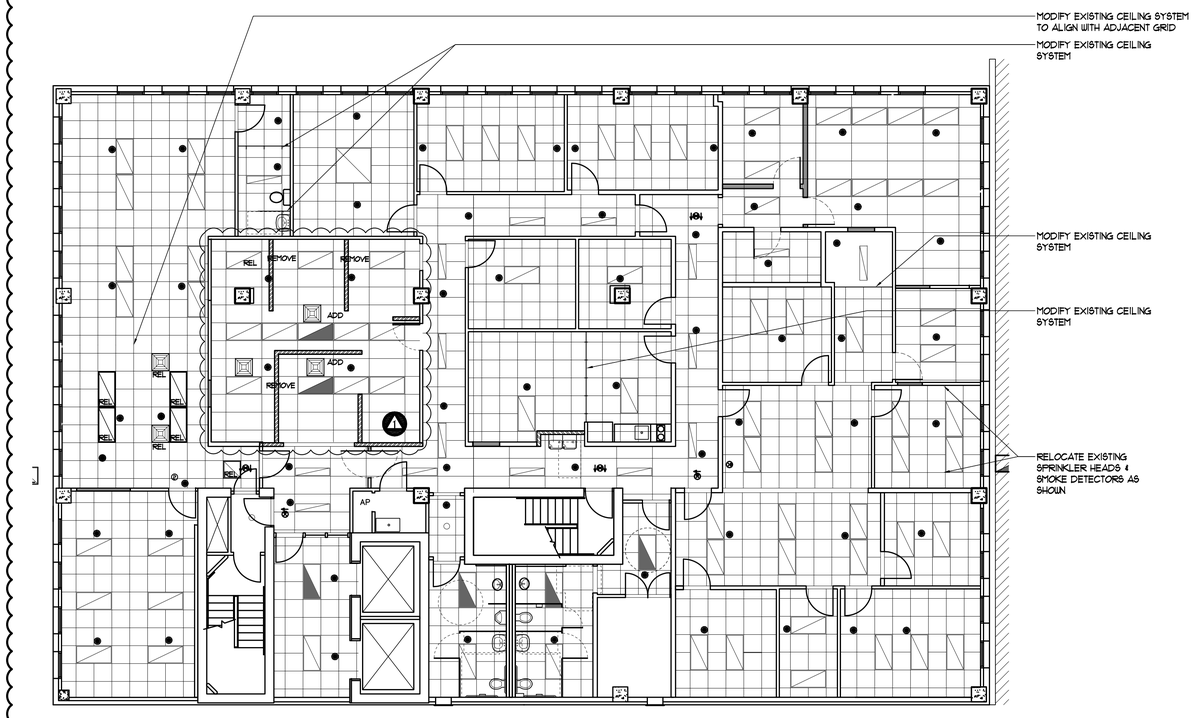
A-1

P:\Active\2000\0202C - Old Judicial Center 5th Floor\0202C Coversheet and Plans.dwg, A-1, 11/17/2011 10:16:25 AM, dautrey

NOTES OMITTED

WALL LEGEND	
	INDICATES EXISTING BLOCK WALLS
	INDICATES ORIGINAL INTERIOR WALLS
	INDICATES EXISTING TO BE REMOVED
	INDICATES PARTITION WALLS W/ 3-5/8" LIGHT GAUGE METAL STUDS @ 16" ON CENTER W/ 5/8" GYPSUM BOARD EACH SIDE AND SOUND BATT INSULATION.

ELECTRICAL SYMBOL LEGEND	
	DUPLEX OUTLET
	DEDICATED OUTLET 220V
TV	CABLE TV JACK
T	TELEPHONE / DATA JACK IN 2X4 ROUGH IN BOX WITH 3/4" CONDUIT STUBBED OUT IN SPACE ABOVE CEILING
	CEILING MOUNTED SPRINKLER HEAD
S	SMOKE ALARM DEVICE
$	SWITCH
	2X4 FLOURSCENT LIGHT (REUSE OR MATCH EXISTING)
	HVAC REGISTER
	RETURN OR EXHAUST REGISTER
	EXISTING / PROPOSED — TYPICAL WITH ALL OF THE SYMBOLS
REL	RELOCATED FIXTURE
NEW	NEW FIXTURE

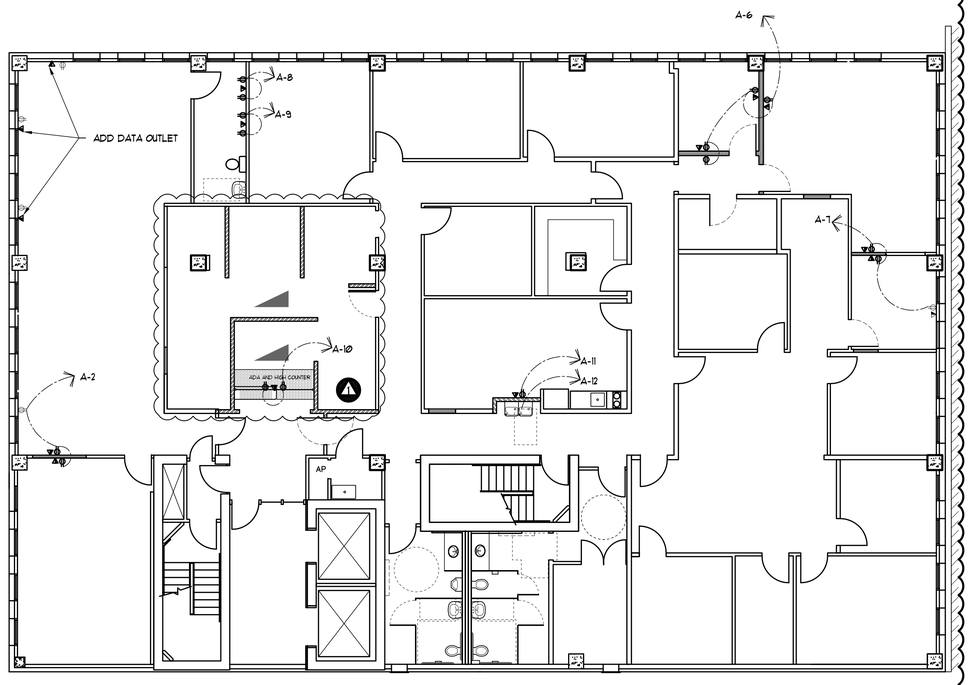


PROVIDE ARMSTRONG CEILING TILE ULTIMA TEGULAR #911 AND PRELUDE XL 15/16 WHITE GRID IN ALL SPACES AT 8'-0" AFF.

EMERGENCY EXIT AND EGRESS LIGHTS SHALL BE CONNECTED TO THE LOCAL LIGHTING CIRCUIT AHEAD OF ANY SWITCHING

2 REFLECTED CEILING / LIGHTING PLAN

1/4" = 1'-0"



SWITCHING AND CIRCUITS NOT SHOWN ARE TO REMAIN

NORTH

1 POWER PLAN

1/4" = 1'-0"

JERRY N. ZOLLER AIA
ARCHITECT / PLANNER P.A.
AA C000557
914 14th STREET W, BRADENTON, FL 34205 TEL: (941) 748-4465 FL. REG. 5926

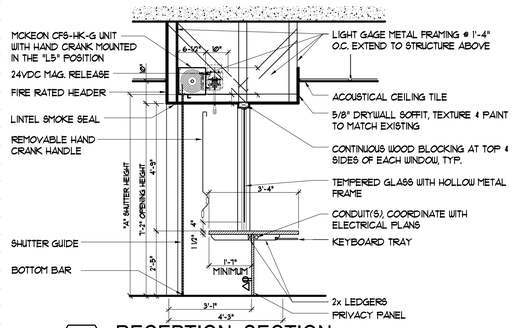
OLD MANATEE COUNTY SHERIFFS OFFICE REMODEL

5TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

JOB NO	0202C
DATE	MAR 04, 2011
DRAWN	DAB
CHECKED	DA
REVISIONS	
1	8/31/11 - ADD REC. DESK & SHUTTER
2	11/10/11 - CHANGE SCOPE AND CORRECTIONS

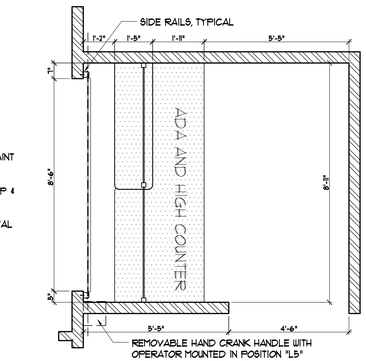
A-2

P:\Active\2009\0202C - Old Judicial Center 5th Floor\0202C Coversheet and Plans.dwg, A-2, 11/17/2011 10:15:53 AM, dautrey



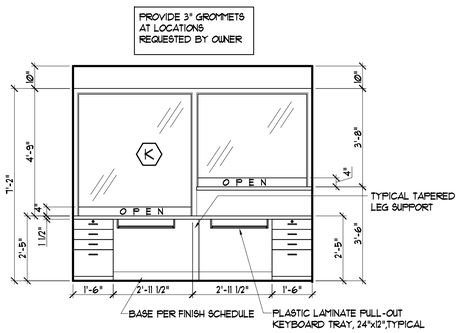
10 RECEPTION SECTION

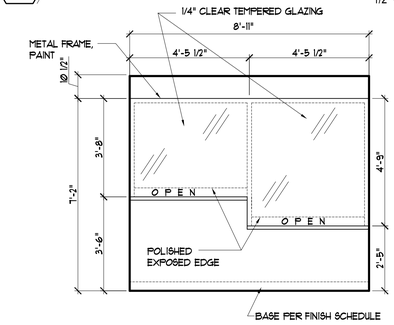
1/2" = 1'-0"



9 RECEPTION PLAN

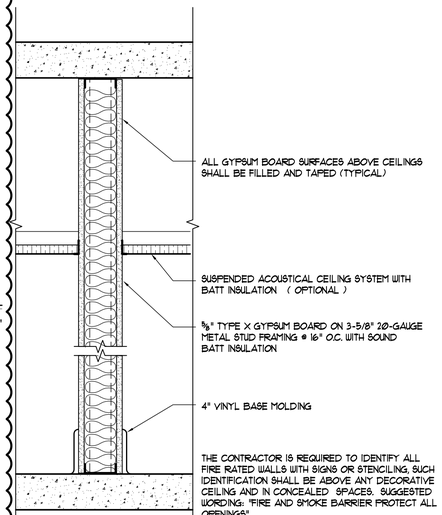
1/2" = 1'-0"





8 RECEPTION DESK ELEVATIONS

1/2" = 1'-0"



COMPLIES WITH UL DESIGN U419

7 TENANT SEPERATION WALL DETAIL

1-1/2" = 1'-0"

NOTE: RESTROOM DIMENSIONS ARE IN COMPLIANCE WITH FIGURE 28 & SECTION 11-422 FLORIDA BUILDING CODE - 2007 EDITION (PAGE 11.10)

THIS PROJECT FALLS BELOW THE THRESHOLD STATED IN THE 2007 FLORIDA BUILDING CODE 105.3.1.2 REQUIRING SEALED ENGINEERED DRAWINGS. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO DEFINE THE LEVEL OF PERFORMANCE REQUIRED OF THE CONTRACTOR. THE PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT AND SIZING OF ALL WATER SUPPLY PIPING AND ALL SANITARY WASTE AND VENT PIPING.

PLUMBING NOTES

1. PROVIDE STOP OR ANGLE VALVES ON EACH WATER CONNECTION TO EACH PLUMBING FIXTURE.
2. WHEN A PIPE SIZE IS NOT INDICATED, SIZE THAT PIPE THE SAME AS LAST UPSTREAM SIZE SHOWN.
3. PLUMBING SYSTEM INSTALLER SHALL PROVIDE ALL STRUCTURAL MEMBERS, SUPPORTS, BRACKETS, FLASHING, HARDWARE ETC., REQUIRED TO INSTALL A COMPLETE AND CODE COMPLIANT SYSTEM.
4. EACH FIXTURE SHALL BE PROVIDED WITH AIR CHAMBER/SHOCK ABSORBER TO PREVENT WATER HAMMER.
5. PLUMBING SYSTEM INSTALLER SHALL MAINTAIN DESIGN SHOWN ON CONSTRUCTION DOCUMENTS AS MUCH AS PRACTICAL REPORTING MAJOR CHANGES TO ARCHITECT FOR HIS APPROVAL PRIOR TO COMMENCING WITH THE WORK.
6. LAVATORY DRAIN PIPES AND WATER SUPPLY PIPES SHALL BE INSULATED TO PREVENT INJURY.

TOILET ACCESSORIES

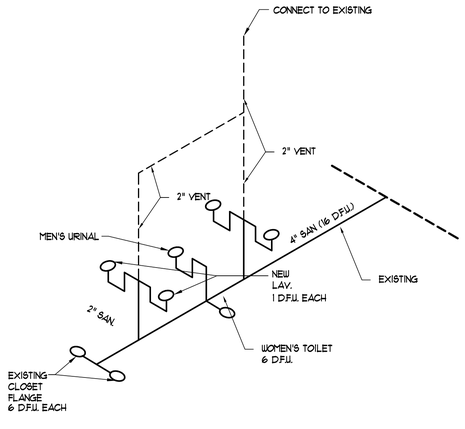
- (A) 1/4" PLATE GLASS MIRROR AND CONCEALED SUPPORT BRACKETS WITH STAINLESS STEEL FRAME.
- (B) SURFACE MOUNTED PAPER TOWEL DISPENSER MOUNTED AT 44" A.F.F. SELECTED BY OWNER. (OWNER OPTIONAL)
- (C) SURFACE MOUNTED TOILET TISSUE DISPENSER MOUNTED AT 19" A.F.F. (SELECTED BY OWNER)
- (D) 42" HANDICAPPED GRAB BAR MOUNTED AT 36" A.F.F. TO CENTER, SELECTED BY OWNER (PROVIDE WOOD BACKING AS NECESSARY)
- (E) 36" HANDICAPPED GRAB BAR MOUNTED AT 36" A.F.F. TO CENTER, SELECTED BY OWNER. (PROVIDE WOOD BACKING AS NECESSARY.)
- (F) BABY CHANGING STATION

NOTE: TOILET ACCESSORIES TYPICAL IN ALL ACCESSIBLE RESTROOMS

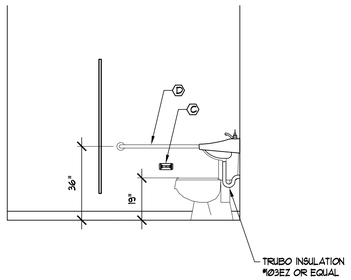
1. NOT ALL SCHEDULE SYMBOLS USED IN EVERY PROJECT. REFER TO PLANS & ELEVATIONS
2. LAVATORY DRAIN PIPES AND WATER SUPPLY PIPES SHALL BE INSULATED TO PREVENT INJURY.
3. PROVIDE SOLID P.T. WOOD BLOCKING IN WALLS OF ALL TOILET ROOMS TO SUPPORT ALL ADA ACCESSORIES INCLUDING GRAB BARS, (INCLUDES TOILET ROOMS WHERE BARS ARE NOT SHOWN), TYPICAL.
4. ALL GRAB BAR TO BE SECURELY FASTENED TO RESIST 250 POUND LOAD APPLIED VERTICAL OR HORIZONTAL.
5. ALL PARTITIONS SHALL BE PHENOLIC. (OWNER OPTION)

PLUMBING FIXTURE & PIPE SIZING SCHEDULE

FIXTURE	WASTE	VENT	C.W.	H.W.	DESCRIPTION
WATER CLOSET ADA COMPLIANT	4"	2"	1/2"		"TOTO" MODEL NO. CST704L, 1.6 GPF ELONGATED 2 PIECE VITREOUS CHINA TOILET. WITH "TOTO" MODEL NO. SS114 SOFTCLOSE TOILET SEAT (OR EQUAL)
URINAL ADA COMPLIANT	2"	2"	3/4"		"TOTO" MODEL NO. UT447E WITH MANUAL FLUSH VALVE NO. TMUL1N2#CP URINAL IS ADA COMPLIANT WHEN TOP OF RIM IS INSTALLED AT 17" A.F.F.
LAVATORY ADA COMPLIANT	1-1/2"	2"	1/2"	1/2"	"TOTO" MODEL NO. LHT241.8G - SUPREME MOUNT WALL LAVATORY, WITH "MOEN" MODEL NO. L4621 CHATEAU SINGLE HANDLE LAVATORY FAUCET, WITH METAL WASTE ASSEMBLY (OR EQUAL)
KITCHEN SINK SINGLE COMPARTMENT	1-1/2"	2"	1/2"	1/2"	JUST MODEL SL-16171-B-GR, 20 GAUGE STAINLESS STEEL, 4" CENTERS FAUCET DRILLINGS , COUNTERTOP MOUNTED WITH GRIP-RIM AND J-35 STRAINER. FAUCET JUST NO. JTR-51-LH4.

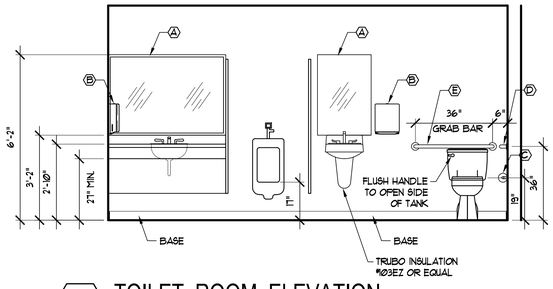


6 PLUMBING ISOMETRIC



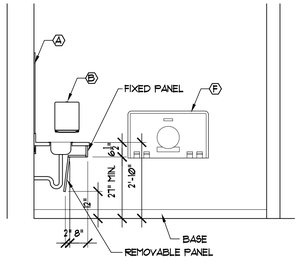
5 TOILET ROOM ELEVATION

1/2" = 1'-0"



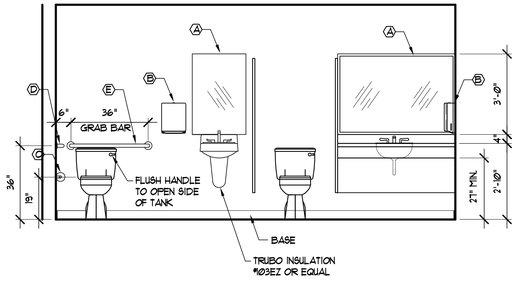
3 TOILET ROOM ELEVATION

1/2" = 1'-0"



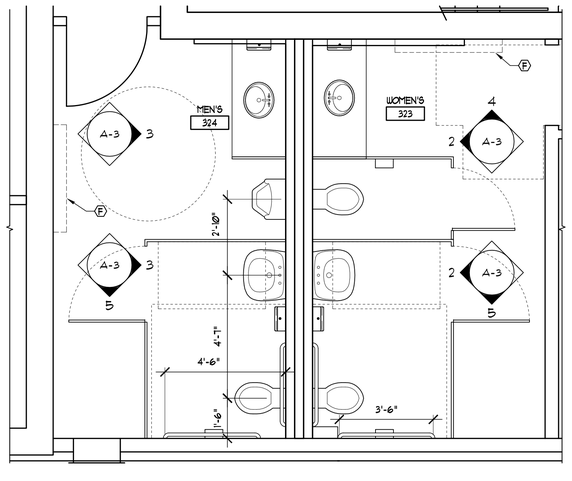
4 TOILET ROOM ELEVATION
MEN'S MIRRORED

1/2" = 1'-0"



2 TOILET ROOM ELEVATION

1/2" = 1'-0"



NORTH

1 ENLARGED PLUMBING PLAN

1/2" = 1'-0"

JERRY N. ZOLLER AIA P.A.
ARCHITECT / PLANNER AA C000557
914 14th STREET W, BRADENTON, FL 34205 TEL: (941) 748-4465 FL. REG. 5926

OLD MANATEE COUNTY SHERIFFS OFFICE REMODEL
5TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

JOB NO 0202C
DATE MAR 04, 2011
DRAWN DAB
CHECKED DA
REVISIONS
1 8/31/11 - ADD REC. DESK & SHUTTER
2 11/10/11 - CHANGE SCOPE AND CORRECTIONS

A-3

P:\Active\2000\2002C - Old Judicial Center 5th Floor\0202C Coversheet and Plans.dwg, A-3, 11/7/2011 10:41:19 AM, dbailey

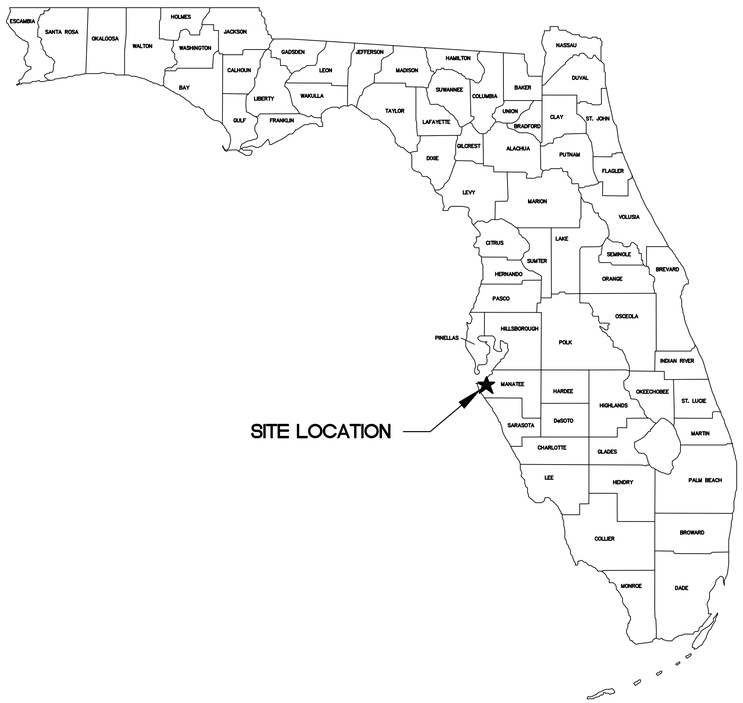
OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5th FLOOR INTERIOR REMODEL
1051 MANATEE AVENUE WEST
BRADENTON, FLORIDA 34206
IFAS# WO100354; WA#32

MANATEE COUNTY GOVERNMENT

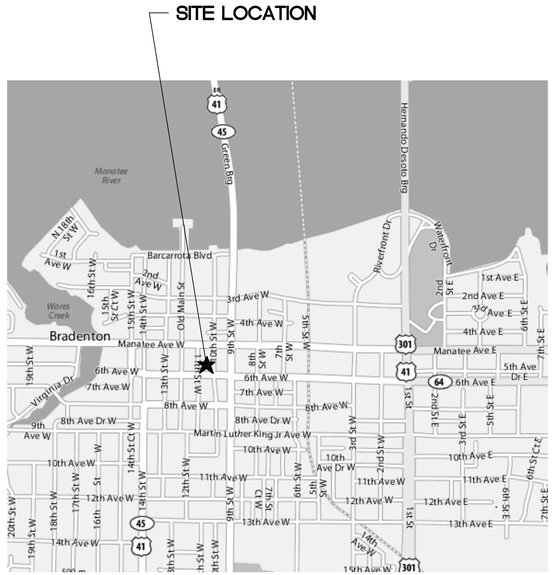
Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018



LOCATION MAP
FLORIDA



SITE MAP

SHEET SCHEDULE

SHEET	DESCRIPTION
COVER	PROJECT NAME, LOCATION and SITE MAPS, SHEET SCHEDULE
E1.0	ELECTRICAL LEGEND, SYMBOLS & GENERAL NOTES
E2.0	5TH FLOOR LIGHTING PLAN
E3.0	ELECTRICAL 4TH FLOOR POWER AND SYSTEMS PLAN
E3.1	ELECTRICAL 5TH FLOOR DEMO POWER AND SYSTEMS PLAN
E3.2	ELECTRICAL 5TH FLOOR NEW POWER AND SYSTEMS PLAN
E3.3	5TH FLOOR SECURITY SYSTEMS PLAN
E3.4	ELECTRICAL ROOF PLAN
E4.0	ELECTRICAL DETAILS
E5.0	ELECTRICAL ONE-LINE AND FEEDER SCHEDULES
E5.1	ELECTRICAL PANELBOARD SCHEDULES
E6.0	ELECTRICAL NOTES, DETAILS AND FIXTURE SCHEDULE
FP1.0	FIRE SPRINKLER LEGEND, SYMBOLS & GENERAL NOTES
FP2.0	FIRE SPRINKLER 4TH FLOOR DEMO PLAN
FP2.1	FIRE SPRINKLER 5TH FLOOR DEMO PLAN
M1.0	MECHANICAL LEGEND, SYMBOLS & GENERAL NOTES
M2.0	MECHANICAL EXISTING 4TH FLOOR PLAN
M2.1	MECHANICAL EXISITING 5TH FLOOR DEMO PLAN
M2.2	MECHANICAL 5TH FLOOR NEW PLAN
M2.4	MECHANICAL ROOF PLAN
M3.0	MECHANICAL SCHEDULES
M4.0	MECHANICAL DETAILS
M4.1	MECHANICAL DETAILS
S0.1	STRUCTURAL SPECIFICATIONS AND 4TH FLOOR PLAN
S0.2	STRUCTURAL 5TH FLOOR PLAN AND ROOF PLAN
S0.3	STRUCTURAL DETAILS

Karins Engineering Group, Inc.

FL. Cert. of Auth. # 8371
2017 Fiesta Drive
Sarasota, FL 34231
(941) 927-8525/ Fax (941) 927-8075
John F Bonacci, PhD, PE
FL. Registration # 63063

SEAL

To the best of the engineer's knowledge, said plans and specifications comply with the applicable building codes and the applicable minimum fire safety standards as determined in accordance with Chapters 553 and 633, Florida Statutes.

ATP ENGINEERING SOUTH, PL
SARASOTA, FLORIDA
ENGR. BUSINESS #8908
941-360-2181

SEAL

FL#53458

ELECTRICAL SYMBOLS AND ABBREVIATIONS

NOTE:
THESE ARE STANDARD SYMBOLS AND MAY NOT ALL APPEAR ON THE PROJECT DRAWINGS; HOWEVER WHEREVER THE SYMBOL APPEARS ON THE PROJECT DRAWINGS, THE ITEM SHALL BE PROVIDED AND INSTALLED.

EQUIPMENT

SYMBOL	DESCRIPTION
MDP	DISTRIBUTION PANELBOARD AND CABINET – RECESSED MOUNT
MDP	DISTRIBUTION PANELBOARD AND CABINET – SURFACE MOUNT
A	BRANCH PANELBOARD AND CABINET – RECESSED MOUNT
A	BRANCH PANELBOARD AND CABINET – SURFACE MOUNT
A	LOAD CENTER – SURFACE MOUNT
A	LOAD CENTER – RECESSED MOUNT
A–XX	DENOTES PANEL/PANELBOARD DESIGNATION
X Y	MOTOR "X" INDICATES HORSEPOWER "Y" INDICATES PHASE
X PF	CAPACITOR "X" INDICATES KVAR
X/Y A/AT	DISCONNECT SWITCH – FUSED "X"= RATING, "Y" = FUSE SIZE
	DISCONNECT SWITCH – NON–FUSED
	DISCONNECT SWITCH – CIRCUIT BREAKER
☒	MOTOR STARTER
☒	COMBINATION MOTOR STARTER
T XX	DRY TYPE TRANSFORMER – "XX" INDICATES KVA
Ⓜ	METER SOCKET
Ⓜ	CURRENT TRANSFORMER METER SOCKET
TV SS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
Ⓖ	GENERATOR
N E ATS/MTS L	TRANSFER SWITCH ATS = AUTOMATIC TRANSFER SWITCH MTS = MANUAL TRANSFER SWITCH N = NORMAL POWER E = EMERGENCY POWER L = LOAD
	WIREWAY
B B	BUSWAY
⏚	GROUND CONNECTION
S_x	HORSEPOWER RATED MANUAL MOTOR STARTER TOGGLE SWITCH WITH THERMAL OVERLOAD PROTECTION "X" INDICATES AS FOLLOWS NONE – SINGLE POLE 2 – 2 POLE 3 – 3 POLE
S_xP_y	HORSEPOWER RATED MANUAL MOTOR STARTER TOGGLE SWITCH WITH THERMAL OVERLOAD PROTECTION WITH PILOT LIGHT "X" INDICATES AS FOLLOWS NONE – SINGLE POLE 2 – 2 POLE 3 – 3 POLE "Y" INDICATES AS FOLLOWS Y – YELLOW LENS G – GREEN LENS R – RED LENS W – WHITE LENS B – BLUE LENS A – AMBER
A	LOW VOLTAGE DRAWOUT TYPE CIRCUIT BREAKER "X" INDICATES AS FOLLOWS A – AIR TYPE S – SF6 TYPE V – VACUUM TYPE
	MOLDED CASE CIRCUIT BREAKER
	DRAW OUT MOTOR STARTER ASSEMBLY

RACEWAY SYSTEM

SYMBOL	DESCRIPTION
———	CONCEALED CONDUIT
[——]	4" CONDUIT SLEEVE WITH BUSHINGS THRU WALL ABOVE CEILING
—XX—	LETTER DESIGNATION REFERS TO SYSTEM (SEE ABBREVIATIONS)
A–XX, F50, PHASE CONDUCTORS, GROUND, SWITCH LEG, NEUTRAL	QUANTITY OF CONDUCTORS OR CABLES IN CONDUIT "F50" DENOTES THE FEEDER SIZE "A–XX" DENOTES PANEL AND CIRCUIT #
———○	CONDUIT TURNED UP
———)	CONDUIT TURNED DOWN
□	JUNCTION OR PULL BOX
┼┼┼┼┼	CABLE TRAY
— · —○	U/G CONDUIT TURNED UP
— · —)	U/G CONDUIT TURNED DOWN

LIGHTING

SYMBOL	DESCRIPTION
X–2–C	X = FIXTURE TYPE, 2 = CIRCUIT NUMBER, C = SWITCH LEG F – FLUORESCENT K – INCANDESCENT H – H.I.D.
	FLUORESCENT STRIP TYPE FIXTURE
	FLUORESCENT TYPE FIXTURE
	FLUORESCENT TYPE FIXTURE WITH EMERGENCY BATTERY BALLAST
¤	CEILING MOUNT LIGHT FIXTURE
○	CEILING MOUNT RECESSED LIGHT FIXTURE
	WALL MOUNT FIXTURE
	LIGHT POLE WITH ONE FIXTURE (FIXTURE LOCATION AND SPACING AS SHOWN)
	2 HEAD POLE LIGHT. LOCATION AND SPACING AS SHOWN.
	3 HEAD POLE LIGHT. LOCATION AND SPACING AS SHOWN.
	4 HEAD POLE LIGHT. LOCATION AND SPACING AS SHOWN.
⊗	EXIT LIGHT –CEILING MOUNTED ARROWS DENOTE EGRESS PATH
⊗	EXIT LIGHT – WALL MOUNTED ARROWS DENOTE EGRESS PATH
	EMERGENCY WALL MOUNT W/ BATTERY UNIT
	EXIT / EMERGENCY WALL MOUNT W/ BATTERY UNIT ARROWS DENOTE EGRESS PATH
	EMERGENCY WALL MOUNT REMOTE HEAD

DEVICES

SYMBOL	DESCRIPTION
X	DUPLEX RECEPTACLE – NORMAL CIRCUIT "X" INDICATES AS FOLLOWS: NONE = 20 AMP, 125VAC GFI = 20 AMP, 125VAC, GROUND FAULT INTERRUPTER TYPE HM = 20 AMP, 125VAC, HORIZONTAL MOUNT TYPE IG = 20 AMP, 125VAC, ISOLATED GROUND TYPE S = 20 AMP, 125VAC, TVSS PROTECTION TYPE WP = 20 AMP, 125VAC, WEATHERPROOF TYPE
	DOUBLE DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE – ABOVE COUNTER. 44" AFF
	DOUBLE DUPLEX RECEPTACLE – ABOVE COUNTER. 44" AFF
	SINGLE RECEPTACLE – SEE DRAWINGS AND SPECIFICATIONS.
	SPECIAL RECEPTACLE – SEE DRAWINGS AND SPECIFICATIONS.
	SINGLE RECEPTACLE – FLOOR, SEE DRAWINGS AND SPECIFICATIONS.
	DUPLEX RECEPTACLE – FLOOR, SEE DRAWINGS AND SPECIFICATIONS.
Ⓒ HEIGHT	CLOCK RECEPTACLE – 120VAC
S	TOGGLE SWITCH – SINGLE POLE
S2	TOGGLE SWITCH – DOUBLE POLE
S3	TOGGLE SWITCH – 3–WAY
S4	TOGGLE SWITCH – 4–WAY
Sa	TOGGLE SWITCH – a– INDICATES TYPE T: TIMER, K: KEY OPERATED
SD	SWITCH – DIMMER
SF	SWITCH – FAN SPEED CONTROL
$	TOGGLE SWITCH – LIGHTING CONTROL PANEL COMPATIBLE
CSx	CEILING MOUNTED OCCUPANCY SENSOR x = TYPE, SEE PLANS
JB	JUNCTION BOX
Ⓣ	HVAC THERMOSTAT
Ⓗ	HVAC HUMIDISTAT
PP	FURNITURE POWER POLE
CP	FURNITURE CABLE MANAGEMENT POLE.
	MUSHROOM HEAD RED PUSH BUTTON

DRAWING SYMBOLS

FIRE ALARM SYSTEM

SYMBOL	DESCRIPTION
	HORN / STROBE ○= CEILING MOUNT □= WALL MOUNT
	HORN ○= CEILING MOUNT □= WALL MOUNT
S S	SPEAKER/STROBE ○= CEILING MOUNT □= WALL MOUNT
	STROBE ○= CEILING MOUNT □= WALL MOUNT
Ⓕ F	BELL ○= CEILING MOUNT □= WALL MOUNT
	SMOKE DETECTOR
	HEAT DETECTOR
	PULL STATION
Ⓕ	ELEVATOR WARNING LIGHT
◁ F	FIREFIGHTER PHONE JACK
	TAMPER SWITCH
	FLOW SWITCH
F.A.A.P.	REMOTE ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
M	DOOR RELEASE DEVICE – FIRE ALARM ACTIVATED
Ⓢ	SPEAKER – FIRE ALARM
Ⓓ x	AUTOMATIC DUCT DETECTOR ("X" DENOTES AS FOLLOWS:) NONE = PHOTO ELECTRIC TYPE S= SUPPLY R= RETURN
R	EQUIPMENT RELAY
RI X	REMOTE DUCT DETECTOR INDICATOR LIGHT X= AIR HANDLER / ROOF TOP UNIT
FSS	FIRE SUPPRESSION SYSTEM

INTERCOMMUNICATION SYSTEM

SYMBOL	DESCRIPTION
IC	INTERCOM SYSTEM ROUGH–IN – SINGLE GANG BACKBOX MOUNTED AT +46"

SECURITY SYSTEM

SYMBOL	DESCRIPTION
	SEE PLANS FOR SECURITY SYSTEM LEGEND

COMMUNICATION SYSTEMS

SYMBOL	DESCRIPTION
◀	WALL MOUNTED VOICE OUTLET
◁	WALL MOUNTED DATA OUTLET
	WALL MOUNTED COMBINATION VOICE / DATA OUTLET
	FLOOR MOUNTED VOICE OUTLET.
F	FLOOR MOUNTED DATA OUTLET.
	FLOOR MOUNTED COMBINATION VOICE / DATA OUTLET.
TTC	TELEPHONE CABINET
CC	COMMUNICATIONS CABINET

PAGING / AUDIO SYSTEM

SYMBOL	DESCRIPTION
Ⓢ1	LOUDSPEAKER – CEILING MOUNTED CONTROLLED BY VOLUME CONTROL "1"
–Ⓥ1	VOLUME CONTROL – CONTROLS SPEAKERS "1"
Ⓢ◁	PAGING ROUGH–IN
–Ⓐ	AUDIO JACK ROUGH–IN
–Ⓜ	MICROPHONE ROUGH–IN
–Ⓟ	PROJECTOR ROUGH–IN

TELEVISION SYSTEM

SYMBOL	DESCRIPTION
TV	TELEVISION ROUGH–IN

① REFER TO LIKE NUMBER NOTES.

⟨1⟩ REFER TO LIKE NUMBER NOTES.

GENERAL NOTES (APPLY TO ALL DRAWINGS):

1. THE WORK INDICATED ON THESE DRAWINGS IS DIAGRAMMATIC AND IS INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE THE GENERAL ARRANGEMENT OF EQUIPMENT AND DEVICES FOR A COMPLETE SYSTEM IN EVERY RESPECT AND DETAIL, TESTED AND LEFT READY IN PERFECT OPERATING CONDITION FOR THE OWNER'S USE. MATERIALS AND EQUIPMENT SHALL BE LISTED BY UNDERWRITERS' LABORATORIES AND SHALL BE INSTALLED IN ACCORDANCE WITH SUCH LISTINGS. INSTALLATIONS SHALL BE MADE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. WORK SHALL MEET THE REQUIREMENTS OF THE SPECIFICATIONS AND CONFORM TO THE NEC (NFPA 70 & 72) AND ALL APPLICABLE CODES, AND BE COMPLETED BY A QUALIFIED, EXPERIENCED, LICENSED ELECTRICAL CONTRACTOR.
2. THE ENGINEER HAS MADE AN EFFORT TO COORDINATE WORK WITH OTHER TRADES AND IDENTIFY ANY AND ALL CONFLICTS. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE FIELD WORK BETWEEN TRADES AND TO IDENTIFY FIELD CONDITIONS PRIOR TO INSTALLATION AND REPORT ANY CONFLICTS TO THE ENGINEER.
3. WHEN A CONFLICT OCCURS BETWEEN THE SPECIFICATIONS AND DRAWINGS, THE ITEMS OF GREATER QUANTITY AND/OR COST SHALL BE PROVIDED.
4. CONTRACTOR SHALL VERIFY THE LOCATION AND ELECTRICAL REQUIREMENTS OF ALL EQUIPMENT FURNISHED BY OTHER TRADES PRIOR TO INSTALLATION. COORDINATE ROUGH–IN INSTALLATION WITH EQUIPMENT DETAILS.
5. ALL OPENINGS IN FIRE AND SMOKE PARTITIONS SHALL BE SEALED AS REQUIRED BY THE NEC/ FLORIDA BUILDING CODE. PROVIDE UL LISTED COMPOUND TO MATCH PARTITION RATING.
6. DO NOT SCALE DRAWINGS. VERIFY FIELD CONDITIONS PRIOR TO AND DURING CONSTRUCTION FOR EXACT DEVICE / EQUIPMENT LOCATION.
7. DEMOLITION WORK: PROVIDE DEMOLITION AND REMOVAL WORK AS INDICATED OR NEEDED. EQUIPMENT THAT IS TO BE REMOVED INCLUDES ALL ASSOCIATED WIRING, BOXES AND CONDUIT BACK TO SOURCE. CLOSE ALL UNUSED OPENINGS IN JUNCTION BOXES THAT REMAIN WITH SUITABLE PLUG OR COVER. WHEN REMOVING OR RELOCATING LIGHT FIXTURES OR OTHER DEVICES, FIELD VERIFY REMAINING DEVICES IN THE SAME CIRCUIT AND RECONNECT FOR CONTINUED SERVICE. EXISTING ELECTRICAL WORK INTERFERING WITH NEW CONSTRUCTION SHALL BE RELOCATED OR REROUTED TO SUIT FINAL INSTALLATION. CUTTING AND PATCHING REQUIRED SHALL BE DONE TO RESTORE AREAS TO ORIGINAL CONDITION.
8. CONTRACTOR SHALL PROVIDE TO LOCAL AHJ OR PERMITTING AGENCY A COPY OF ALL MAJOR EQUIPMENT CUT SHEETS AT TIME OF APPLICATION IF REQUESTED.

THESE DOCUMENTS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. THE CONSULTANT HAS NOT VERIFIED THE ACCURACY AND/OR COMPLETENESS OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS THAT MAY BE INCORPORATED AS A RESULT OF ERRONEOUS INFORMATION PROVIDED BY OTHERS. NOTIFY THIS ENGINEER IMMEDIATELY OF ANY DISCREPANCIES FOUND.

ABBREVIATIONS

A	AMPERE
AC	AIR CONDITIONING OR ALTERNATING CURRENT
ACC	ACCESS
AF	AMPERE FRAME
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLER UNIT
AM	AMMETER
ARCH	ARCHITECT
AT	AMPERE TRIP
ATC	AUTOMATIC TEMPERATURE CONTROL
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
C	CONDUIT
CAT	CATEGORY
CB	CIRCUIT BREAKER
CH	CHILLER
CKT	CIRCUIT
CL	CENTER LINE
CLF	CURRENT–LIMITING FUSE
CM	CEILING MOUNTED
CNTL	CONTROL
CU	COPPER
DWG(S)	DRAWING(S)
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EM	EMERGENCY
EMS	ENERGY MANAGEMENT SYSTEM
EMT	ELECTRICAL METALLIC TUBING
EPO	EMERGENCY POWER OFF
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EX	EXISTING TO REMAIN
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FACC	FIRE ALARM COMMAND CENTER
FATC	FIRE ALARM TERMINAL CABINET
FLR	FLOOR
FMC	FURNISHED BY MECHANICAL CONTRACTOR
FO	FIBER OPTIC
FOTC	FIBER OPTIC TERMINAL CABINET
FSS	FIRE SUPPRESSION SYSTEM
FWE	FURNISHED WITH EQUIPMENT
GFI	GROUND FAULT INTERRUPTER
GND,G	GROUND
GRS	GALVANIZED RIGID STEEL CONDUIT
HOA	HAND–OFF–AUTO
HACR	HEATING/AIR CONDITIONING–RATED
HID	HIGH INTENSITY DISCHARGE
HPF	HIGH POWER FACTOR
HPS	HIGH PRESSURE SODIUM
HZ	HERTZ
HP	HORSEPOWER
IG	ISOLATED GROUND
IMC	INTERMEDIATE METALLIC CONDUIT
JB	JUNCTION BOX
KAIC	KILO AMPERE INTERRUPTING CAPACITY
KCMIL	THOUSAND CIRCULAR MILS
KVA	KILOVOLT AMPERE
KW	KILOWATT
LC	LIGHTING CONTACTOR
MC	MECHANICAL CONTRACTOR
MCC	MOTOR CONTROL CENTER
M–G	MOTOR GENERATOR
MDP	MAIN DISTRIBUTION PANEL
MH	METAL HALIDE
MOD	MOTOR OPERATED DAMPER OR DOOR
MTD	MOUNTED
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NF	NON–FUSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OCPD	OVER CURRENT PROTECTIVE DEVICE
PNL	PANEL
ø	PHASE
PB	PUSHBUTTON
PE	PHOTOELECTRIC CONTROLLER
PP	PATCH PANEL
PVC	POLYVINYL CHLORIDE CONDUIT
R	RELOCATED
RTU	ROOF TOP UNIT
SCH	SCHEDULE
SEC	SECURITY
SW	SWITCH
SWGR	SWITCHGEAR
TEL,T	TELEPHONE
TBB	TELEPHONE BACKBOARD
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TC	TIME CLOCK
XFMR	TRANSFORMER
XFR	TRANSFER
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UL,U.L.	UNDERWRITERS LABORATORIES
UPS	UNINTERRUPTIBLE POWER SUPPLY
U.O.N.	UNLESS OTHERWISE NOTED
VT	VAPORTIGHT
VAV	VARIABLE AIR VOLUME
VFD	VARIABLE FREQUENCY DRIVE
VSD	VARIABLE SPEED DRIVE
V	VOLT
VM	VOLTMETER
W	WATT
WHM	WATTHOUR METER
WM	WATTMETER
WP	WEATHER PROOF

MANATEE
COUNTY
GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

ELECTRICAL -
SYMBOLS, LEGEND, GENERAL NOTES

Project Number
IFAS# WO100354; WA#32

Drawn by
CMD/MC

Checked by
DDC

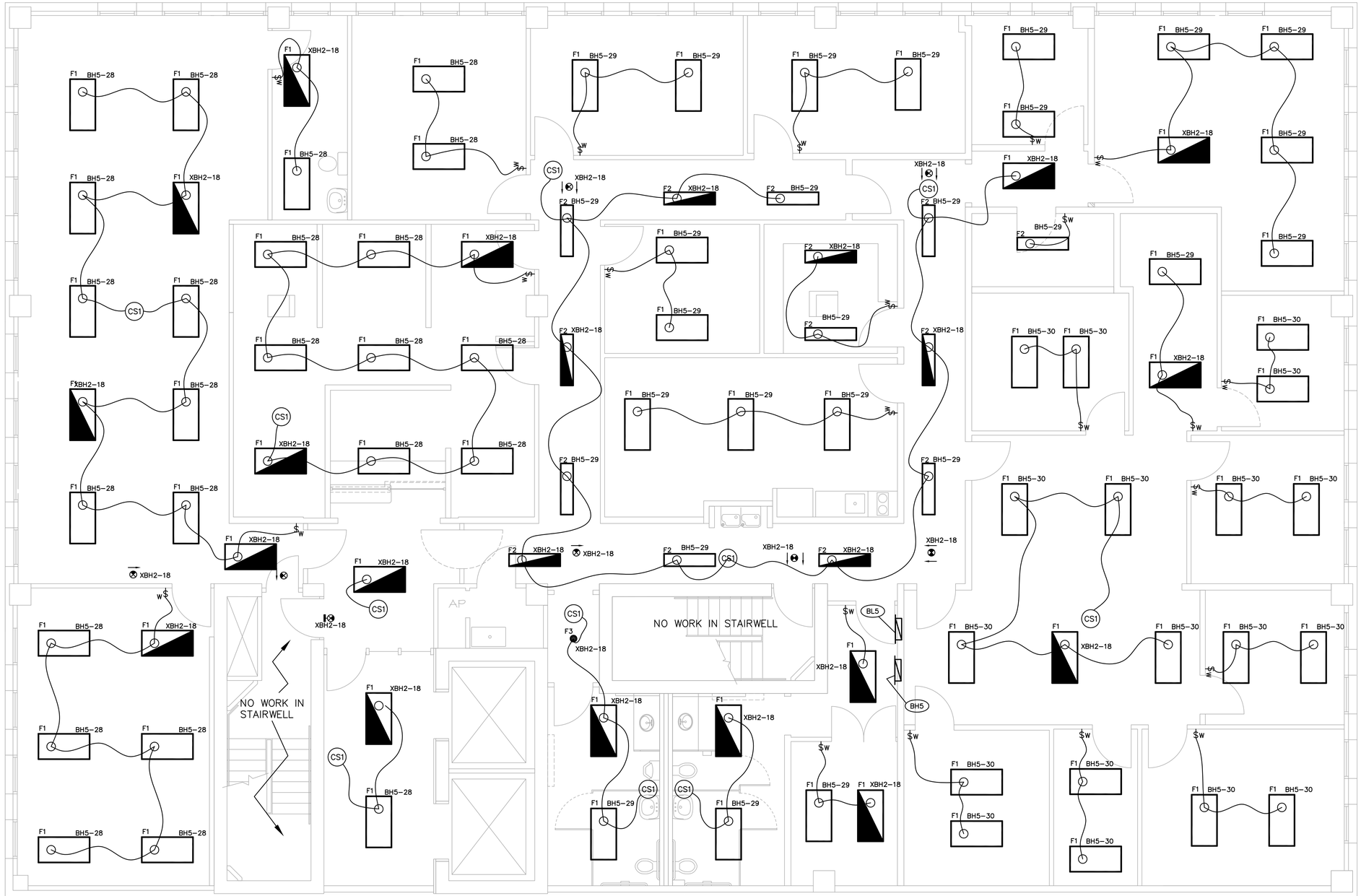
Date
9–17–2010

JOHN D. CAMDEN, PE
FL#53458

Scale
NOT TO SCALE

Set

Drawing Number
E1.0



GENERAL NOTES:

ALL EXIT FIXTURES SHALL BE CONNECTED TO THE UN-SWITCHED PORTION OF THE CIRCUIT. (HOT ALL OF THE TIME).

ALL F1 AND F2 FIXTURES ARE ON AN EMERGENCY CIRCUIT WITH GENERATOR POWER. NO BATTERY PACKS OR EMERGENCY BALLASTS REQUIRED.

ALL WIRING ABOVE CEILING SHALL BE IN CONDUIT OR PLENUM RATED.

WALL SWITCHES (^{W}) TO BE LEVITON OCCUPANCY SENSORS ODS10-IDW, SINGLE-POLE, 180 DEGREE, 2100 SQ. FT. COVERAGE, PASSIVE INFRARED WALL SWITCH OCCUPANCY SENSOR, COMMERCIAL GRADE - WHITE, OR APPROVED EQUAL.

CEILING MOUNT (CS1) TO BE LEVITON OCCUPANCY SENSORS OSC10-M, MULTI-TECHNOLOGY, 360 DEGREE, MINIMUM 500 SQ. FT.COVERAGE, SELF-ADJUSTING, CEILING MOUNT OCCUPANCY SENSOR, COMMERCIAL GRADE - WHITE OR APPROVED EQUAL.

N 1/E2.0 **5TH FLOOR LIGHTING PLAN**

1/4" = 1'-0"

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

5TH FLOOR LIGHTING PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
CMD/MC

Checked by
DDC

Date
9-17-2010

JOHN D. CAMDEN, PE
FL#53458

Scale 1/4" = 1'-0"

Set

Drawing Number

E2.0

GENERAL NOTES:

ALL CONDITIONS NEED TO BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO BIDDING AND STARTING WORK.

FIRE ALARM DEVICES SHOWN ARE "NEW". VERIFY LOCATIONS OF ALL EXISTING INITIATION AND NOTIFICATION DEVICES. COORDINATE DEMOLITION ON EXISTING WITH NEW LOCATIONS. RE-USE EXISTING LOCATIONS AS POSSIBLE. IN LOCATIONS TO BE RE-USED, PRESERVE CONDUITS AND CONDUCTORS IF SERVICEABLE. IN LOCATIONS THAT ARE NOT TO BE RE-USED, REMOVE CONDUITS AND CONDUCTORS BACK TO FACP.

EXIT LIGHTS SHOWN ARE "NEW". VERIFY LOCATIONS OF ALL EXISTING EXIT LIGHTS. COORDINATE DEMOLITION ON EXISTING WITH NEW LOCATIONS. IN LOCATIONS TO BE RE-USED, PRESERVE CONDUITS AND CONDUCTORS IF SERVICEABLE. IN LOCATIONS THAT ARE NOT TO BE RE-USED, REMOVE CONDUITS AND CONDUCTORS BACK TO SOURCE.

CONTRACTOR TO REMOVE ANY AND ALL PVC & ENT CONDUIT, AND ANY NON-PLENUM RATED CABLING. REPLACE AS NECESSARY.

DOCUMENT ON AN EXISTING PLAN ANY WORK PERFORMED BEYOND THIS SCOPE OF WORK.

4TH FLOOR POWER AND SYSTEMS

N — 1/E3.0

1/4" = 1'-0"

SHEET LEGEND

SMOKE DAMPER - 24V, INTERLOCK WITH FACP

M — MOTORIZED DAMPER, CONNECT TO AVAILABLE CIRCUIT ON PANEL SHOWN

ITEMS IN GRAYSCALE ARE EXISTING.

ITEMS BOLD ARE NEW, UNLESS OTHERWISE NOTED.

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

4TH FLOOR POWER AND SYSTEMS PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
CMD/MC

Checked by
DDC

Date
9-17-2010

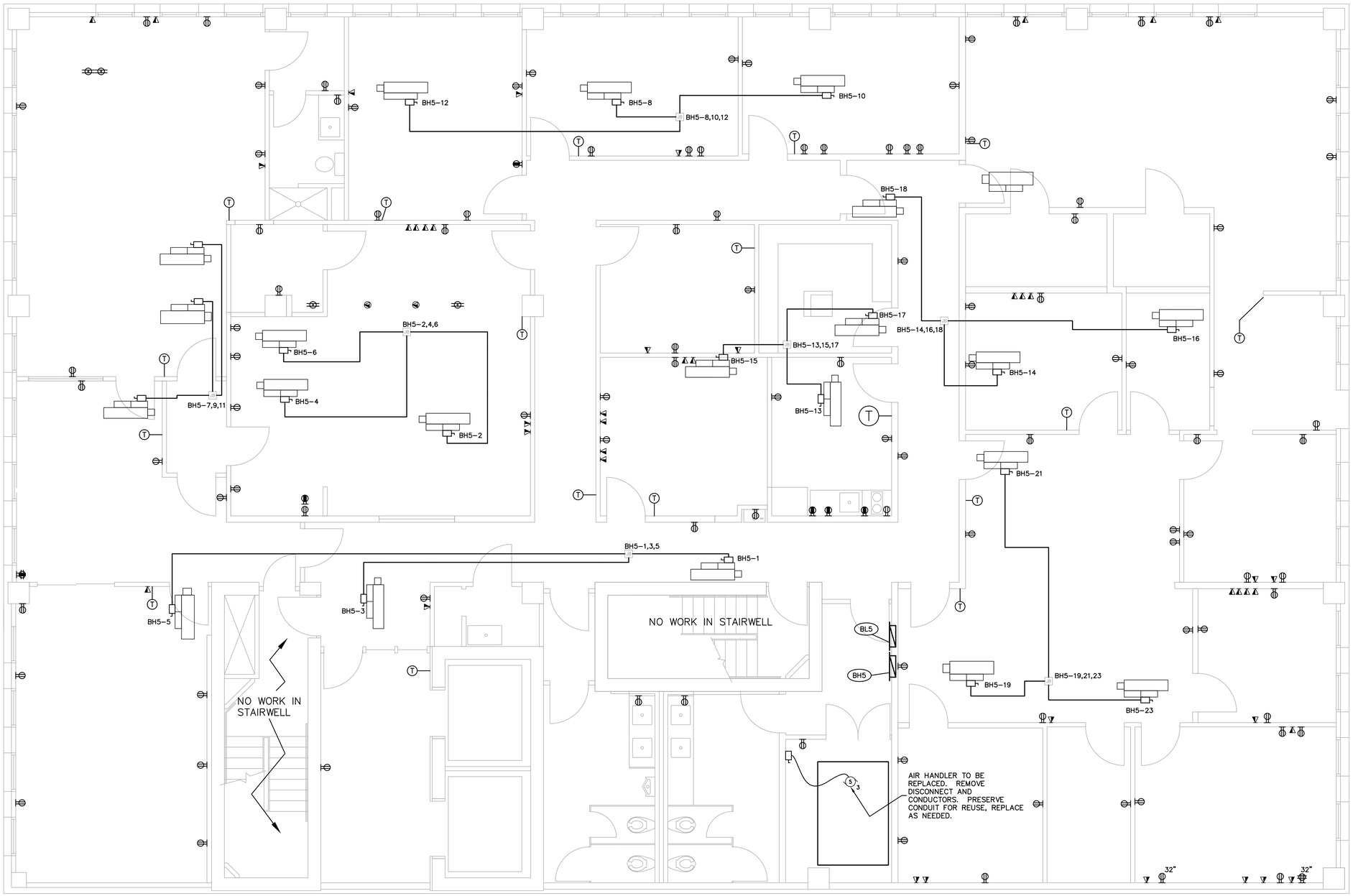
JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'-0"

Set

Drawing Number

E3.0



GENERAL NOTES:

THE PURPOSE FOR THIS PLAN IS TO DEMOLISH THE EXISTING ELECTRICAL SYSTEMS IN PREPARATION OF NEW EQUIPMENT.

ALL CONDITIONS NEED TO BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO BIDDING AND STARTING WORK.

VERIFY THAT THE POWER TO THE EXISTING PANEL BL5 IS FED FROM THE 1ST FLOOR 120/208V DISTRIBUTION PANEL. EXISTING PANELBOARD TO BE REPLACED. REMOVE COMPLETE. REMOVE LINE SIDE CONDUCTORS FROM 1ST FLOOR DISTRIBUTION PANEL. TRY TO PRESERVE CONDUITS. REPLACE CONDUITS AS NEEDED.

VERIFY THE LOCATION OF THE POWER FEED TO THE EXISTING PANEL BH5. EXISTING PANELBOARD TO BE REPLACED. REMOVE COMPLETE. REMOVE LINE SIDE CONDUCTORS FROM PANEL TO SOURCE. TRY TO PRESERVE CONDUITS. REPLACE CONDUITS AS NEEDED.

TELEPHONE/DATA RECEPTACLES TO BE REPLACED. REMOVE DATA CABLES BACK TO SOURCE. REPLACE CONDUIT IF NO LONGER SERVICEABLE.

REMOVE ALL RECEPTACLES AND CORRESPONDING CONDUCTORS BACK TO PANEL, TO INCLUDE ANY RECEPTACLES NOT SHOWN. LOCATION OF RECEPTACLES SHOWN ARE BASED UPON EXISTING DRAWINGS. VERIFY LOCATIONS AND QUANTITY ON SITE. TRY TO PRESERVE EXISTING CONDUITS AND BACKBOXES, REPLACE AS NEEDED. MARK ALL EXISTING LOCATION FOR REUSE. PROVIDE THIS ENGINEER WITH THE CORRECT LOCATION OF RECEPTACLES FOR NEW EQUIPMENT DRAWINGS.

EXISTING 277V, 1ϕ VAV BOXES TO BE REMOVED. REMOVE CONDUCTORS BACK TO SOURCE. REMOVE DISCONNECT SWITCHES. REMOVE CONDUITS BACK TO JUNCTION BOX, CONDUIT SHOWN IS DIAGRAMMATIC. VERIFY LOCATIONS OF VAV BOXES AND JUNCTION BOXES. PROVIDE THIS ENGINEER WITH THE CORRECT LOCATION OF JUNCTION BOXES FOR NEW EQUIPMENT DRAWINGS.

THERMOSTATS TO BE REPLACED BY MECHANICAL CONTRACTOR. REMOVE EXISTING CONDUITS, CONDUCTORS AND BACKBOXES. REPAIR DRYWALL.

REMOVE ALL EXISTING LIGHTING FIXTURES, EXIT LIGHTS, EMERGENCY FIXTURES AND WALL SWITCHES EXCEPT IN STAIRWELLS. PRESERVE ALL CONDUITS AND CONDUCTORS FOR RE-USE. REPLACE AS NEEDED.

CHECK ENTIRE FLOOR FOR LOOSE CONDUCTORS AND CONTACTS ON ALL WALL, FLOOR, AND CEILING CONNECTIONS. REMOVE AND REPLACE ITEMS AS NECESSARY.

CONTRACTOR TO REMOVE ANY AND ALL PVC & ENT CONDUIT, AND ANY NON-PLENUM RATED CABLING. REPLACE AS NECESSARY.

DOCUMENT ON AN EXISTING PLAN ANY WORK PERFORMED BEYOND THIS SCOPE OF WORK.

1/E3.1 5TH FLOOR DEMO POWER AND SYSTEMS

1/4" = 1'-0"

SHEET LEGEND

EXISTING VARIABLE AIR VOLUME (VAV) BOX

ITEMS IN GRAYSCALE ARE EXISTING TO REMAIN.

ITEMS BOLD ARE TO BE REMOVED.

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

5TH FLOOR DEMO POWER AND SYSTEMS PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
CMD/MC

Checked by
DDC

Date
9-17-2010

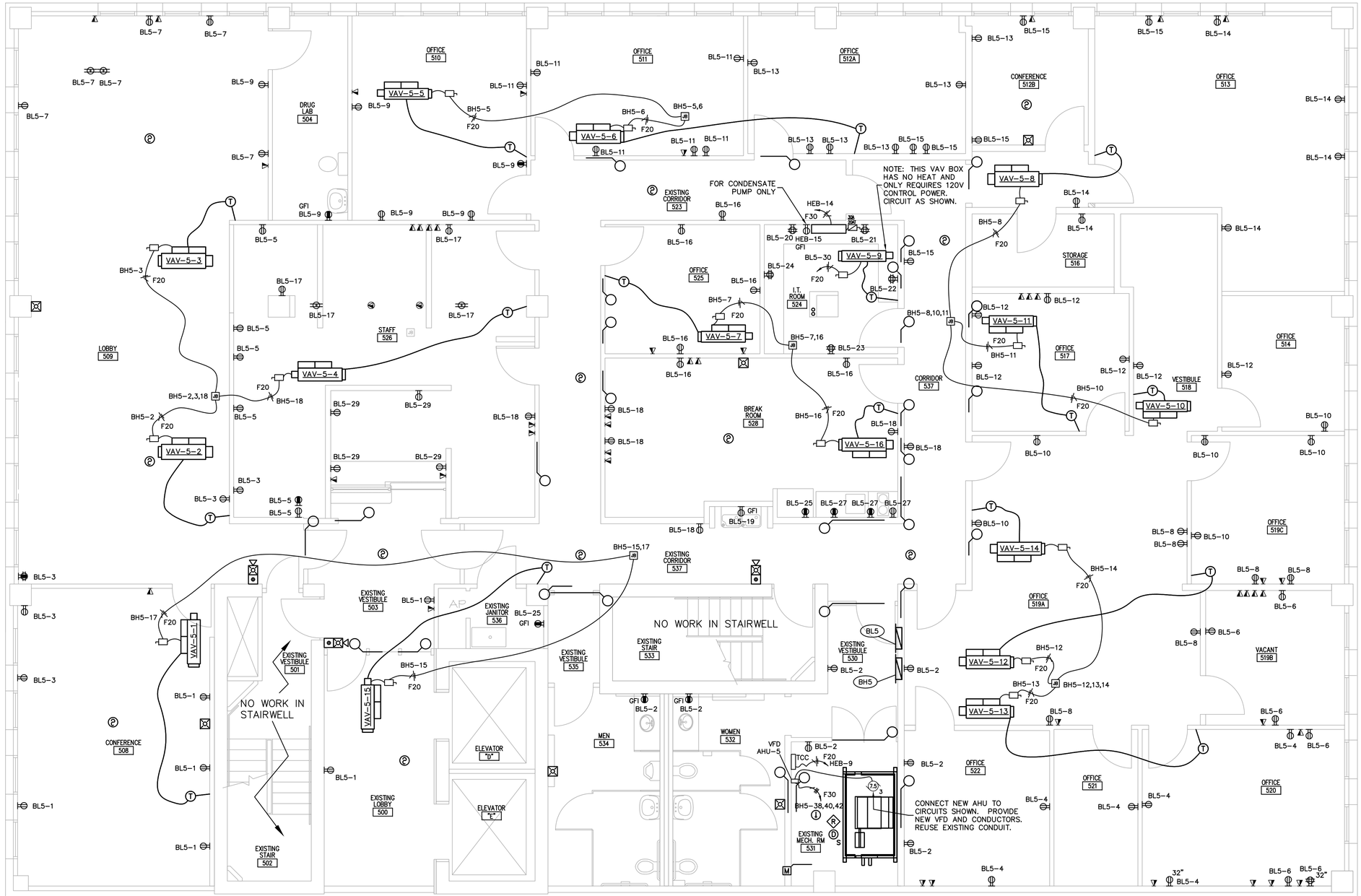
JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'-0"

Set

Drawing Number

E3.1



5TH FLOOR NEW POWER AND SYSTEMS

1/4" = 1'-0"

SHEET LEGEND

- NEW VARIABLE AIR VOLUME (VAV) BOX
- TCC — TCC – TEMPERATURE CONTROL PANEL
- SMOKE DAMPER – 24V, INTERLOCK WITH FACP
- M — MOTORIZED DAMPER, CONNECT TO AVAILABLE CIRCUIT ON PANEL SHOWN

ITEMS IN GRAYSCALE ARE EXISTING.

ITEMS BOLD ARE NEW, UNLESS OTHERWISE NOTED.

GENERAL NOTES:

PROVIDE AND INSTALL NEW PANEL BL5, FEED FROM EXISTING SPACE IN THE 1ST FLOOR 120/208v DISTRIBUTION PANEL. REUSE EXISTING CONDUITS.

PROVIDE AND INSTALL NEW PANEL BH5, FEED FROM EXISTING SPACE IN MAIN DISTRIBUTION PANEL. REUSE EXISTING CONDUITS.

ALL TELEPHONE/DATA DISTRIBUTION FOR 5TH FLOOR TO RUN TO NEW 5TH FLOOR IT ROOM. PROVIDE AND INSTALL (1) 3" CONDUIT FROM NEW 5TH FLOOR IT ROOM TO THE 3RD FLOOR IT ROOM, AND (1) 3" CONDUIT FROM NEW 5TH FLOOR IT ROOM TO THE 4TH FLOOR IT ROOM. CABLES TO BE INSTALLED BY MANATEE COUNTY ISD.

PROVIDE AND INSTALL NEW RECEPTACLES ON CIRCUITS SHOWN. PROVIDE NEW CONDUCTORS, REUSE EXISTING LOCATIONS. REUSE EXISTING CONDUITS IF SERVICEABLE, REPLACE AS NECESSARY. LOCATION OF RECEPTACLES SHOWN ARE BASED UPON EXISTING DRAWINGS. VERIFY LOCATIONS AND QUANTITY ON SITE.

CONNECT NEW VAV BOXES TO CIRCUITS SHOWN. REUSE EXISTING JUNCTION BOXES AND CONDUITS IF SERVICEABLE, REPLACE AS NECESSARY. PROVIDE AND INSTALL NEW DISCONNECT SWITCHES, CONDUITS AND CONDUCTORS.

FURNISH CONDUIT AND FLUSH MOUNTED BACKBOXES FOR THERMOSTATS AS SHOWN AT 46" A.F.F. TO TOP OF BOX. INSTALL (1) 1/2" CONDUIT W/ PULL STRING TO CORRESPONDING VAV. THERMOSTATS TO BE PROVIDED BY AND INSTALLED BY MECHANICAL CONTRACTOR.

PROVIDE INTERLOCKING RELAYS AS SHOWN FOR NEW MECHANICAL EQUIPMENT AND FIRE ALARM SYSTEM. SEE MECHANICAL SHEETS FOR SEQUENCE OF OPERATIONS. FACP LOCATED ON FIRST FLOOR.

INSTALL NEW CALL BUTTON WITH LOCKOUT FOR ELEVATOR. USE MANUFACTURE'S (SCHINDLER) RECOMMENDED RECALL AND LOCKOUT BUTTON FOR THE SYSTEM.

PROVIDE AND INSTALL VARIABLE FREQUENCY DRIVES (VFD) AS SHOWN. SEE SPECIFICATIONS.

ALL WIRING ABOVE CEILING SHALL BE IN CONDUIT OR PLENUM RATED.

AFTER ALL NEW EQUIPMENT IS INSTALL, REMOVE ANY ABOVE CEILING JUNCTION BOXES, CONDUITS AND CONDUCTORS THAT ARE NOT RE-USED.

PANEL XBH2 IS ON 3RD FLOOR IN VESTIBULE TO WOMEN'S RESTROOM WITH THE 3RD FLOOR PANELS.

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

5TH FLOOR NEW POWER AND SYSTEMS PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
CMD/MC

Checked by
DDC

Date
9-17-2010

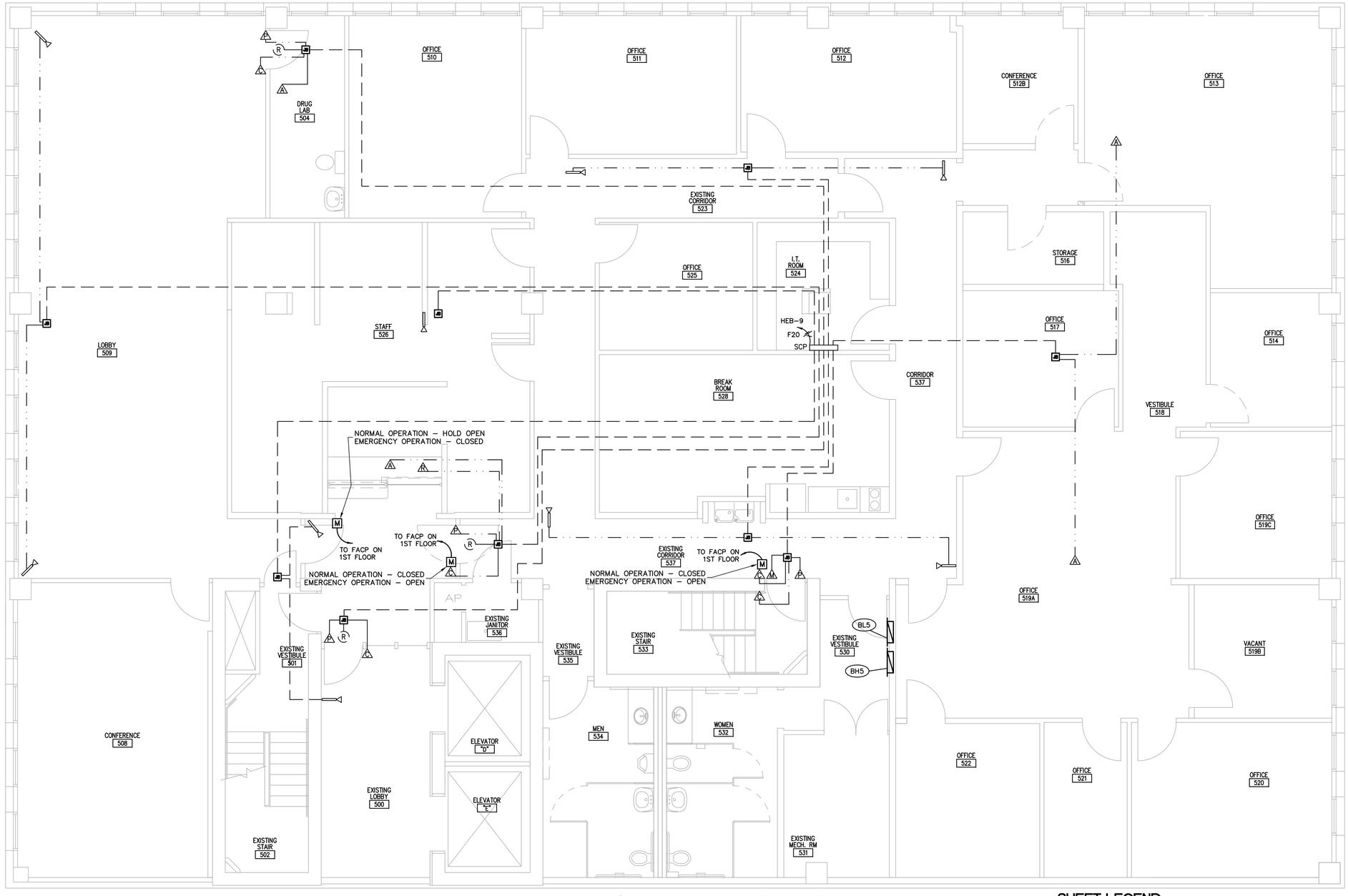
JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'-0"

Set

Drawing Number

E3.2



5TH FLOOR SECURITY SYSTEM PLAN

1/4" = 1'-0"

GENERAL NOTES:

FACP LOCATED ON FIRST FLOOR.

ALL WIRING ABOVE CEILING SHALL BE IN CONDUIT OR PLENUM RATED.

ALL DEVICES SHALL BE INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS AND INSTRUCTION.

COORDINATE ALL LOCATIONS WITH PROJECT MANAGER IN SPACES PRIOR TO PLACEMENT.

ALL CONDUIT RUNS ARE DIAGRAMMATIC. USE "BEST PRACTICE" TO RUN CONDUITS. LOCATE JUNCTIONS BOXES AS SHOWN, COORDINATE WITH EXISTING CONDITIONS.

SHEET LEGEND

- DOOR CONTACT ROUGH-IN
- DOOR RELEASE ROUGH-IN
- PROXIMITY CARD READER ROUGH-IN
- DURESS ALARM ROUGH-IN
- DELAYED EGRESS MAGNETIC LOCK
- DOOR POSITION SWITCH
- REQUEST TO EXIT MOTION SENSOR, CEILING MOUNT
- CAMERA ROUGH-IN
- [M] DOOR RELEASE DEVICE – FIRE ALARM ACTIVATED
- SCP SECURITY CONTROL PANEL, FIELD COORDINATE LOCATION
- 1/2" CONDUIT
- 1" CONDUIT UNLESS OTHERWISE NOTED

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

5TH FLOOR SECURITY SYSTEM PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
CMD/MC

Checked by
DDC

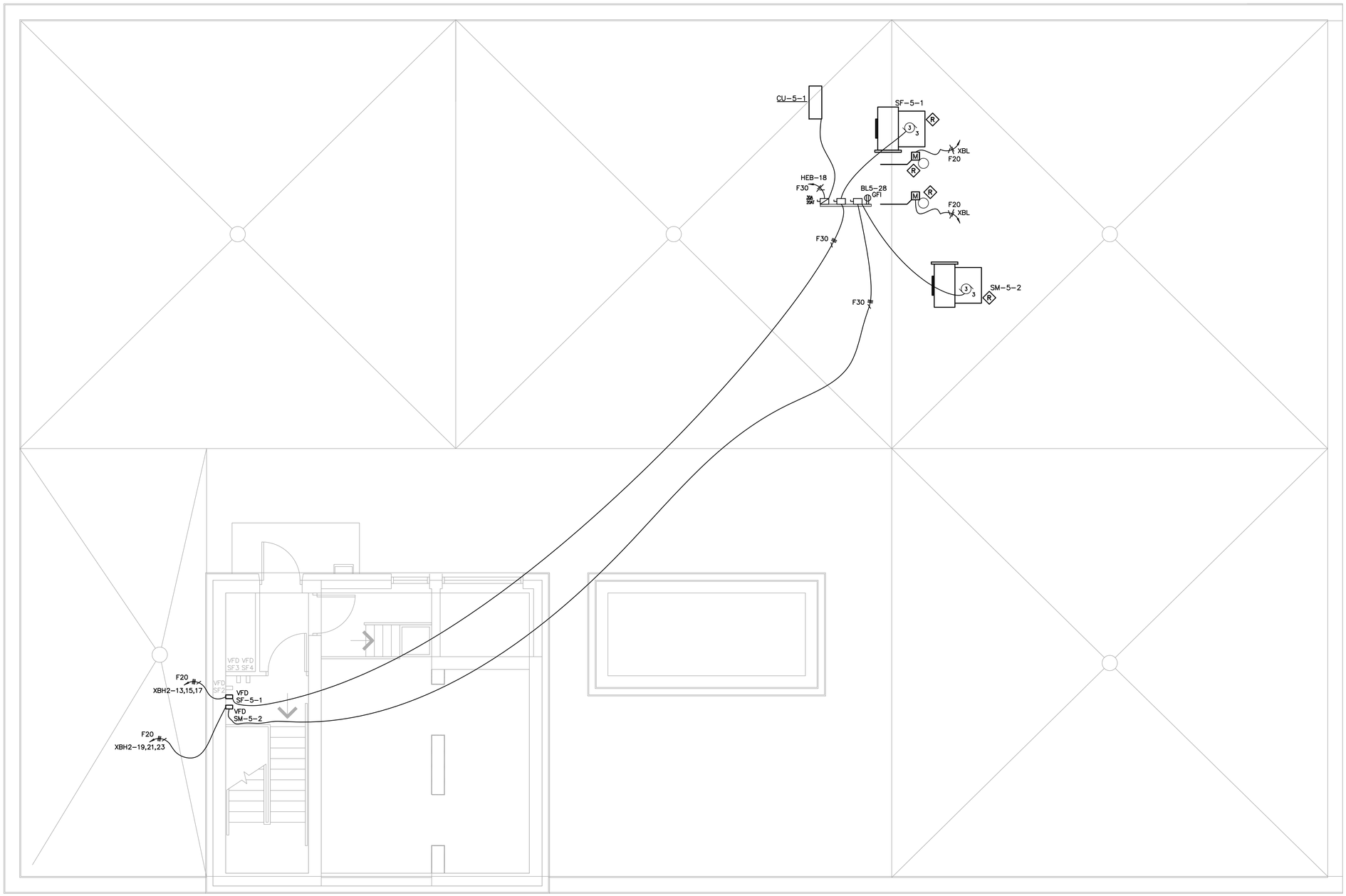
Date
9-17-2010

JOHN D. CAMDEN, PE
FL#53458

Scale
1/16" = 1'-0"

Set

Drawing Number
E3.3



N

1
E3.4

ROOF PLAN

1/4" = 1'-0"

GENERAL NOTES:

PROVIDE AND INSTALL NEW VARIABLE FREQUENCY DRIVES (VFD) IN THE STAIRWAY LANDING. CONNECT TO CIRCUITS SHOWN AND TO CORRESPONDING FAN ON ROOF.

PROVIDE AND INSTALL FIRE ALARM RELAYS FOR EACH FAN. SEE MECHANICAL SHEETS FOR SEQUENCE OF OPERATION.CIRCUITS TO THE SAME PANELBOARD SPACE.

EXTEND LIGHTNING PROTECTION TO NEW EXHAUST FANS ON ROOF.

PROVIDE AND INSTALL CIRCUITS SHOWN FROM EXISTING PANEL XBL, 2ND FLOOR, FOR DAMPERS. DAMPERS PROVIDED AND INSTALLED BY MECHANICAL CONTRACTOR.

CONDUITS TO RUN IN CEILING SPACE ON 5TH FLOOR. ONLY STUB UP TO DISCONNECTS AND FINAL CONNECTIONS TO BE ON ROOF TOP.

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

ROOF POWER AND SYSTEMS PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
CMD/MC

Checked by
DDC

Date
9-17-2010

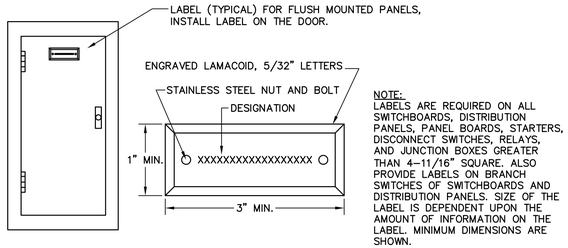
JOHN D. CAMDEN, PE
FL#53458

Scale
1/8" = 1'-0"

Set

Drawing Number

E3.4

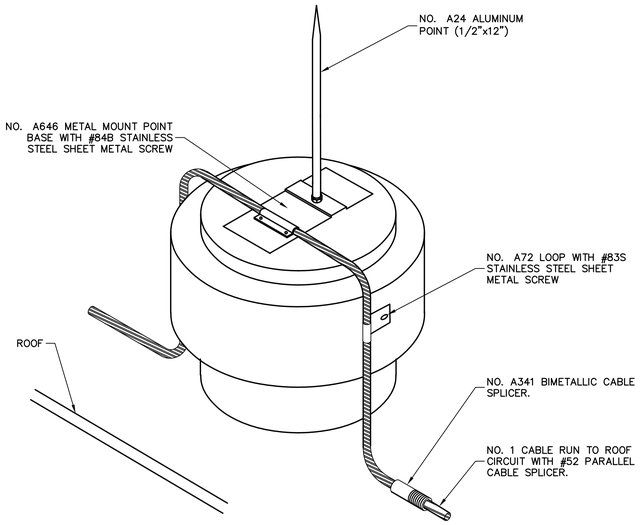


NOTE:
LABELS ARE REQUIRED ON ALL SWITCHBOARDS, DISTRIBUTION PANELS, PANEL BOARDS, STARTERS, DISCONNECT SWITCHES, RELAYS, AND JUNCTION BOXES GREATER THAN 4–11/16" SQUARE. ALSO PROVIDE LABELS ON BRANCH SWITCHES OF SWITCHBOARDS AND DISTRIBUTION PANELS. SIZE OF THE LABEL IS DEPENDENT UPON THE AMOUNT OF INFORMATION ON THE LABEL. MINIMUM DIMENSIONS ARE SHOWN.

STANDARD COLORS:
1. NORMAL POWER– BLACK BACKGROUND, WHITE LETTERS
2. EMERGENCY POWER– BLUE BACKGROUND, WHITE LETTERING
3. LIFE SAFETY EMERGENCY POWER – YELLOW BACKGROUND, WHITE LETTERING.

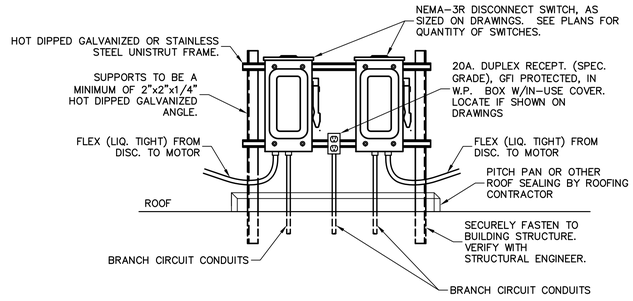
3 E4.0 EQUIPMENT LABELING DETAIL

NOT TO SCALE



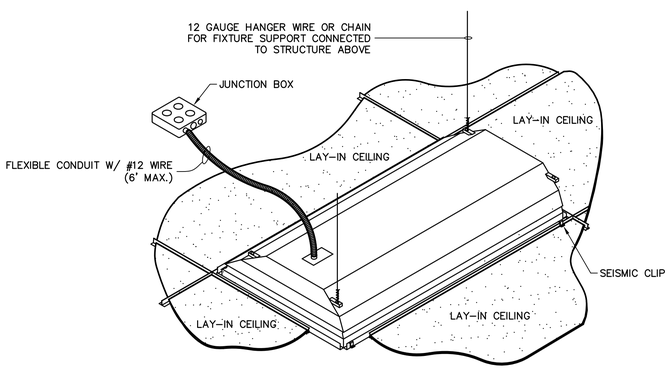
5 E4.0 TYPICAL AIR TERMINAL ON EXHAUST EQUIPMENT

NOT TO SCALE



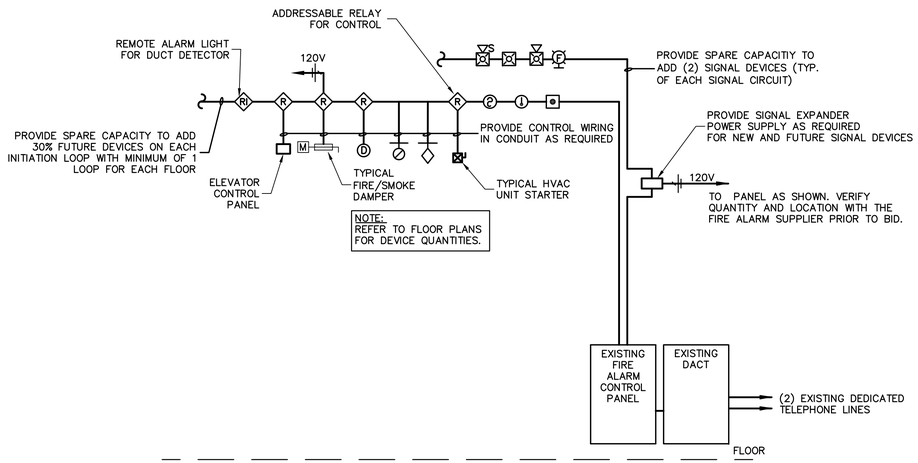
6 E4.0 ROOF TOP DISCONNECT SWITCH MOUNTING DETAIL

NOT TO SCALE



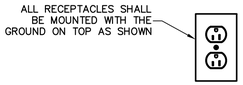
1 E4.0 LAY–IN FIXTURE DETAIL

NOT TO SCALE



2 E4.0 ADDRESSABLE FIRE ALARM SYSTEM SCHEMATIC

NOT TO SCALE



4 E4.0 RECEPTACLE MOUNTING DETAIL

NOT TO SCALE

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

ELECTRICAL - DETAILS

Project Number
IFAS# W0100354; WA#32

Drawn by
CMD/MC

Checked by
DDC

Date
9–17–2010

JOHN D. CAMDEN, PE
FL#53458

Scale
NOT TO SCALE

Set

Drawing Number

E4.0

FEEDER AND BRANCH CIRCUIT SCHEDULE

FEEDER/BRANCH CIRCUIT DESIGNATION	COPPER CONDUCTOR THHN,THWN,&THWN-2		CONDUIT SIZE AND QUANTITY [QUANTITY IS 1, UNLESS NOTED IN ( )]					
	PHASE & NEUTRAL	EQUIPMENT GROUND	1P, 1N, 1G, 2P, 1G	2P, 1N, 1G, 3P, 1G	3P, 1N, 1G	3P, 2N, 1G	3P, 3N, 1G	3P, 1N, 2G
F20	12	12	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
F30	10	10	3/4"	3/4"	3/4"	1"	1"	1"
F40–50	8	10	3/4"	1"	1"	1 1/4"	1 1/4"	1 1/4"
F60	6	10	1"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/4"
F70–F80	4	8	1"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	1 1/2"
F90–F100	3	8	1 1/4"	1 1/4"	1 1/2"	1 1/2"	2"	1 1/2"
F110	2	6	1 1/4"	1 1/2"	1 1/2"	2"	2"	2"
F125	1	6	1 1/2"	2"	2"	2"	2 1/2"	2"
F150	1/0	6	1 1/2"	2"	2"	2 1/2"	2 1/2"	2 1/2"
F175	2/0	6	2"	2"	2 1/2"	2 1/2"	3"	2 1/2"
F200	3/0	6	2"	2 1/2"	2 1/2"	3"	3"	3"
F225	4/0	4	2"	2 1/2"	3"	3"	3"	3"
F250	250	4	2 1/2"	3"	3"	3 1/2"	3 1/2"	3–1/2"
F300	350	4	3"	3"	3 1/2"	3 1/2"	4"	3 1/2"
F350	2/0	3	(2) 2"	(2) 2 1/2"	(2) 2 1/2"	(2) 2 1/2"	(2) 3"	(2) 2 1/2"
F400	3/0	3	(2) 2"	(2) 2 1/2"	(2) 2 1/2"	(2) 3"	(2) 3"	(2) 2 1/2"
F450	4/0	2	(2) 2"	(2) 2 1/2"	(2) 2 1/2"	(2) 3"	(2) 3"	(2) 3"
F500	250	2	(2) 2 1/2"	(2) 3"	(2) 3"	(2) 3"	(2) 3 1/2"	(2) 3 1/2"
F600	350	1	(2) 2 1/2"	(2) 3"	(2) 3"	(2) 3"	(2) 3 1/2"	(2) 3"
F800	300	1/0	(3) 2 1/2"	(3) 3"	(3) 3"	(3) 3 1/2"	(3) 3 1/2"	(3) 3 1/2"
F900	350	2/0	(3) 3"	(3) 3"	(3) 3 1/2"	(3) 3 1/2"	(3) 4"	(3) 3 1/2"
F1000	400	2/0	(3) 3"	(3) 3"	(3) 3 1/2"	(3) 3 1/2"	(3) 4"	(3) 4"
F1200	350	3/0	(4) 3"	(4) 3"	(4) 3 1/2"	(4) 3 1/2"	(4) 4"	(4) 4"
F1600	400	4/0	(5) 3"	(5) 3"	(5) 3 1/2"	(5) 3 1/2"	(5) 4"	(5) 4"
F2000	400	250	(6) 3"	(6) 3"	(6) 3 1/2"	(6) 3 1/2"	(6) 4"	(6) 4"
F2500	500	350	(7) 3"	(7) 3 1/2"	(7) 4"	(7) 4"	(7) 4"	(7) 4"

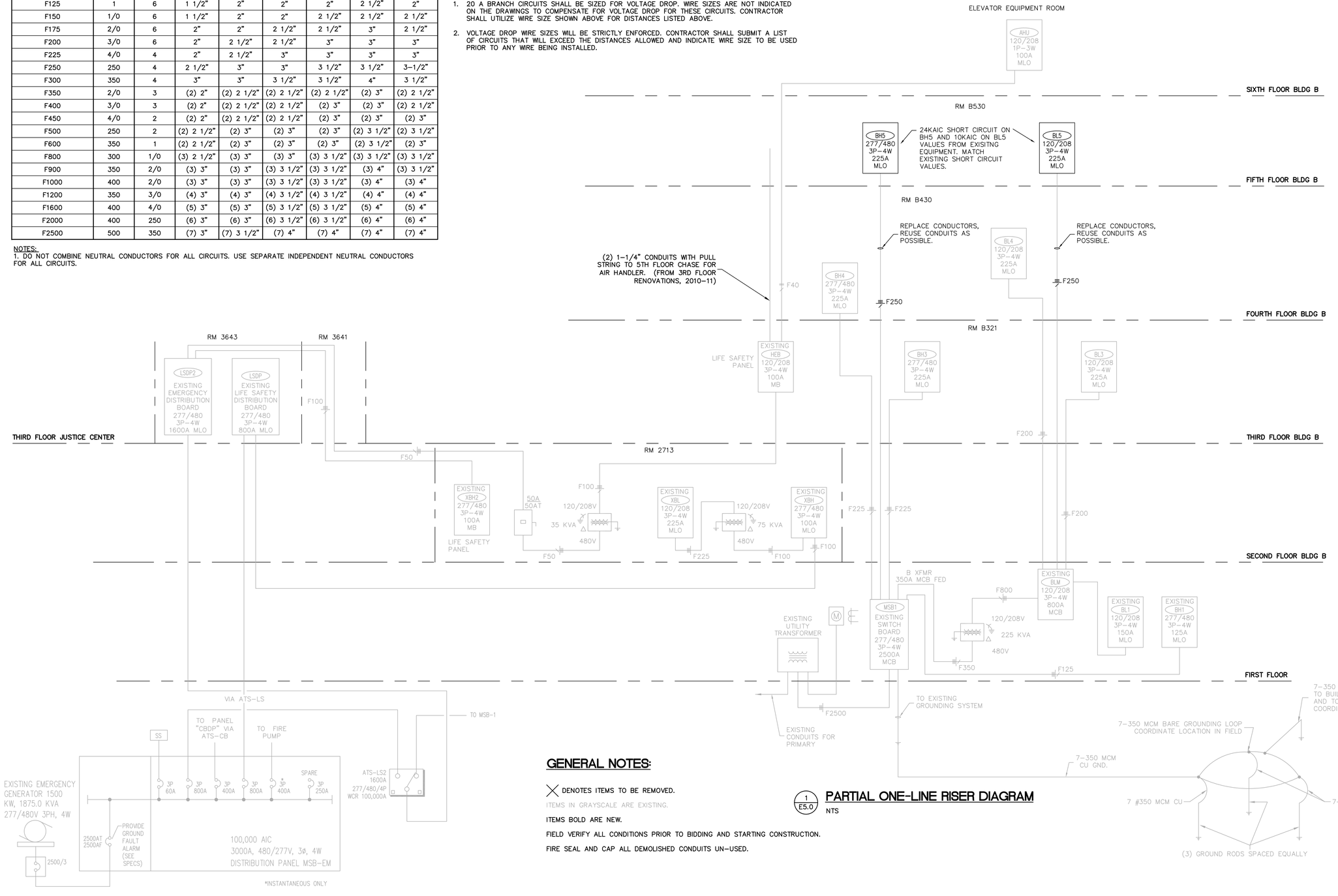
NOTES:
1. DO NOT COMBINE NEUTRAL CONDUCTORS FOR ALL CIRCUITS. USE SEPARATE INDEPENDENT NEUTRAL CONDUCTORS FOR ALL CIRCUITS.

VOLTAGE DROP FOR 1ϕ, 20A BRANCH CIRCUITS

	DISTANCE ALLOWED			
FEEDER SIZE TO USE	120V	208V	277V	
F20	0 – 70 FEET	0 – 125 FEET	0 – 165 FEET	
F30	70 – 115 FEET	125 – 200 FEET	165 – 265 FEET	
F40–50	115 – 185 FEET	200 – 320 FEET	265 – 425 FEET	
F60	185 – 290 FEET	320 – 510 FEET	425 – 675 FEET	
F70–80	290 – 460 FEET	510 – 810 FEET	675 – 1075 FEET	

NOTES:

1. 20 A BRANCH CIRCUITS SHALL BE SIZED FOR VOLTAGE DROP. WIRE SIZES ARE NOT INDICATED ON THE DRAWINGS TO COMPENSATE FOR VOLTAGE DROP FOR THESE CIRCUITS. CONTRACTOR SHALL UTILIZE WIRE SIZE SHOWN ABOVE FOR DISTANCES LISTED ABOVE.
2. VOLTAGE DROP WIRE SIZES WILL BE STRICTLY ENFORCED. CONTRACTOR SHALL SUBMIT A LIST OF CIRCUITS THAT WILL EXCEED THE DISTANCES ALLOWED AND INDICATE WIRE SIZE TO BE USED PRIOR TO ANY WIRE BEING INSTALLED.



GENERAL NOTES:

X DENOTES ITEMS TO BE REMOVED.

ITEMS IN GRAYSCALE ARE EXISTING.

ITEMS BOLD ARE NEW.

FIELD VERIFY ALL CONDITIONS PRIOR TO BIDDING AND STARTING CONSTRUCTION.

FIRE SEAL AND CAP ALL DEMOLISHED CONDUITS UN-USED.

1 / E5.0 **PARTIAL ONE-LINE RISER DIAGRAM**
NTS

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

ELECTRICAL -
ONE-LINE RISER, FEEDER SCHEDULE

Project Number
IFAS# W0100354; WA#32

Drawn by
CMD-MC

Checked by
DDC

Date
9-17-2010

JOHN D. CAMDEN, PE
FL#53458

Scale
NOT TO SCALE

Set

Drawing Number

E5.0

PANELBOARD SCHEDULE	DESIGNATION: LSDP	MAINS: 800 A MB
	LOCATION: 3RD Fl Justice Center	BUS SIZE: 800 AMP
	VOLTAGE: 480Y/277	PANEL MOUNTING: SURFACE
	PHASE: 3 PHASE, 4 WIRE	ALL BREAKERS: 35,000 AIC

CKT NO.	LOAD DESCRIPTION	LOAD CODE	CONN. KVA	BREAKER AMPS	BREAKER POLE	CONNECTED LOAD A	CONNECTED LOAD B	CONNECTED LOAD C	BREAKER AMPS	BREAKER POLE	CONN. KVA	LOAD CODE	LOAD DESCRIPTION	CKT NO.
1	HLS1	M	12.00	125	3	30.80			150	3	18.80	P	HLS 5	2
		M	12.00				30.80				18.80	P		
		M	12.00					30.80			18.80	P		
3		M			3	12.00			150	3	12.00	P	HLS 8	4
		M					12.00				12.00	P		
		M						12.00			12.00	P		
5	ASM	M	15.30	100	3	35.30			100	3	20.00	P	HLS 3	6
		M	15.30				35.30				20.00	P		
		M	15.30					35.30			20.00	P		
7	XAH	M	10.30	100	3	34.90			100	3	24.60	P	XBH	8
		M	10.30				34.90				24.60	P		
		M	10.30					34.90			24.60	P		
9	HLSPH	P	54.26	300	3	54.26								10
		P	54.26				54.26							
		P	54.26					54.26						
11					3	0.00								12
							0.00							
								0.00						
13	TVSS			60	3	7.00			127	3	7.00	P	HLS 2	14
							7.00				7.00	P		
								7.00			7.00	P		
15						0.00			800	3			MAIN	16
							0.00							
								0.00						
						174.26	174.26	174.26	KVA					
	TOTAL CONNECTED AMPS:		629.10 AMPS			629.10	629.10	629.10	AMPS					
	TOTAL CONNECTED LOAD:		522.78 KVA											
	TOTAL DEMAND AMPS:		595.16 AMPS											
	TOTAL DEMAND LOAD:		494.58 KVA											

LOAD CODES:
L= LIGHTING
R= RECEPTACLES
M= MECHANICAL/EQUIPMENT
C= COMPUTER
K= KITCHEN
P= PANELBOARD

1 / E5.1 **EXISTING PANELBOARD LSDP**
NTS 277/480V

LIFE SAFETY PANEL

PANELBOARD SCHEDULE	DESIGNATION: XBH2	MAINS: 100A MB
	LOCATION: RM 2713	BUS SIZE: 100 AMP
	VOLTAGE: 480Y/277	PANEL MOUNTING: SURFACE
	PHASE: 3 PHASE, 4 WIRE	ALL BREAKERS: 42,000 AIC
		FED FROM LSDP2

CKT NO.	LOAD DESCRIPTION	LOAD CODE	CONN. KVA	BREAKER AMPS	BREAKER POLE	CONNECTED LOAD A	CONNECTED LOAD B	CONNECTED LOAD C	BREAKER AMPS	BREAKER POLE	CONN. KVA	LOAD CODE	LOAD DESCRIPTION	CKT NO.
1	3rd FL Supply Fan SF-1	M	2.10	15	3	4.20			15	3	2.10	M	4th FL Supply Fan	2
3	5 hp	M	2.10				4.20				2.10	M	5 hp	4
5	480V	M	2.10					4.20			2.10	M	480V	6
7	3rd FL Smoke Fan SM-1	M	2.10	15	3	4.20			15	3	2.10	M	4th FL Smoke Fan	8
9	5 hp	M	2.10				4.20				2.10	M	5 hp	10
11	480V	M	2.10					4.20			2.10	M	480V	12
13	5th FL Supply Fan	M	2.10	15	3	3.40			20	1	1.30	L	3rd Fl Emergency Lights	14
15	3 hp	M	2.10				3.40		20	1	1.30	L	4th Fl Emergency Lights	16
17	480V	M	2.10					3.39	20	1	1.29	L	5th Fl Emergency Lights	18
19	5th FL Smoke Fan	M	2.10	15	3	2.93			15	3	0.83	M	Stariwell Fan SF-2	20
21	3 hp	M	2.10				2.93				0.83	M	1.5HP	22
23	480V	M	2.10					2.93			0.83	M	*	24
25	Elevator Shaft Fan SF-3	M	1.33	15	3	2.27			15	3	0.94	M	Stariwell Fan SF-4	26
27	3 HP	M	1.33				2.27				0.94	M	2HP	28
29	*	M	1.33					2.27			0.94	M	*	30
31	TC-1 Control Power	P	0.10	20	1	0.10								32
33	TC-5 Control Power	P	0.10	20	1		0.10							34
35								0.00						36
37						0.00								38
39							0.00							40
41								0.00						42
						17.10	17.10	16.99	KVA					
	TOTAL CONNECTED AMPS:		61.73 AMPS			61.73	61.73	61.34	AMPS					
	TOTAL CONNECTED LOAD:		51.19 KVA											
	TOTAL DEMAND AMPS:		47.09 AMPS											
	TOTAL DEMAND LOAD:		39.03 KVA											

LOAD CODES:
L= LIGHTING
R= RECEPTACLES
M= MECHANICAL/EQUIPMENT
C= COMPUTER
K= KITCHEN
P= PANELBOARD

LIFE SAFETY

2 / E5.1 **PANELBOARD XBH2**
NTS 277/480V

LIFE SAFETY PANEL

PANELBOARD SCHEDULE	DESIGNATION: HEB	MAINS: 100A MB
	LOCATION: RM 2713	BUS SIZE: 100 AMP
	VOLTAGE: 208Y/120	PANEL MOUNTING: SURFACE
	PHASE: 3 PHASE, 4 WIRE	ALL BREAKERS: 42,000 AIC
		FED FROM LSDP2 VIA TRANSFORMER

CKT NO.	LOAD DESCRIPTION	LOAD CODE	CONN. KVA	BREAKER AMPS	BREAKER POLE	CONNECTED LOAD A	CONNECTED LOAD B	CONNECTED LOAD C	BREAKER AMPS	BREAKER POLE	CONN. KVA	LOAD CODE	LOAD DESCRIPTION	CKT NO.
1	ELEVATOR ROOM AHU	P	1.80	40	2	4.00			20	3	2.20	M	Spare	2
3	SUB-PANEL	p	1.80				4.00				2.20	M	*	4
5	3rd Fl Temp.ContolCntr	P	1.00	20	1			3.20			2.20	M	*	6
7				20	1	3.20			45	3	3.20	M	Spare	8
9	5th Fl Temp.ContolCntr	P	1.00	20	1		4.20				3.20	M	*	10
11	5th FIL Security Panel	P	1.00	20	1			4.20			3.20	M	*	12
13						1.44			20	1	1.44	M	5TH FL I.T. Rm AHU	14
15							0.00		20	1			Spare	16
17								0.90	20	1	0.90	M	5TH FL I.T. Rm CU (roof)	18
19	MAIN BREAKER			100	3	0.00								20
21	*						0.00							22
23	*							0.00						24
25						0.00								26
27							0.00							28
29								0.00						30
31						0.00								32
33							0.00							34
35								0.00						36
37						0.00								38
39							0.00							40
41								0.00						42
						8.64	8.20	8.30	KVA					
	TOTAL CONNECTED AMPS:		72.00 AMPS			72.00	68.33	69.17	AMPS					
	TOTAL CONNECTED LOAD:		25.14 KVA											
	TOTAL DEMAND AMPS:		57.75 AMPS											
	TOTAL DEMAND LOAD:		20.51 KVA											

LOAD CODES:
L= LIGHTING
R= RECEPTACLES
M= MECHANICAL/EQUIPMENT
C= COMPUTER
K= KITCHEN
P= PANELBOARD

LIFE SAFETY

3 / E5.1 **PANELBOARD HEB**
NTS 120/208V

PANELBOARD SCHEDULE	DESIGNATION: BH5	MAINS: 225 A MLO
	LOCATION: RM 530 WOMEN'S BATH COORIDOR	BUS SIZE: 225 AMP
	VOLTAGE: 480Y/277	PANEL MOUNTING: SURFACE
	PHASE: 3 PHASE, 4 WIRE	ALL BREAKERS: 25,000 AIC

CKT NO.	LOAD DESCRIPTION	LOAD CODE	CONN. KVA	BREAKER AMPS	BREAKER POLE	CONNECTED LOAD A	CONNECTED LOAD B	CONNECTED LOAD C	BREAKER AMPS	BREAKER POLE	CONN. KVA	LOAD CODE	LOAD DESCRIPTION	CKT NO.
1	Spare			20	1	5.00			25	1	5.00	M	VAV-5-2	2
3	VAV-5-3	M	5.00	25	1		5.00		20	1			Spare	4
5	VAV-5-5	M	1.75	20	1			3.75	20	1	2.00	M	VAV-5-6	6
7	VAV-5-7	M	1.25	20	1	4.25			20	1	3.00	M	VAV-5-8	8
9	Spare			20	1		1.25		20	1	1.25	M	VAV-5-10	10
11	VAV-5-11	M	1.00	20	1			2.75	20	1	1.75	M	VAV-5-12	12
13	VAV-5-13	M	2.00	20	1	4.00			20	1	2.00	M	VAV-5-14	14
15	VAV-5-15	M	2.00	20	1		4.00		20	1	2.00	M	VAV-5-16	16
17	VAV-5-1	M	2.00	20	1			4.00	20	1	2.00	M	VAV-5-4	18
19						0.00								20
21							0.00							22
23								0.00						24
25						0.00			20	1		L	LIGHTS	26
27							1.39		20	1	1.39	L	LIGHTS	28
29	LIGHTS	L	1.56	20	1			2.60	20	1	1.04	L	LIGHTS	30
31	SPACE					0.00			20	1				32
33	SPACE						0.00		20	1				34
35	SPACE							0.00						36
37	SPACE					3.04			30	3	3.04	M	AHU-5	38
39	SPACE						3.04				3.04	M	*	40
41	SPACE							3.04			3.04	M	*	42
						16.29	14.68	16.14	KVA					
	TOTAL CONNECTED AMPS:		58.81 AMPS			58.81	53.00	58.28	AMPS					
	TOTAL CONNECTED LOAD:		47.11 KVA											
	TOTAL DEMAND AMPS:		45.12 AMPS											
	TOTAL DEMAND LOAD:		35.93 KVA											

LOAD CODES:
L= LIGHTING
R= RECEPTACLES
M= MECHANICAL/EQUIPMENT
C= COMPUTER
K= KITCHEN
P= PANELBOARD

4 / E5.1 **PANELBOARD BH5**
NTS 277/480V

NEW PANEL TO REPLACE EXISTING PANEL.
KAIC RATINGS MATCH OLD PANELBOARD.
FED FROM MSB1.

PANELBOARD SCHEDULE	DESIGNATION: BL5	MAINS: 225 A MLO
	LOCATION: RM530 WOMEN'S BATH CORRIDOR	BUS SIZE: 225 AMP
	VOLTAGE: 208Y/120	PANEL MOUNTING: SURFACE
	PHASE: 3 PHASE, 4 WIRE	ALL BREAKERS: 25,000 AIC

CKT NO.	LOAD DESCRIPTION	LOAD CODE	CONN. KVA	BREAKER AMPS	BREAKER POLE	CONNECTED LOAD A	CONNECTED LOAD B	CONNECTED LOAD C	BREAKER AMPS	BREAKER POLE	CONN. KVA	LOAD CODE	LOAD DESCRIPTION	CKT NO.
1	Recpts Rm 500, 503,508	R	1.08	20	1	2.16			20	1	1.08	R	Rcpts 519A,522,530-34	2
3	Recpts Rm 509	R	1.08	20	1		2.16		20	1	1.08	R	Recpts Rm 520-22	4
5	Recpts Rm 526	R	1.08	20	1			2.16	20	1	1.08	R	Recpts Rm 519B,520	6
7	Recpts Rm 509	R	1.08	20	1	2.16			20	1	1.08	R	Recpts Rm 519A,519C	8
9	Recpts Rm 504, 509,510	R	1.08	20	1		2.16		20	1	1.08	R	Recpts Rm 514,519A,519C	10
11	Recpts Rm 510,511	R	1.08	20	1			2.16	20	1	1.08	R	Recpts Rm 514,517,518	12
13	Recpts Rm 512A,512B	R	1.08	20	1	2.16			20	1	1.08	R	Recpts Rm 513,516	14
15	Recpts Rm 512A,512B,513	R	1.08	20	1		2.16		20	1	1.08	R	Recpts Rm 525,528	16
17	Recpts Rm 526	R	0.72	20	1			1.80	20	1	1.08	R	Recpts Rm 526,528,537	18
19	Water Cooler	R	0.50	20	1	1.00			20	1	0.50	R	IT Room 524	20
21	IT Room	R	0.50	20	1		1.00		20	1	0.50	R	IT Room 524	22
23	IT Room	R	0.50	20	1			1.00	20	1	0.50	R	IT Room 524	24
25	Refrigerator RM 528	K	1.00	20	1	1.00			20	1			Spare	26
27	Counter top Recps 528	R	0.54	20	1		0.90		20	1	0.36	R	Recpts Rm 536, Roof	28
29	Reception Desk Rcpts	R	0.72	20	1			0.97	20	1	0.25	M	VAV-5-9 (control)	30
31						0.00								32
33							0.00							34
35								0.00						36
37						0.00								38
39							0.00							40
41								0.00						42
						8.48	8.38	8.09	KVA					
	TOTAL CONNECTED AMPS:		70.67 AMPS			70.67	69.83	67.42	AMPS					
	TOTAL CONNECTED LOAD:		24.95 KVA											
	TOTAL DEMAND AMPS:		34.92 AMPS											
	TOTAL DEMAND LOAD:		12.44 KVA											

LOAD CODES:
L= LIGHTING
R= RECEPTACLES
M= MECHANICAL/EQUIPMENT
C= COMPUTER
K= KITCHEN
P= PANELBOARD

5 / E5.1 **PANELBOARD BL5**
NTS 120/208V

NEW PANEL TO REPLACE EXISTING PANEL.
KAIC RATINGS MATCH OLD PANELBOARD.
FED FROM BLM.

PANELBOARD SCHEDULE	DESIGNATION: LSDP2	MAINS: 1600 A MLO
	LOCATION: 3RD Fl Justice Center	BUS SIZE: 1600 AMP
	VOLTAGE: 480Y/277	PANEL MOUNTING: SURFACE
	PHASE: 3 PHASE, 4 WIRE	ALL BREAKERS: 65,000 AIC

CKT NO.	LOAD DESCRIPTION	LOAD CODE	CONN. KVA	BREAKER AMPS	BREAKER POLE	CONNECTED LOAD A	CONNECTED LOAD B	CONNECTED LOAD C	BREAKER AMPS	BREAKER POLE	CONN. KVA	LOAD CODE	LOAD DESCRIPTION	CKT NO.
1	DP ELEV	M	98.06	600	3	98.06								2
		M	98.06				98.06							
		M	98.06					98.06						
3	DOMESTIC WATER PUMP	M	10.00	100	3	10.00			100	3			SPARE	4
		M	10.00				10.00							
		M	10.00					10.00						
5	ELEV 7	M	16.50	125	3	33.40			150	3	16.90	M	ELEV 12 & 14	6
		M	16.50				33.40				16.90	M		
		M	16.50					33.40			16.90	M		
7	ELEV 10-11	M	24.50	125	3	42.20			150	3	17.70	P	HNE 1	8
		M	24.50				42.20				17.70	P		
		M	24.50					42.20			17.70	P		
9	HNE 9	P	10.50	175	3	23.55			100	3	13.05	P	XBH2	*10*
		P	10.50				23.55				13.05	P		
		P	10.50					23.44			12.94	P		
11	HNE 7	P	10.50	175	3	30.50			175	3	20.00	P	HNE 8	12
		P	10.50				30.50				20.00	P		
		P	10.50					30.50			20.00	P		
13					3	16.80			175	3	16.80	P	HNE 5	14
							16.80				16.80	P		
								16.80			16.80	P		
15	HNE 6	P	13.80	225	3	20.73			50	3	6.93	P	HEB	*16*
		P	13.80				20.65				6.85	P	VIA 35KVA XFMR	
		P	13.80					20.53			6.73	P	*	
17	HNE 2	P	13.70	225	3	27.30			225	3	13.60	P	HNE 4	18
		P	13.70				27.30				13.60	P		
		P	13.70					27.30			13.60	P		
19	HNE3	P	54.80	400	3	54.80								20
		P	54.80				54.80							
		P	54.80					54.80						
21						0.00								22
							0.00							
								0.00						
23						0.00								24
							0.00							
								0.00						
						357.34	357.26	357.02	KVA					
	TOTAL CONNECTED AMPS:		1290.02 AMPS			1290.02	1289.73	1288.88	AMPS					
	TOTAL CONNECTED LOAD:		763.41 KVA											
	TOTAL DEMAND AMPS:		1140.23 AMPS											
	TOTAL DEMAND LOAD:		947.14 KVA											

LOAD CODES:
L= LIGHTING
R= RECEPTACLES
M= MECHANICAL/EQUIPMENT
C= COMPUTER
K= KITCHEN
P= PANELBOARD

PROVIDE AND INSTALL NEW 100A BREAKER FOR NEW PANEL XBH2
PROVIDE AND INSTALL NEW 50A BREAKER FOR NEW PANEL HEB
RE-LABEL PANEL AS "LSDP2"

6 / E5.1 **EXISTING PANELBOARD LSDP2**
NTS 277/480V

LIFE SAFETY PANEL, LABEL AS PER DETAILS.

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

ELECTRICAL - PANELLBOARD SCHEDULES

Project Number
IFAS# W0100354; WA#32

Drawn by
CMD-MC

Checked by
DDC

Date
9-17-2010

JOHN D. CAMDEN, PE
FL#53458

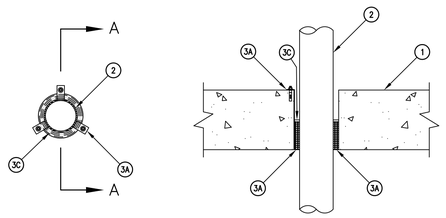
Scale
NOT TO SCALE

Set

Drawing Number
E5.1

SYSTEM NO. C-AJ-2002

May 18, 2005
F Rating – 2 Hr
T Ratings – 0 and 2 Hr
L Rating at Ambient – 7 CFM/sq ft
L Rating at 400 F – less than 1 CFM/sq ft (See Item 3C)
W Rating – Class I (See Item 3)



SECTION A-A

1. FLOOR OR WALL ASSEMBLY – MIN 2–1/2 IN. (64 MM) THICK LIGHTWEIGHT OR NORMAL WEIGHT (100–150 PCF OR 1600–2400 KG/M3) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX DIAM OF CIRCULAR OPENING IS 6–1/2 IN. (165 MM).

SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

2. NONMETALLIC PIPE OR CONDUIT – NOM 4 IN. (102 MM) DIAM (OR SMALLER) SCHEDULE 40 SOLID CORE OR CELLULAR CORE, POLYVINYL CHLORIDE (PVC) PIPE FOR USE IN CLOSED (PROCESS OR SUPPLY) OR VENTED (DRAIN, WASTE OR VENT) PIPING SYSTEMS OR RIGID NONMETALLIC CONDUIT++ OR SDR 13.5 CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPE FOR USE IN CLOSED (PROCESS OR SUPPLY) PIPING SYSTEMS. A MAX OF ONE PIPE OR CONDUIT IS PERMITTED IN THE FIRESTOP SYSTEM, EXCEPT AS NOTED IN ITEM B, THE PIPE OR CONDUIT SHALL BE CENTERED IN THE THROUGH OPENING. PIPE OR CONDUIT TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

SEE RIGID NONMETALLIC CONDUIT (DZKT) CATEGORY IN THE UL ELECTRICAL CONSTRUCTION MATERIALS DIRECTORY FOR NAMES OF MANUFACTURERS.

3. FIRESTOP SYSTEM – THE HOURLY T RATINGS FOR THE FIRESTOP SYSTEM ARE DEPENDENT UPON THE FIRESTOP ORIENTATION (WALL OR FLOOR), THE SIZE OF THE NONMETALLIC PIPE OR CONDUIT, AND THE FLOOR THICKNESS, AS TABULATED BELOW:

ORIENTATION (a)	NOMINAL PIPE DIAMETER In. (mm)	ANNULAR SPACE In. (mm)	F RATING HR	T RATING HR
F(b)	1/2–2 (13–51 mm)	1/4–1 (6–25 mm)	2	0
F(b)	2–1/2, 3 (64, 76 mm)	1/2–1 (13–25 mm)	2	0
W,F	1/2–2 (13–51 mm)	1/4–1 (6–25 mm)	2	2
W,F	2–1/2, 3 (64, 76 mm)	1/2–1 (13–25 mm)	2	2
W,F	3–1/2, 4 (89, 102 mm)	3/4–1 (19–25 mm)	2	2

(a) W = WALL, F = FLOOR
(b) MIN CONCRETE FLOOR THICKNESS IS 2–1/2 IN. (64 MM).
THE DETAILS OF THE FIRESTOP SYSTEM SHALL BE AS FOLLOWS:

A. STEEL SUPPORT CLIPS – NOM 1 IN. (25 MM) WIDE BY NOM 0.019 IN. (0.5 MM) THICK (28 GAUGE) GALV STEEL STRIPS FIELD–FORMED INTO "Z"–SHAPE WITH HEIGHT OF Z–SHAPE EQUAL TO THE FLOOR THICKNESS AND WITH WIDTH OF BOTTOM (AS INSTALLED) LEG OF SUFFICIENT LENGTH TO SPAN ANNULAR SPACE. TOP (AS INSTALLED) LEG OF Z–SHAPE TO BE MIN 2 IN. (51 MM) LONG AND MAY OR MAY NOT BE SECURED TO TOP SURFACE OF FLOOR WITH MASONRY ANCHORS. AS AN ALTERNATE TO THE Z–SHAPE CLIPS, THE GALV STEEL STRIPS MAY BE FORMED INTO "L"–SHAPE WITH HEIGHT EQUAL TO 2 IN. (51 MM) AND WITH BOTTOM (AS INSTALLED) LEG OF SUFFICIENT LENGTH TO SPAN ANNULAR SPACE. CLIPS SECURED TO OUTERMOST WRAP STRIP LAYER WITH STEEL WIRE TIE PRIOR TO INSERTION IN THROUGH OPENING. MIN OF THREE STEEL SUPPORT CLIPS TO BE USED, SYMMETRICALLY LOCATED, WITH BOTTOM LEG OF CLIPS FLUSH WITH BOTTOM PLANE OF FLOOR. WHEN ANNULAR SPACE AROUND NOM 1/2 IN. TO 2 IN. (13 MM TO 51 MM) DIAM PIPE IN FLOOR ASSEMBLY IS 1/4 IN. TO 3/8 IN. (6 MM TO 10 MM) , STEEL SUPPORT CLIPS ARE NOT REQUIRED.

B. FILL, VOID OR CAVITY MATERIALS* – WRAP STRIP – NOM 1/4 IN. (6 MM) THICK INTUMESCENT ELASTOMERIC MATERIAL FACED ON ONE SIDE WITH ALUMINUM FOIL, SUPPLIED IN 2 IN. (51 MM) WIDE STRIPS. NOM 2 IN. (51 MM) WIDE STRIPS TIGHTLY WRAPPED AROUND NONMETALLIC PIPE (FOIL SIDE EXPOSED) TO FILL ANNULAR SPACE AROUND PIPE. A MIN OF ONE LAYER OF WRAP STRIP IS REQUIRED FOR NOM 1/2 IN. TO 2 IN. (13 MM TO 51 MM) DIAM PIPES. A MIN OF TWO LAYERS OF WRAP STRIP IS REQUIRED FOR NOM 2–1/2 IN. AND 3 IN. (64 MM AND 76 MM) DIAM PIPES. A MIN OF THREE LAYERS OF WRAP STRIP IS REQUIRED FOR NOM 3–1/2 IN. AND 4 IN. (89 MM AND102 MM) DIAM PIPES. EACH LAYER OF WRAP STRIP TO BE INSTALLED WITH BUTTED SEAM WITH BUTTED SEAMS IN SUCCESSIVE LAYERS STAGGERED. WRAP STRIP LAYERS SECURELY BOUND WITH STEEL WIRE OR ALUMINUM FOIL TAPE AND SLID INTO THROUGH OPENING SUCH THAT THE BOTTOM EDGES ARE FLUSH WITH THE BOTTOM PLANE OF THE FLOOR AND ARE RESTING ON THE STEEL SUPPORT CLIP LEGS. WHEN NOM 2 IN. TO 4 IN. (51 MM TO 102 MM) DIAM PVC PIPE IS USED IN MIN 4–1/2 IN. (114 MM) THICK CONCRETE FLOOR, THE PIPE MAY BE INSTALLED ECCENTRICALLY IN THE THROUGH OPENING (MIN ZERO CLEARANCE AT POINT CONTACT LOCATION) PROVIDED THAT (1) THE INSIDE DIAM OF THE THROUGH OPENING IS 1.3 TO 1.5 TIMES LARGER THAN THE OUTSIDE DIAM OF THE PIPE, (2) THE ANNULAR SPACE BETWEEN THE PIPE AND THE SIDES OF THE OPENING AT THE BOTTOM 2 IN. (51 MM) OF THE THROUGH OPENING IS COMPLETELY FILLED WITH WRAP STRIP LAYERS INSTALLED FOLLOWING THE CONTOUR OF THE PIPE AND (3) THE BOTTOM EDGES OF THE WRAP STRIP LAYERS ARE RELIABLY SUPPORTED BY "Z"–SHAPED STEEL SUPPORT CLIPS ANCHORED TO THE TOP SURFACE OF THE CONCRETE FLOOR. IN WALL ASSEMBLIES, THE WRAP STRIP LAYERS ON THE NONMETALLIC PIPE ARE TO BE INSTALLED IN THE SAME MANNER USED FOR FLOOR ASSEMBLIES, BUT SHALL BE INSTALLED SYMMETRICALLY ON BOTH SIDES OF THE WALL WITH THE EXPOSED EDGES OF THE WRAP STRIP LAYERS FLUSH WITH THE WALL SURFACES.

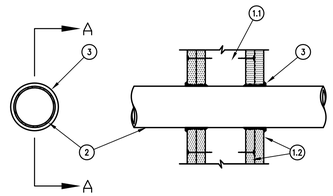
C. FILL, VOID OR CAVITY MATERIALS* – CAULK OR SEALANT – MIN 1/4 IN. (6 MM) DIAM CONTINUOUS BEAD APPLIED TO INSIDE WALLS OF THROUGH OPENING PRIOR TO INSTALLATION OF STEEL SUPPORT CLIPS AND/OR WRAP STRIP. CAULK BEAD TO BE RECESSED 1 IN. (25 MM) FROM THE BOTTOM PLANE OR FLOOR. IN WALL ASSEMBLIES, CAULK BEAD TO BE RECESSED 1 IN. (25 MM) FROM WALL SURFACE ON BOTH SIDES OF WALL. IN FLOOR ASSEMBLIES, A NOM 1/2 IN. (13 MM) THICK COATING OF CAULK IS TO BE APPLIED TO THE TOP EDGES OF THE WRAP STRIP LAYERS AND TO FILL ALL GAPS AT THE WRAP STRIP/ CONCRETE INTERFACE. IN WALL ASSEMBLIES, THE EXPOSED EDGES OF THE WRAP STRIP LAYERS AND ALL GAPS AT THE WRAP STRIP/CONCRETE INTERFACE ON BOTH SIDES OF THE WALL TO BE COATED WITH THIN LAYER OF CAULK.
(NOTE: W RATING APPLIES ONLY WHEN FB–3000 WT SEALANT IS USED. CP 25WB+ NOT SUITABLE FOR USE WITH CPVC PIPES.)
*BEARING THE UL CLASSIFICATION MARKING
++BEARING UL LISTING MARK

X/XX **CONCRETE WALL OR FLOOR PENETRATION DETAIL**

NOT TO SCALE

SYSTEM NO. WL1001

(FORMERLY SYSTEM NO. 147)
F RATING – 1, 2, 3 AND 4HR. (SEE ITEM 2 AND 3)
T RATINGS– 0, 1, 2, 3, AND 4 HR. (SEE ITEM 3)



SECTION A-A

1. WALL ASSEMBLY – THE 1, 2, 3 OR 4 HOUR FIRE–RATED GYPSUM WALLBOARD / STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL OR PARTITION DESIGN IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

1.1. STUDS – WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS CONSIST OF NOMINAL 2 BY 4 IN. LUMBER SPACED 16 INCHES OC WITH NOMINAL 2 BY 4 IN. LUMBER END PLATES AND CROSS BRACES. STEEL STUDS TO BE MIN. 3–5/8 IN. WIDE BY 1–3/8 IN. DEEP CHANNELS SPACED MAX 24 IN. OC.

1.2. WALL BOARD GYPSUM* – 1/2 IN. OR 5/8 IN. THICK 4 FOOT WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAM OF OPENING IS 13–1/2 IN.

2. PIPE OR CONDUIT – NOMINAL 12 IN. DIAM. (OR SMALLER) SCHEDULE 10 (OR HEAVIER STEEL CONDUIT, NOM. 4 IN. DIAM (OR SMALLER) STEEL ELECTRICAL CONDUIT MECHANICAL OR TYPE L OR (HEAVIER) COPPER TUBING OR MON. 1 IN. DIAM (OR SMALLER) FLEXIBLE STEEL CONDUIT.

3. FILL, VOID OR CAVITY MATERIAL* – CAULK – CAULK FILL MATERIAL INSTALLED TO COMPLETELY FILL ANNULAR SPACE BETWEEN PIPE OR CONDUIT AND GYPSUM WALLBOARD AND W/ A MIN. 1/4 IN. DIAM BEAD OF CAULK APPLIED TO PERIMETER OF PIPE OR CONDUIT AT ITS EGRESS FROM THE WALL. CAULK INSTALLED SYMMETRICALLY ON BOTH SIDES OF WALL ASSEMBLY. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS SHOWN IN THE FOLLOWING TABLE. THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE TYPE OR SIZE OF THE PIPE OR CONDUIT AND THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS TABULATED BELOW:

MAXIMUM PIPE OR CONDUIT DIAMETER (IN INCHES)	ANNULAR SPACE (IN INCHES)	F RATING HR	T RATING HR
1	0 TO 3/16	1 OR 2	0+, 1 OR 2
1	1/4 TO 1/2	3 OR 4	3 OR 4
4	0 TO 1 1/2	1 OR 2	0
6	1/4 TO 1/2	3 OR 4	0
12	3/16 TO 3/8	1 OR 2	0
+WHEN COPPER PIPE IS USED, T RATING IS O H.			

MINNESOTA MINING & MANUFACTURING CO. – TYPES CP–25 S/L, CP–25 N/S, CP–25 WB, CP–25 WB+

* BEARING THE UL CLASSIFICATION MARKING

X/XX **U.L. PENETRATION DETAIL**

NOT TO SCALE

GENERAL NOTES:

(APPLY TO ALL ELECTRICAL SHEETS)

1. PROVIDE COMPLETE AND OPERATIONAL ELECTRICAL SYSTEM.
2. ALL WORK SHALL CONFORM TO OR EXCEED THE MINIMUM REQUIREMENTS OF THE CURRENT ANSI/NFPA 70 WITH STATE OF FLORIDA AMENDMENTS, ANSI/IEEE C2 AND ALL FEDERAL, STATE, LOCAL, AND MUNICIPAL CODES AND ORDINANCES. THE ELECTRICAL SUBCONTRACTOR SHALL COMPLY WITH THE DIRECTIONS OF ALL AUTHORITIES HAVING JURISDICTION.
3. INSTALL WORK USING PROCEDURES DEFINED IN NECA STANDARDS OF INSTALLATION. ALL WORK SHALL PRESENT A NEAT MECHANICAL APPEARANCE WHEN COMPLETED.
4. REFER TO THE ARCHITECTURAL DRAWINGS FOR CEILING AND MILLWORK WORK BY THE SEPARATE GENERAL CONTRACT. COORDINATE ALL ELECTRICAL WORK.
5. THE ELECTRICAL SUBCONTRACTOR SHALL PROVIDE ALL FLOOR, WALL, AND CEILING PENETRATIONS TO COMPLETE HIS WORK. PROVIDE PROPER FIRE SAFEING FOR ALL PENETRATIONS MADE.
6. COORDINATE ALL ELECTRICAL WORK WITH ALL OTHER TRADES TO ENSURE EFFECTIVE AND EFFICIENT OVERALL INSTALLATION.
7. COORDINATE ALL ELECTRICAL SYSTEM DOWNTIME WITH THE OWNER, PERFORMANCE SERVICES, AND OTHER TRADES. DOWNTIME OF THE SYSTEM SHALL BE MINIMIZED. WEEKEND AND AFTER HOUR WORK SHALL BE REQUIRED TO PREVENT OR MINIMIZE INTERFERENCE WITH THE OWNER'S OPERATION.
8. THE LOCATIONS OF NEW RECEPTACLES, PHONE/DATA JACKS, AND ROOM EQUIPMENT SHOWN ON THESE DRAWINGS ARE APPROXIMATE. FINAL LOCATIONS WILL BE DETERMINED DURING THE CONSTRUCTION PHASE.
9. ALL NEW EQUIPMENT SHALL BE SUBMITTED FOR APPROVAL PRIOR TO ORDERING.
10. PHYSICAL SIZES AND LOCATIONS OF ALL MECHANICAL EQUIPMENT SHOWN ON THESE DRAWINGS ARE APPROXIMATE. COORDINATE ELECTRICAL WORK FOR THIS EQUIPMENT WITH THE OTHER TRADES.
11. PROVIDE APPROPRIATE SEALANT (I.E. FIRESAFEING) TO MAINTAIN CONSTRUCTION INTEGRITY FOR ANY PENETRATIONS THROUGH FLOORS, STRUCTURAL CEILINGS, AND FIRE WALLS.
12. ALL BRANCH CIRCUITS SHALL UTILIZE SEPARATE INDEPENDENT NEUTRAL CONDUCTOR, AND INSULATED GROUNDING CONDUCTOR. DO NOT COMBINE NEUTRAL CONDUCTORS.
13. ALL FEEDER NEUTRAL/GROUNDED CONDUCTORS SHALL BE CONSIDERED CURRENT CARRYING. DERATE MULTIPLE CONDUCTORS IN A RACEWAY ACCORDINGLY WITH NEC TABLES.
14. INSTALL ALL CONDUITS, RACEWAYS, AND CABLE TRAY FOR MAXIMUM HEAD CLEARANCE IN MECHANICAL AREAS, AND ATTIC. COORDINATE CLEARANCES WITH PERFORMANCE SERVICES AND THE OWNER.
15. ALL ELECTRICAL SERVICE WORK SHALL COMPLY WITH THE LOCAL UTILITY. COORDINATE ALL REQUIREMENTS AND MAXIMUM AVAILABLE FAULT CURRENT PRIOR TO BID AND INCLUDE ALL NECESSARY MATERIAL AND LABOR REQUIRED FOR THE ADDITION TO THE ELECTRICAL SERVICE. ADD UTILITY FEES TEXT.
16. CONTRACTOR SHALL DEMOLISH ANY REMAINING EXISTING ELECTRICAL EQUIPMENT, DEVICES, CONDUIT, FIXTURES, WIRE, UTILITY TRANSFORMER, ETC. COMPLETE. FIELD VERIFY EXACT REQUIREMENTS PRIOR TO BID. ALL REMOVED EQUIPMENT/FIXTURES SHALL BE TURNED OVER TO THE OWNER.
17. CAP AND FIRE STOP ALL EXISTING UNUSED CONDUITS AND CONDUIT PENETRATIONS THROUGH THE FLOOR AND TO THE FLOOR ABOVE.
18. PROVIDE UL LISTED SYSTEM FOR ALL FIRE/SMOKE WALL PENETRATIONS.
19. IF A NEW CONDUIT IS REQUIRED FOR A RECEPTACLE, THERMOSTAT, OR WALL SWITCH, THE ELECTRICAL CONTRACTOR SHALL PATCH THE DRYWALL.

LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	VOLT	LAMP NUMBER AND TYPE	MOUNT	LENS	SERIES	ACCEPTABLE MANUFACTURERS	REMARKS
F1	NOMINALLY 2'X4'X4" DEEP TROFFER, CODE GAUGE STEEL HOUSING, WHITE ENAMEL FINISH. FLOATING EXTRUDED ALUMINUM DOOR. AIR HANDLING OPTION.	277	(2) 32W T8	CEILING RECESSED T–BAR	PATTERN NO. 12, 0.125" NOMINAL PRISMATIC ACRYLIC	GCAFA DP 6PA SP AIR RG R2	METALUX DAY–BRITE COLUMBIA LITHONIA LUMAX LSI	ELECTRONIC BALLAST
F2	NOMINALLY 1'X4'X4" DEEP TROFFER, CODE GAUGE STEEL HOUSING, WHITE ENAMEL FINISH. FLOATING EXTRUDED ALUMINUM DOOR. AIR HANDLING OPTION.	277	(2) 32W T8	CEILING RECESSED T–BAR	PATTERN NO. 12, 0.125" NOMINAL PRISMATIC ACRYLIC	GCAFA DP 6PA SP AIR RG R2	METALUX DAY–BRITE COLUMBIA LITHONIA LUMAX LSI	ELECTRONIC BALLAST
F3	NOMINAL 8" APERTURE OPEN DOWN LIGHT WITH CLEAR, SPECULAR REFLECTOR. HORIZONTAL LAMP MOUNTING. UL LISTED DAMP	277	(2) 26W TTT	CEILING RECESSED	N/A	LFB H802 OMB LFBN CBH	PRESCOLITE HALO OMEGA LITHONIA JUNO	ELECTRONIC BALLAST
⊗ ⊗	LED EDGE LIT EXIT LIGHT, SINGLE OR DOUBLE FACE AS INDICATED ON DRAWINGS. UNIVERSAL SURFACE MOUNTING CANOPY, END, BACK OR TOP MOUNT, DIRECTIONAL ARROW PANEL, STROKE STENCIL FACE RED LETTERS "EXIT".	277	MULTIPLE LED WITH RED DIFFUSING PANEL	SURFACE/ CEILING		EDG 44 LINE EUR LE	LITHONIA MCPHILBEN SURE–LITES DUALLITE	AC POWER ONLY, NO BATTERY PACK

NOTES:

1. ALL LIGHT FIXTURES TO BE SUPPLIED WITH LAMPS. LAMPS SHALL BE GE, PHILLIPS, OR OSRAM/SLYVANIA, NO EXCEPTIONS.
2. FLUORESCENT LAMP COLOR SHALL BE 3500 DEGREES K.

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

ELECTRICAL - SPECIFICATIONS, PENETRATION DETAILS AND FIXTURE SCHEDULE

Project Number
IFAS# WO100354; WA#32

Drawn by
DC

Checked by
DDC

Date
9–17–2010

JOHN D. CAMDEN, PE
FL#53458

Scale
NOT TO SCALE

Set

Drawing Number

E6.0

ABBREVIATIONS, LEGENDS AND GENERAL NOTES

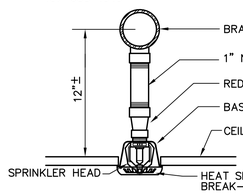
ABBREVIATIONS

AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AP	ACCESS PANEL
BFF	BELOW FINISHED FLOOR
BOT	BOTTOM CEILING
CLG	CLEANOUT
CO	COLD WATER
CW	DUCTILE IRON PIPE
DIP	ELEVATION
EL	EQUIPMENT
EQUIP	EXISTING
EXIST	FIRE SERVICE
F	FLOOR DRAIN
FD	FIRE DEPARTMENT
FDC	CONNECTIONS
FDV	FIRE DEPARTMENT VALVE
FH	FIRE HYDRANT
FL	FLOOR
FSP	FIRE STANDPIPE RISER
HB	HOSE BIBB
OS&Y	OUTSIDE SCREW & YOKE
SPK	SPRINKLER
TYP	TYPICAL
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
W/TS	WITH TAMPER SWITCH

FIRE PROTECTION SYSTEM SERVES

TOTAL AREA – 6919 S.F.
CLASSIFICATION – LIGHT HAZARD
WET PIPE SYSTEM
DENSITY – .1 GPM
COVERAGE PER SPRINKLER 225 SF MAX
NO. OF SPRINKLER HEADS CALCULATED – 20
SPRINKLER "K" FACTOR – 5.6
HMD MINIMUM RESIDUAL PRESSURE – 7.0 PSI
HOSE STREAM ALLOWANCE – 100 GPM
SCHEDULE 10 AND 40 STEEL PIPE –
SCREWED AND GROOVED CONNECTIONS

FIRE HAZARD – LIGHT
FIRE PUMP DATA
.1/1500SF 9TH FLOOR 524 GPM AT 194.1 PSI RESIDUAL
STANDPIPE#1– 1000 GPM AT 175.6 PSI
EAST COAST FIRE PROTECTION, FIRE & LIFE SAFETY AMERICA
407–688–1949



1 / FP1.0 **RECESSED PENDENT SPRINKLER HEAD**

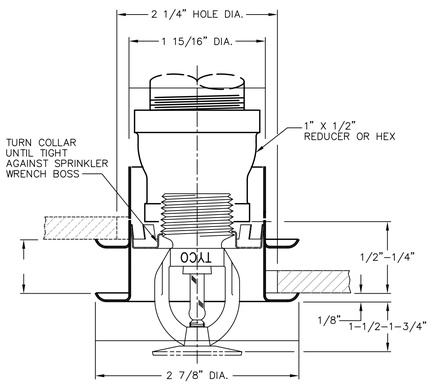
NOT TO SCALE

Preliminary Sprinkler Calculation Sheet

Flow Test Data					
Static Pressure:	172				
Residual Pressure:	139.1				
Flow (GPM): (From fire pump tag)	1000				
Data Taken:					
Time:					
Test Taken By:	East Coast Fire Protection				
Elevation of fire pump	26	ft			
Building floor	26	ft			
GPM Demand of Building:					
Most Remote Area or Highest Demand (Room Name)	5th floor building D		Judicial Center		
Design Density (NFPA 13 or supplies by Insurance Co.)	0.1				
Design Area (Square Footage)	1500	sq. ft			
Overage Factor(1.20 typ.)	1.2				
Remote Area GPM Demand(Density x Area x Overage)	180	gpm			
Standpipe GPM Demand(If required)(500 gpm for first, 250 after)	500	gpm			
Hose GPM demand (100 light, 250 ordinary, 500 for extra hazard)	100	gpm			
Total GPM (Remote Area + Standpipe + Hose) (Total Q)	780	gpm			
Available Pressure:					
Density	0.1				
Max Sprinkler Head Coverage(As per NFPA 13 table 8.6.2.2)	168	sq. ft.			
Square footage spacing x Density= GPM spinkler head (Q)	16.8	gpm			
K-Factor of Sprinkler head (K)	5.6	(K)			
Equation: Pressure required at head = (Q/K)^2	9.0000	psi			
Elevation difference from fire pump to base of riser x .433	13	ft.	5.6	psi	
Elevation difference from base of riser to remote area x .433	68	ft	29.4	psi	
Backflow Preventer Pressure Drop	0	psi			
Safety Factor (5psi min.) (SF)	9	psi			
Fixed Pressure Drop=	53.1	psi			
Estimated Friction Drop Through Fire Line:					
				Riser to floor	
Length of run from pump to riser (HR)	104.4	Lin. Ft.		107.4	Lin. Ft.
Pipe C-Factor (Steel C-120)– (C Factor)	120			120	
Nominal Pipe Inside Diameter (8",6",4")-(D)	8			4	
Hazen-William's Eq: Pd = 4.52x(Total Q^1.85)/((C Factor^1.85)x(D^4.87))					
Friction Loss in pipe (psi/ft)(Based upon Hazen William Eq.)(HW1)	0.0058	psi/ft		0.1687	psi/ft
HRx1.30xHW1 =	0.78	Est. psi required		23.55	Est. psi required
Length of run from riser to last sprinkler head(estimated.) (RS)	157.4	Lin. Ft.			
Base of Riser to furthest sprinkler	345.4				
Pipe C Factor (Black Steel C-120)	120				
Nominal Pipe Inside Diameter (6",4", 3" 2 1/2")	2.5				
Hazen-William's Eq: Pd = 4.52x(Total Q^1.85)/((C Factor^1.85)x(D^4.87))					
Friction Loss in pipe (psi/ft)(Based upon Hazen William Eq.)(HW1)	0.1104	psi/ft			
HRx1.30xHW1 =	22.59	Est psi required			
total pressure drop	99.99	psi	required at pump discharge		
at flow of sprinkler system	780	gpm			
(using min. requirement of 7 psi at head)					

FIRE PROTECTION

SPRINKLER HEAD – UPRIGHT
SPRINKLER HEAD – PENDENT
SPRINKLER HEAD – SPECIAL
SPRINKLER HEAD – SIDEWALL
VALVE IN RISER
FIRE DEPARTMENT CONNECTION
DIRECTION OF PIPE PITCH (DOWN)
DIRECTION OF FLOW
ANCHOR
REDUCER OR INCREASER
ECCENTRIC REDUCER
TOP CONNECTION, 45 OR 90 DEG.
BOTTOM CONNECTION, 45 OR 90 DEG.
SIDE CONNECTION
CAPPED OUTLET
RISE OR DROP IN PIPE
UNION
ORIFICE UNION
STRAINER
PRESSURE GAGE
EXISTING PIPE TO BE REMOVED
GATE VALVE
GLOBE VALVE
CHECK VALVE
BALL VALVE
BUTTERFLY VALVE
GATE VALVE W/ ADAPTER TO 3/4" HOSE THREAD
ANGLE GLOBE VALVE
OUTSIDE SCREW & YOKE (O S & Y)



RECESSED

2 / FP1.0 **SPRINKLER HEAD PENETRATION DETAIL**

NOT TO SCALE

TYCO TY–FRL 165 DEGREE F SPRINKLER, QUICK RESPONSE, 1/2 INCH, K=5.6
VERIFY PRIOR TO PURCHASE AND INSTALLATION, CENTRAL RECESSED UNITS.
WHITE SPRINKLER, AND ESCUTCHEON MATCHING HEAD. PROVIDE PENDANT HEADS ON IN AREAS WHERE EXISTING UNITS ARE PENDANTS LIKE F1FR56 RELIABLE PENDANT, AND UPRIGHTS, 165 DEGREE F QUICK REPSPONSE, WHITE.

NOTE:

THESE ARE STANDARD SYMBOLS AND MAY NOT ALL APPEAR ON THE PROJECT DRAWINGS; HOWEVER WHEREVER THE SYMBOL APPEARS ON THE PROJECT DRAWINGS, THE ITEM SHALL BE PROVIDED AND INSTALLED.

DRAWING SYMBOLS

2 / FP5 — DETAIL NUMBER / DRAWING NUMBER WHERE DRAWN

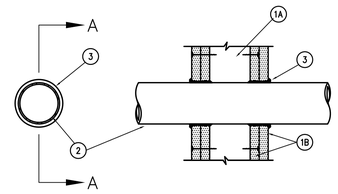
A / FP5 — SECTION LETTER / DRAWING NUMBER WHERE DRAWN

POINT OF INTERFACE BETWEEN NEW & EXISTING
POINT OF DEMOLITION
POINT OF INTERFACE BETWEEN CONTRACTORS

SYSTEM NO. WL1001

(Formerly System No. 147)

F Ratings– 1, 2, 3 and 4Hr. (See item 2 and 3)
T Ratings– 0, 1, 2, 3, and 4 Hr. (See item 3)



SECTION A–A

1. WALL ASSEMBLY – THE 1,2,3 OR 4 HOUR FIRE–RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300 OR U400 SERIES WALL OR PARTITION DESIGN IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

   A. STUDS – WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS CONSIST OF NOMINAL 2 BY 4 IN. LUMBER SPACED 16 INCHES OC WITH NOMINAL 2 BY 4 IN. LUMBER END PLATES AND CROSS BRACES. STEEL STUDS TO BE MIN. 3–5/8 IN. WIDE BY 1–3/8 IN. DEEP CHANNELS SPACED MAX. 24 IN. OC.

   B. WALL BOARD GYPSUM* – 1/2 IN. OR 5/8 IN. THICK 4 FOOT WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX. DIAM OF OPENING IS 13–1/2 IN.

2. PIPE OR CONDUIT – NOMINAL 12 IN. DIAM. (OR SMALLER) SCHEDULE 10 (OR HEAVIER STEEL CONDUIT, NOM. 4 IN. DIAM (OR SMALLER) STEEL ELECTRICAL CONDUIT MECHANICAL OR TYPE L OR (HEAVIER) COPPER TUBING OR MON. 1 IN. DIAM (OR SMALLER) FLEXIBLE STEEL CONDUIT.

3. FILL, VOID OR CAVITY MATERIAL* – CAULK – CAULK FILL MATERIAL INSTALLED TO COMPLETELY FILL ANNULAR SPACE BETWEEN PIPE OR CONDUIT AND GYPSUM WALLBOARD AND W/ A MIN. 1/4 IN. DIAM BEAD OF CAULK APPLIED TO PERIMETER OF PIPE OR CONDUIT AT ITS EGRESS FROM THE WALL. CAULK INSTALLED SYMMETRICALLY ON BOTH SIDES OF WALL ASSEMBLY. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS SHOWN IN THE FOLLOWING TABLE. THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS DEPENDENT UPON THE TYPE OR SIZE OF THE PIPE OR CONDUIT AND THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED, AS TABULATED BELOW:

MAX. PIPE OR CONDUIT DIAM. in.	ANNULAR SPACE	F RATING	T RATING
1 in.	0 to 3/16 in.	1 or 2	0+, 1 or 2
1 in.	1/4 to 1/2	3 or 4	3 or 4
4 in.	0 to 1 1/2	1 or 2	0
6 in.	1/4 to 1/2	3 or 4	0
12 in.	3/16 to 3/8	1 or 2	0

+WHEN COPPER PIPE IS USED, T RATING IS O H.

MINNESOTA MINING & MANUFACTURING CO. – TYPES CP–25 S/L, CP–25 N/S, CP–25 WB, CP–25 WB+

*BEARING THE UL CLASSIFICATION MARKING

3 / FP1.0 **UL PENETRATION DETAILS**

NOT TO SCALE

GENERAL NOTES

1. FIRE PROTECTION WORK SHALL BE DESIGNED, INSTALLED, AND TESTED IN ACCORDANCE WITH NFPA 13 NFPA 14 AND 25 LATEST EDITION OR AS ADOPTED BY THE AUTHORITY HAVING JURISDICTION. THE PROJECT CONSISTS OF RELOCATION OF FIRE SPRINKLERS IN EXISTING SPACES. THE AREA OF WORK (4th and 5th FLOORS) IS AN OFFICE. THE TOTAL NUMBER OF RELOCATED AND NEW IS 35 SPRINKLER HEADS. ACTIVATION OF 19 EXISTING HEADS IS REQUIRED IN EXISTING LINES ON THE 4TH FLOOR TO REPLACE AN OLD HALON SYSTEM BEING REMOVED. HYDRAULIC CALCULATIONS PROVIDED FOR FIRE FLOW AND STAND PIPE FLOW FOR THIS FLOOR WERE COMPLETED BY THE ORIGINAL FIRE PROTECTION CONTRACTOR "EAST COAST FIRE PROTECTION". THE FIRE FLOW ACTUAL DATA IS FOR THE 9TH FLOOR OF THE JUDICIAL CENTER AND THE ELEVATOR PENTHOUSE HOSE CONNECTION ON THE JUDICIAL CENTER.
2. PLANS PROVIDED ARE FOR USE IN CRITERIA FOR THE FACILITY RENOVATION. AS REQUESTED BY THE CITY OF BRADENTON FIRE MARSHAL, HYDRAULIC CALCULATIONS SHALL BE PROVIDED.
3. INCLUDE ANY INCIDENTAL APPARATUS, APPLIANCES, MATERIAL LABOR AND SERVICES NECESSARY TO MAKE NEW WORK COMPLETE IN ALL RESPECTS AND FULLY READY FOR OPERATION.
4. MAKE SUCH OFFSETS AND DEVIATIONS FROM WORK SHOWN ON THE DRAWINGS, AS MAY BE NECESSARY TO FIT THE ACTUAL SPACE CONDITIONS.
5. THE INSTALLER SHALL VISIT THE JOB SITE, INSPECT ALL EXISTING CONDITIONS AFFECTING THE WORK. SUBMISSION OF HIS PROPOSAL SHALL BE CONSTRUED AS INDICATING SUCH KNOWLEDGE. NO ADDITIONAL PAYMENT WILL BE MADE ON CLAIMS THAT ARISE FROM THE CONTRACTOR'S FAILURE TO COMPLY WITH THIS REQUIREMENT.
6. INSTALLER SHALL COORDINATE AT SITE WITH ALL PLUMBING, HVAC, FIRE PROTECTION, AND ELECTRICAL WORK SO AS NOT TO CONFLICT IN LOCATION WITH OTHER WORK UNDER THIS CONTRACT OR THAT MAY BE EXISTING. CONTRACTOR SHALL ADJUST PIPE ROUTING AS NECESSARY TO AVOID CONFLICTS WITH EXISTING DUCTWORK, EQUIPMENT, LIGHTING, ETC.
7. INSTALLER SHALL NOT CUT ANY STRUCTURAL MEMBERS WITHOUT FIRST SECURING WRITTEN APPROVAL FROM THE PROJECT MANAGER.
8. PIPE SIZED, GENERAL ROUTING, AND CONFIGURATION IN SYSTEMS REQUIRED TO BE HYDRAULICALLY CALCULATED SHALL BE INSTALLED PER THIS ENGINEER'S CONSTRUCTION DOCUMENTS. ANY DEVIATION SUBMITTED BY THE CONTRACTOR SHALL BE RE–DESIGNED BY THIS ENGINEER WITH RELATED RE–DESIGN FEES BORN BY THE CONTRACTOR.
9. CONTRACTOR SHALL ARRANGE FOR, OBTAIN AND BEAR THE COST OF NECESSARY PERMITS, BONDS, AND FEES.
10. ALL MATERIALS SHALL BE U.L. LISTED AND BEAR THE U.L. LABEL.
11. CONDITIONS SHOWN AS EXISTING (LOCATIONS, MATERIALS, ELEVATIONS, SIZED, ETC.) ARE BASED ON AVAILABLE EXISTING DATA AND SHOULD BE INTERPRETED TO BE APPROXIMATE. CONTRACTOR SHALL VERIFY CONDITIONS IN THE FIELD. EXISTING CONDITIONS FOUND TO DEVIATE FROM THOSE SHOWN SHALL BE REPORTED TO THE ENGINEER.
12. PENETRATIONS THROUGH FIRE RATED ASSEMBLIES. PENETRATIONS FOR PIPES, CONDUITS, OR OTHER PURPOSES THROUGH ASSEMBLIES (FLOORS, ROOF, WALLS, PARTITIONS, ETC.) WITH A REQUIRED FIRE STOP MATERIAL FIRE STOP MATERIAL SHALL BE U.L. LISTED AND INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS TO MEET OR EXCEED THE FIRE RATING OF THE PENETRATED ASSEMBLY.
13. BEFORE SHUTTING OFF ANY SECTION OF THE FIRE PROTECTION SYSTEM TO MAKE ADJUSTMENTS OR ADDITIONAL CONNECTIONS, COORDINATE WITH THE OWNER AND NOTIFY THE AUTHORITY HAVING JURISDICTION. PLAN THE WORK CAREFULLY AND ASSEMBLE ALL MATERIALS TO ENABLE COMPLETION IN THE SHORTEST POSSIBLE TIME. WORK SHALL BE USED TO COMPLETION WITHOUT INTERRUPTION, AND PROTECTION SHALL BE RESTORED AS PROMPTLY AS POSSIBLE.
14. WHERE ELECTRICAL PANELS EXIST, PROVIDE DEFLECTORS ON ELECTRICAL EQUIPMENT TO PREVENT WETTING PANELS. SPRINKLER PIPING SHALL NOT BE INSTALLED DIRECTLY ABOVE ELECTRIC PANELS.
15. PROVIDE FLUSHING CONNECTION AT END OF SPRINKLER SYSTEM WHERE LAY–IN CEILING OCCURS. ALL SPRINKLER PIPING THAT REQUIRES CHANGE IN ELEVATION DUE TO COORDINATION ROUTING OF PIPING SHALL HAVE FLUSH CONNECTION AT ALL LOWER ELEVATION. THE SPRINKLER SYSTEM SHALL BE INSTALLED WITH COMPLETE DRAINABLE SYSTEM.
16. VERIFY THE EXACT LOCATION OF EXISTING FIRE PROTECTION PIPING, FROM THE ACTUAL JOB SITE. ALL NEW LINES ARE TO BE ROUTED TO AND/OR FROM VERIFIED LOCATIONS. TAPS, WHEN NOT PROVIDED BY PREVIOUS INSTALLER SHALL BE PROVIDED BY THIS INSTALLER.
17. PROVIDE AND MAINTAIN TEMPORARY CONNECTIONS TO KEEP EXISTING FIRE PROTECTION SYSTEM IN SERVICE. ANY SHUT DOWNS ARE TO BE APPROVED BY OWNER'S REPRESENTATIVE.
18. NEW SPRINKLER HEADS IN RENOVATION AREA AND NEW ADDITION SHALL MATCH EXISTING TYPE SPRINKLER HEADS. PROVIDE PROJECT MANAGER SPARE SPRINKLERS IN ACCRODNACE WITH NFPA 13 SECTION 6.9.
19. THE ENGINEER HAS MADE AN EXTENSIVE EFFORT TO IDENTIFY ABOVE CEILING CONFLICTS. THE CONTRACTOR IS RESPONSIBLE TO ALSO CHECKING FIELD CONDITIONS PRIOR TO BIDDING AND REPORT ANY PROBLEMS/CONFLICTS TO THE ENGINEER WITHIN 2 DAYS OF DISCOVERY. ANY CHANGES RESULTING FROM CONDITIONS ARISING IN THE FIELD WHICH WERE NOT BROUGHT TO THE ENGINEER'S ATTENTION ARE TO BE MADE BY THIS CONTRACTOR WITH NO ADDITIONAL COST TO THE OWNER.
20. ALL WORK IS TO BE FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE(1) YEAR FROM DATE OF FINAL ACCEPTANCE. ALL DEFECTS WHICH DEVELOP OR ARE DISCOVERED WITHIN THIS PERIOD SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST TO THE OWNER.
21. UPON COMPLETION OF THE WORK UNDER THIS CONTRACT, THE CONTRACTOR SHALL REMOVE ALL TOOLS, APPLIANCES, SURPLUS MATERIALS, AND SCRAP. ALL IDENTIFIED EXISTING EQUIPMENT TO BE REMOVED SHALL BE TURNED OVER TO THE OWNER.
22. WHEN CONFLICTS OCCUR IN SPECIFICATIONS OR IN THE DRAWINGS, OR BETWEEN EITHER, THE ITEMS OF GREATER QUANTITY OR HIGHER COST SHALL BE PROVIDED.
23. THE CONTRACTOR SHALL COORDINATE WORK WITH OTHER TRADES IN ORDER TO AVOID CONFLICTS.
24. MECHANICAL ROOM NOTE – SPRINKLER HEADS IN THE MECHANICAL ROOMS MUST BE COORDINATED WITH THE EQUIPMENT AND DUCTWORK. THE SPRINKLER CONTRACTOR SHALL COORDINATE HIS SHOP DRAWINGS WITH THOSE OF THE HVAC CONTRACTOR AND PROVIDE HEADS BETWEEN EQUIPMENT AND UNDER DUCTWORK AS REQUIRED. ADDITIONAL SPRINKLERS SHALL BE PROVIDED UNDER ALL DUCTS AND OBSTRUCTIONS GREATER THAN 4 FEET IN WIDTH AS REQUIRED BY NFPA 13, 8.10.7.3.2 (2007).
25. CONTRACTOR SHALL PROVIDE TO LOCAL AHJ OR PERMITTING AGENCY A COPY OF ALL MAJOR EQUIPMENT CUTS SHEETS AT TIME OF APPLICATION.
26. COORDINATE ALL WORK WITH THE PROJECT MANAGER AS TO SCHEDULING OF MODIFICATIONS AND BUILDING SHUT DOWNS. ALL WORKERS SHALL BE CLEARED FOR WORK PRIOR TO START.
27. ALL WORK SHALL BE SCHEDULED AND CLEARED THROUGH THE PROJECT MANAGER.
27. PROVIDE A UNIT PRICE FOR REPLACEMENT HEADS ON THE EXISTING PIPING TO THE PROJECT MANAGER AS AN ALTERNATE.

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749–3063
FAX (941) 749–3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

FIRE PROTECTION LEGEND AND GENERAL NOTES

Project Number
IFAS# WO100354; WA#32

Drawn by
DC

Checked by
JDC

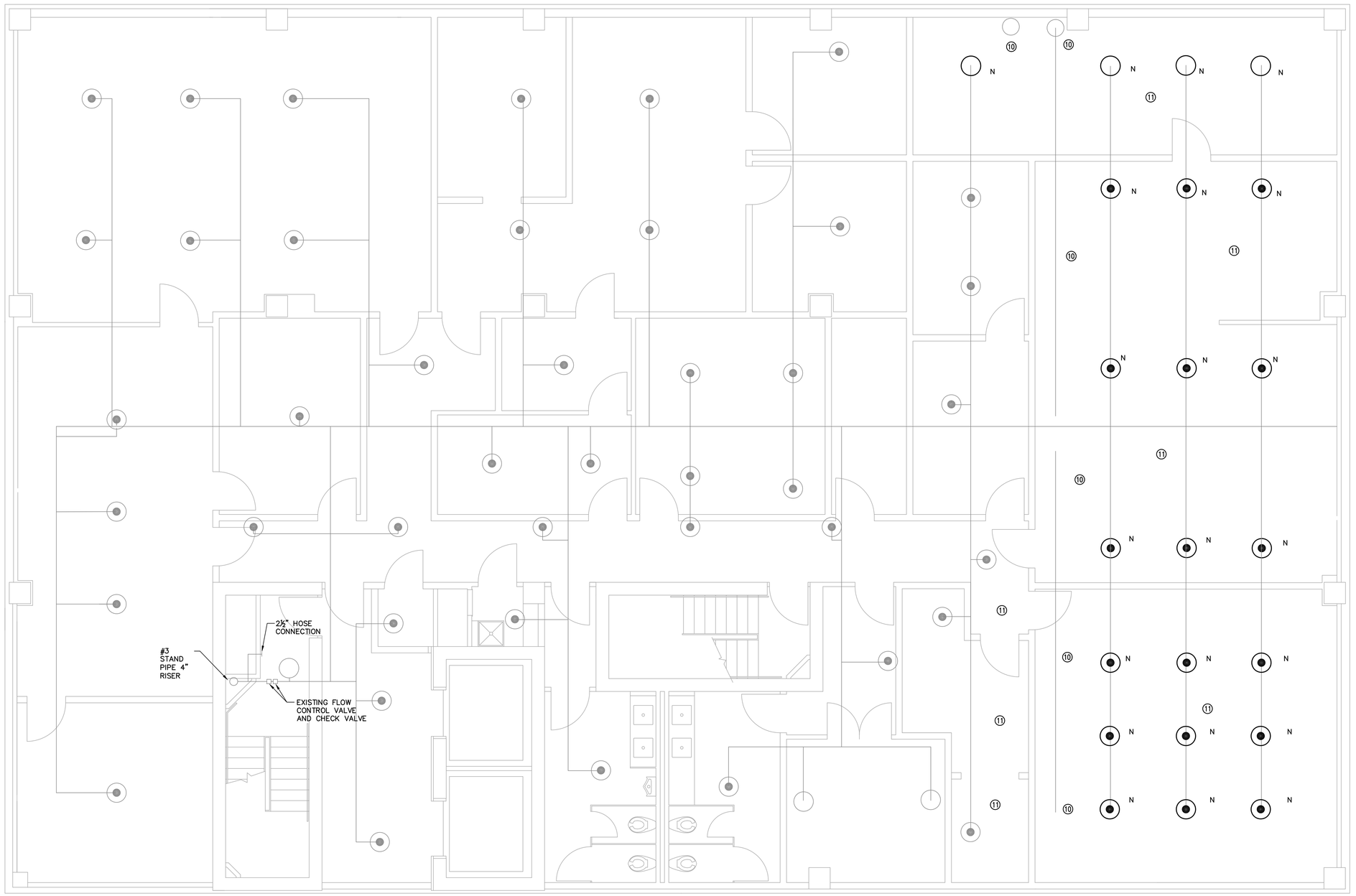
Date
9–17–2010

JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'–0"

Set

Drawing Number
FP1.0



EXISTING TO BE REMOVED OR RELOCATED

NEW UPRIGHT SPRINKLER

EXISTING TO BE REMAIN

NEW PENDANT SPRINKLER (N) RELOCATED (R)

N

1 / FP2.0

4th FL FIRE PROTECTION FLOOR PLAN

1/4" = 1'-0"

FIRE SPRINKLER GENERAL NOTES:

1. CONTRACTOR SHALL COORDINATE ALL FINAL HEAD LOCATIONS WITH PROJECT MANAGER AND CONFORM TO NFPA 13.
2. ACTIVATING 19 EXISTING SPRINKLERS AT EXISTING HEAD LOCATIONS SHOWN.
3. REFER TO GENERAL NOTES AND SPECIFICATIONS FOR ADDITIONAL SCOPE OF WORK.
4. ALL SPRINKLER HEADS IN AREA OF WORK ARE TO BE REPAIRED AND FLUSHED
5. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING PIPING AND SPRINKLER LOCATIONS PRIOR TO FIT UP.
6. COORDINATE PIPING LOCATIONS WITH EXISTING AND NEW CEILING SYSTEMS AND DUCTWORK PRIOR TO PLACEMENT AND FIT UP.
7. CENTER ALL SPRINKLERS IN CENTER OF FRAME FOR ACOUSTICAL TILE. (TYP)
8. REFER TO PLANS AND SPECIFICATIONS FOR ADDITIONAL SCOPE OF WORK.
9. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO COMMENCING OF WORK. ANY QUESTIONS SHALL BE ANSWERED BY THE PROJECT MANAGER AND ARCHITECT PRIOR TO START.
10. CONTRACTOR SHALL REMOVE EXISTING HALON SYSTEM IN THIS AREA.
11. CONTRACTOR SHALL REMOVE RAISED FLOOR IN THIS ROOM AND LEAVE STRINGER BASE SYSTEM. CONTRACTOR SHALL STACK PANELS IN AREA OF THIS FLOOR AS DIRECTED BY THE PROJECT MANAGER.

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

FIRE PROTECTION 4TH FLOOR PLAN

Project Number
IFAS# W0100354; WA#32

Drawn by
DC

Checked by
JDC

Date
9-17-2010

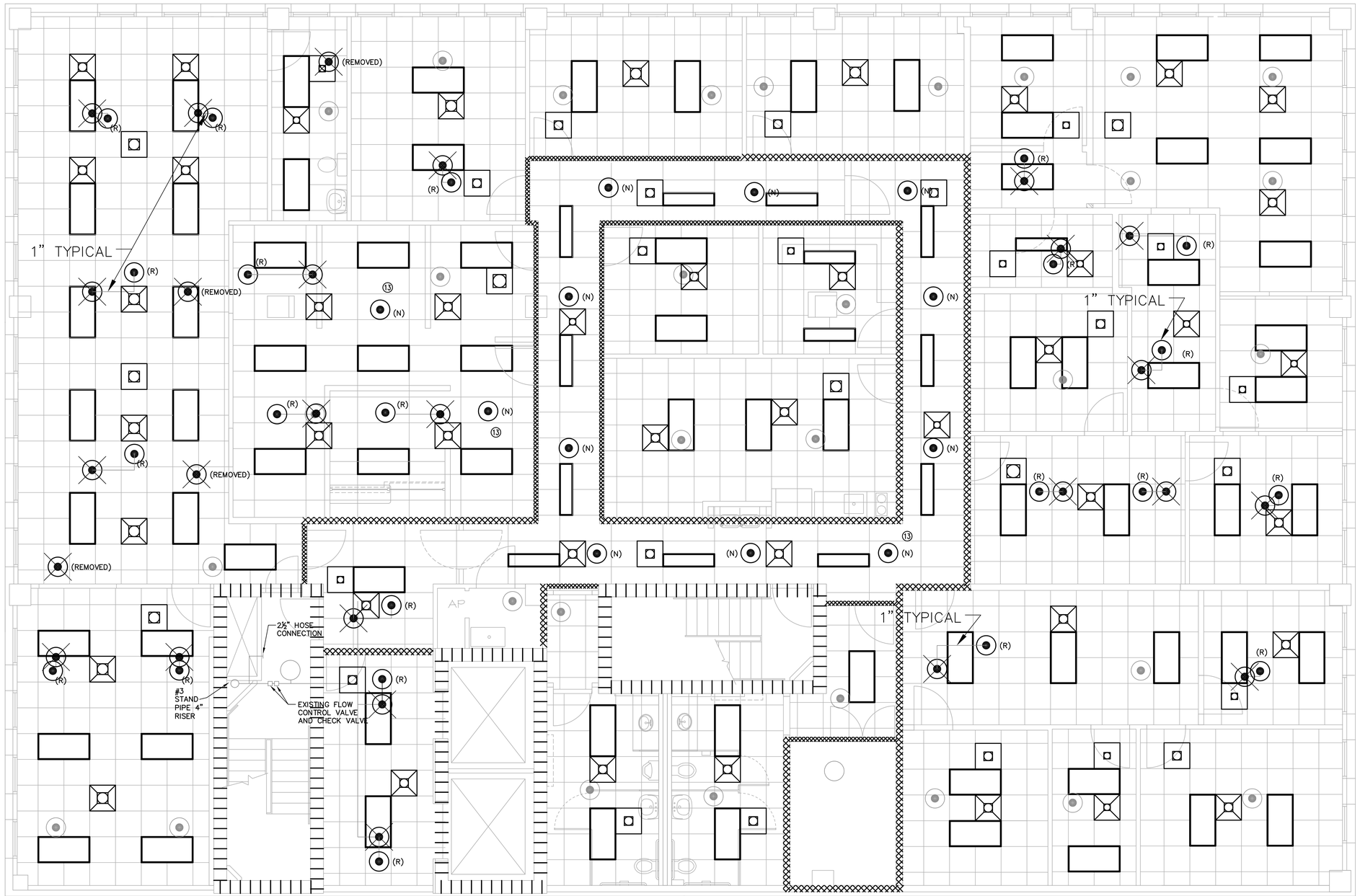
JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'-0"

Set

Drawing Number

FP2.0



EXISTING TO BE REMOVED OR RELOCATED

NEW SPRINKLER

EXISTING TO BE REMAIN

NEW SPRINKLER (N) RELOCATED (R)

N 1/FP2.1

FIRE PROTECTION FLOOR PLAN

1/4" = 1'-0"

FIRE SPRINKLER GENERAL NOTES:

1. CONTRACTOR SHALL COORDINATE ALL FINAL HEAD LOCATIONS WITH PROJECT MANAGER AND CONFORM TO NFPA 13.
2. RELOCATE 22 EXISTING SPRINKLERS TO NEW LOCATIONS SHOWN AND ADD 12 NEW SPRINKLERS IN THE HALLWAY AND OFFICE AND REMOVE 3 SPRINKLERS.
3. REFER TO GENERAL NOTES AND SPECIFICATIONS FOR ADDITIONAL SCOPE OF WORK.
4. ALL SPRINKLER HEADS IN AREA OF WORK ARE TO BE RELOCATED AND LINES EXTENDED AS INDICATED.
5. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING PIPING AND SPRINKLER LOCATIONS PRIOR TO FIT UP.
6. COORDINATE PIPING LOCATIONS WITH EXISTING AND NEW CEILING SYSTEMS AND DUCTWORK PRIOR TO PLACEMENT AND FIT UP.
7. CENTER ALL SPRINKLERS IN CENTER OF NEW ACOUSTICAL TILE. (TYP)
8. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO COMMENCING OF WORK. ANY QUESTIONS SHALL BE ANSWERED BY THE PROJECT MANAGER PRIOR TO START.
9. PROVIDE 10 NEW SPRINKLERS IN THIS AREA. TAP OF EXISTING MAIN FOR NEW HEADS.
10. COORDINATE PIPING LOCATIONS WITH EXISTING AND NEW CEILING SYSTEMS AND DUCTWORK PRIOR TO PLACEMENT AND FIT UP.
11. CENTER ALL SPRINKLERS IN CENTER OF NEW ACOUSTICAL TILE. (TYP) PROVIDE AND INSTALL FLEX HEAD 1 INCH UNITS.
12. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO COMMENCING OF WORK. ANY QUESTIONS SHALL BE ANSWERED BY THE PROJECT MANAGER PRIOR TO START.
13. PROVIDE 12 NEW SPRINKLERS IN THIS AREA. TAP OF EXISTING MAIN FOR NEW HEADS.

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

FIRE PROTECTION EXISTING 5TH FLOOR DEMOLITION AND NEW PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
DC

Checked by
JDC

Date
9-17-2010

JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'-0"

Set

Drawing Number

FP2.1

LEGENDS, GENERAL NOTES AND ABBREVIATIONS

ABBREVIATIONS

AC	AIR CONDITIONING
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
AP	ACCESS PANEL
BFF	BELOW FINISHED FLOOR
BHP	BRAKE HORSE POWER
BOT	BOTTOM
CC	COOLING COIL
CD	CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CLG	CEILING
CO	CLEANOUT
CT	COOLING TOWER
CU	CONDENSING UNIT
CW	COLD WATER
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
DB	DRY BULB
DCC	DIRECT DIGITAL CONTROL
DG	DOOR GRILLE
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
DP	DEW POINT
DX	DIRECT EXPANSION
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
ECC	ENERGY CONTROL CENTER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
ET	EXPANSION TANK
EL	ELEVATION
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EWT	ENTERING WATER TEMPERATURE
EXIST	EXISTING
FA	FIRE ALARM
FDPR	FIRE DAMPER
FCU	FAN COIL UNIT
FD	FLOOR DRAIN
FL	FLOOR
FPI	FINS PER INCH
FPF	FINS PER FOOT
FPM	FEET PER MINUTE
G	GUARD
GC	GENERAL CONTRACTOR
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
H	HUMIDITY
HB	HOSE BIBB
HC	HEATING COIL
HE	HEAT EXCHANGER
HP	HORSE POWER
HW	HOT WATER
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MC	MECHANICAL CONTRACTOR
MD	MOTORIZED DAMPER
MAX	MAXIMUM
MIN	MINIMUM
NC	NORMALLY CLOSED
NO	NORMALLY OPENED
OA	OUTSIDE AIR
OS&Y	OUTSIDE SCREW & YOKE
PC	PLUMBING CONTRACTOR
PD	PRESSURE DROP
PRESS	PRESSURE
RA	RETURN AIR
RD	ROOF DRAIN
RL	RAIN LEADER
RTU	ROOF TOP UNIT
S	SANITARY
SDPR	SMOKE DAMPER
SA	SUPPLY AIR
SP	STATIC PRESSURE
TCC	TEMPERATURE CONTROL CONTRACTOR
T	TEMPERATURE
TYP	TYPICAL
UC	UNDERCUT
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
UV	UNIT VENTILATOR
V	VENT
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VFD	VARIABLE FREQUENCY DRIVE
VSD	VARIABLE SPEED DRIVE
VTR	VENT THRU ROOF
W	WASTE
WB	WET BULB
WCO	WALL CLEANOUT

DUCTWORK

- UP DN — SUPPLY DUCT (UP & DOWN)
- UP DN — EXHAUST DUCT (UP & DOWN)
- UP DN — RETURN AIR DUCT (UP & DOWN)
- CEILING DIFFUSERS
- SIDE WALL REGISTER OR GRILLE
- RETURN OR EXHAUST CEILING GRILLE
- EXHAUST OR RETURN WALL MTD GRILLE
- 10x8 — NEW DUCT – WIDTH X DEPTH
- (SINGLE LINE)
- EXISTING DUCT TO REMAIN
- (SINGLE LINE)
- EXISTING DUCT TO BE REMOVED
- (SINGLE LINE)
- FLEXIBLE DUCTWORK (INSULATED)
- (SINGLE LINE)
- SPIN–IN FITTING
- (SINGLE LINE)
- DUCT SIZE TRANSITION (CONCENTRIC)
- (SINGLE LINE)
- DUCT SIZE TRANSITION (ECCENTRIC)
- (SINGLE LINE)
- DUCT TRANSITION (RECTANGULAR TO ROUND)
- (SINGLE LINE)
- ACOUSTICALLY LINED DUCT
- INCLINED RISE, IN DIRECTION OF AIR FLOW
- INCLINED DROP, IN DIRECTION OF AIR FLOW
- FLEXIBLE CONNECTION
- LOUVER
- MANUAL VOLUME DAMPER
- FIRE DAMPER
- SMOKE DAMPER
- FIRE / SMOKE DAMPER
- SMOKE DETECTOR
- DUCT HEATER
- VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES EVEN IF SYMBOL IS MISSING)
- VANED ELBOW (SHORT RADIUS)
- STANDARD RADIUS ELBOW
- VANE TURN ELBOW & AIR SPLIT TYPE DUCT TAKE–OFF
- T — THERMOSTAT / TEMPERATURE SENSOR
- H — HUMIDISTAT / HUMIDITY SENSOR
- UC — UNDERCUT (1" U.O.N.)
- DG — DOOR GRILLE (18"X12" U.O.N.)
- A / 100 / 6"ø — AIR DEVICE TYPE, AIR FLOW CFM, NECK SIZE
- 4–WAY AIR FLOW
- 3–WAY AIR FLOW
- 2–WAY AIR FLOW
- 1–WAY AIR FLOW

PIPING

- CWS — CONDENSER WATER SUPPLY
- CWR — CONDENSER WATER RETURN
- CHWS — CHILLED WATER SUPPLY
- CHWR — CHILLED WATER RETURN
- C — CONDENSATE LINE
- RL — REFRIGERANT LIQUID
- RS — REFRIGERANT SUCTION
- RHG — REFRIGERANT HOT GAS
- HWS — HOT WATER SUPPLY
- HWR — HOT WATER RETURN
- DOMESTIC WATER
- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- BALL VALVE
- PLUG VALVE
- PRESSURE REDUCING VALVE
- 2–WAY CONTROL VALVE
- 3–WAY MODULATING CONTROL VALVE
- SAFETY OR PRESSURE RELIEF VALVE
- MANUAL AIR VENT
- BUTTERFLY VALVE
- HOSE BIBB
- ANGLE GLOBE VALVE
- MOTOR OPERATED GATE VALVE
- MOTOR OPERATED GLOBE VALVE
- TEST PLUG (PRESSURE / TEMPERATURE)
- OUTSIDE SCREW & YOKE (O S & Y)
- DIRECTION OF FLOW
- ANCHOR
- REDUCER OR INCREASER
- ECCENTRIC REDUCER
- TOP CONNECTION, 45 OR 90 DEG.
- BOTTOM CONNECTION, 45 OR 90 DEG.
- SIDE CONNECTION
- CAPPED OUTLET
- RISE OR DROP IN PIPE
- UNION
- STRAINER
- THERMOMETER
- PRESSURE GAGE
- WATER FLOW MEASURING DEVICE
- EXISTING PIPE TO BE REMOVED

DRAWING SYMBOLS

- 2 / FP5 — DETAIL NUMBER / DRAWING NUMBER WHERE DRAWN
- A / FP5 — SECTION LETTER / DRAWING NUMBER WHERE DRAWN
- POINT OF INTERFACE BETWEEN NEW & EXISTING P.O.C.
- POINT OF DEMOLITION P.O.D.
- POINT OF INTERFACE BETWEEN CONTRACTORS

GENERAL NOTES

1. HVAC WORK CONSISTS OF PROVIDING AND INSTALLING AIR CONDITIONING SYSTEMS FOR A COMPLETE OPERATING SYSTEM AND AS INDICATED ON THE DRAWINGS. ALL WORK SHALL COMPLY WITH APPLICABLE CODES IN SPECIFICATIONS. IT IS THE INTENTION OF THE CONTRACT DRAWINGS AND SPECIFICATIONS TO CALL FOR COMPLETE, FINISHED WORK, TESTED, AND READY FOR OPERATION.
2. TEST AND BALANCE SHALL BE PROVIDED BY A COMPANY SPECIALIZING IN THE TESTING AND BALANCING OF HVAC SYSTEMS AS SUBCONTRACTOR TO THE HVAC CONTRACTOR. THE TEST AND BALANCE CONTRACTOR SHALL BE A MEMBER OF NEBB.
3. DUCT DIMENSIONS SHOWN ON THE DRAWINGS ARE CLEAR INSIDE AIR PASSAGE DIMENSIONS.
4. PROVIDE SPIN–IN FITTINGS AT ALL FLEXIBLE DUCT RUNOUTS TO DIFFUSERS WITH AIR EXTRACTOR AND DAMPER.
5. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL BE 6'–0".
6. ALL PIPING SUBJECT TO THERMAL EXPANSION AND/OR CONTRACTION THAT PENETRATES A SMOKE, FIRE, OR FIRE/SMOKE WALL, PARTITION, OR FLOOR SLAB SHALL BE SUITABLY SLEEVED AND FIRE SAFED.
7. METAL DUCTS WHICH PENETRATE 1 HOUR RATED FIRE WALLS AND ARE LESS THAN 100 SQUARE INCHES SHALL EXTEND A MINIMUM OF 5 FEET ON BOTH SIDES OF THE WALL WITHOUT AN OPENING (TO PRECLUDE THE REQUIREMENT OF A FIRE DAMPER). DUCTWORK SHALL IN NO CASE BE LIGHTER (TO PRECLUDE THE REQUIREMENT OF A FIRE DAMPER). DUCTWORK SHALL IN NO CASE BE LIGHTER THAN 24 GAUGE STEEL.
8. PROVIDE IDENTIFICATION OF THE LOCATION OF ALL FIRE AND BALANCING DAMPERS. IDENTIFICATION TAGS SHALL BE AFFIXED TO THE WALLS OR CEILINGS AND SHALL BE VISIBLE FROM THE OCCUPIED SPACE.
9. ALL PIPING SHALL BE SUPPORTED WITH COMMERCIAL MANUFACTURED CLAMPS. PROVIDE ISOLATION SLEEVES TO PREVENT CONTACT OF DISSIMILAR METALS.
10. INSTALL ALL EQUIPMENT IN STRICT ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS AND RECOMMENDATIONS.
11. CONTRACTOR TO PROVIDE ALL SUPPLEMENTARY STEEL REQUIRED TO SUSPEND MECHANICAL EQUIPMENT AND MATERIALS.
12. PENETRATIONS THROUGH FIRE RATED ASSEMBLIES, PENETRATIONS FOR PIPES, CONDUITS, OR OTHER PURPOSES THROUGH ASSEMBLIES (FLOORS, ROOF, WALLS, PARTITIONS, ETC.) WITH A REQUIRED FIRE RESISTANCE RATING FIRE STOP MATERIAL. FIRE STOP SEALANTS SHALL BE UL LISTED. APPLY FIRE STOP AS RECOMMENDED BY THE MANUFACTURER AND IN ACCORDANCE WITH ITS LISTING TO MEET OR EXCEED THE FIRE RATING OF THE ASSEMBLY IN WHICH IT IS INSTALLED.
13. ALL INSULATION SHALL BE FIRE RATED IN ACCORDANCE WITH ASHRAE 90A 50/25 SMOKE DEVELOPMENT AND FLAME SPREAD REQUIREMENTS. INSULATION "R" VALUES SHALL COMPLY WITH THE FLORIDA ENERGY CODE.
14. MOUNT ALL SPACE THERMOSTATS AND/OR SENSORS 4 FEET ABOVE THE FLOOR, UNLESS OTHERWISE NOTED.
15. INSTALL DUCT MOUNTED SMOKE DETECTORS (FURNISHED BY DIVISION 16) IN SUPPLY AIR DUCTWORK CONNECTED TO THE A/C UNIT. WIRE DUCT MOUNTED SMOKE DETECTORS SUCH THAT ACTIVATION WILL DE–ENERGIZE AIR HANDLING UNIT FAN. LOCATE DUCT MOUNTED SMOKE DETECTORS THE REQUIRED DISTANCE DOWNSTREAM FROM BENDS OR INLETS AS RECOMMENDED BY THE MANUFACTURER.
16. AIR HANDLING UNITS SHALL BE SHUT DOWN BY THE FIRE ALARM SYSTEM. WIRE THROUGH FIRE ALARM RELAY CONTACT (PROVIDED BY THE FIRE ALARM CONTRACTOR) TO SHUT DOWN AIR HANDLING UNITS UPON FIRE ALARM ACTIVATION. COORDINATE WITH FIRE ALARM CONTRACTOR ACCORDINGLY. WHEN AIR HANDLING UNITS SHUT DOWN FOR FIRE ALARM OR MAINTENANCE, INTERLOCKED EXHAUST FANS SHALL ALSO SHUT DOWN.
17. ACTIVATION OF THE FIRE ALARM SHALL CLOSE ALL SMOKE DAMPERS. SMOKE DAMPERS SHALL RE–OPEN AUTOMATICALLY UPON RESTORATION OF THE FIRE ALARM "ALL CLEAR" SIGNAL. COORDINATE THE WIRING OF THE COMBINATION SMOKE/FIRE DAMPERS WITH THE FIRE ALARM CONTRACTOR ACCORDINGLY.
18. SEE THE REFLECTED CEILING PLAN FOR EXACT LOCATION OF ALL AIR DEVICES LOCATED IN THE CEILING.
19. SEE ELECTRICAL DRAWINGS FOR ELECTRICAL CHARACTERISTICS OF MECHANICAL EQUIPMENT.
20. UNLESS OTHERWISE NOTED, INSTALL ALL DUCTWORK AS HIGH AS POSSIBLE, TIGHT TO THE BOTTOM OF THE STRUCTURE. COORDINATE ELEVATION AND LOCATION WITH RAIN LEADERS, WATER PIPING, PLUMBING VENTS, AND MAJOR ELECTRICAL CONDUITS OR CABLE TRAY.
21. PROVIDE MOTORIZED DAMPERS IN ALL OUTSIDE AIR DUCTS.
22. PROVIDE DRAIN P–TRAPS IN THE CONDENSATE LINES AT ALL AIR HANDLING UNITS.
23. ROUTE FULL SIZE (MIN. 1") COPPER DRAIN PIPE FROM EACH AHU DRAIN PAN TO RESPECTIVE FLOOR DRAIN. INSULATE WITH 3/4" ARMSTRONG "ARMAFLEX" INSULATION.
24. THE ENGINEER HAS MADE AN EXTENSIVE EFFORT TO IDENTIFY ABOVE CEILING CONFLICTS. THE CONTRACTOR IS RESPONSIBLE TO ALSO CHECKING FIELD CONDITIONS PRIOR TO BIDDING AND REPORT ANY PROBLEMS/CONFLICTS TO THE ENGINEER WITHIN 2 DAYS OF DISCOVERY. ANY CHANGES RESULTING FROM CONDITIONS ARISING IN THE FIELD WHICH WERE NOT BROUGHT TO THE ENGINEER'S ATTENTION ARE TO BE MADE BY THIS CONTRACTOR WITH NO ADDITIONAL COST TO THE OWNER.
25. THE WORK INDICATED ON THESE DRAWINGS IS GENERALLY DIAGRAMMATIC AND IS INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE THE GENERAL ARRANGEMENT OF DUCTWORK AND EQUIPMENT, ETC.
26. ALL WORK IS TO BE FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE(1) YEAR FROM DATE OF FINAL ACCEPTANCE BY THE OWNER. ALL DEFECTS WHICH DEVELOP OR ARE DISCOVERED WITHIN THIS PERIOD SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST TO THE OWNER.
27. UPON COMPLETION OF THE WORK UNDER THIS CONTRACT, THE CONTRACTOR SHALL REMOVE ALL TOOLS, APPLIANCES, SURPLUS MATERIALS, AND SCRAP. ALL IDENTIFIED EXISTING EQUIPMENT TO BE REMOVED SHALL BE TURNED OVER TO THE OWNER.
28. WHEN CONFLICTS OCCUR IN SPECIFICATIONS OR IN THE DRAWINGS, OR BETWEEN EITHER, THE ITEMS OF GREATER QUANTITY OR HIGHER COST SHALL BE PROVIDED.
29. THE CONTRACTOR SHALL COORDINATE WORK WITH OTHER TRADES IN ORDER TO AVOID CONFLICTS.
30. PROVIDE BALANCING DAMPER IN EACH BRANCH CONNECTION.
31. ALL DUCTWORK INSTALLED ON THIS PROJECT SHALL BE OF SHEET METAL CONSTRUCTION. DUCTWORK SHALL BE FABRICATED AND CONSTRUCTED IN ACCORDANCE WITH SMACNA REQUIREMENTS.
32. ALL ROOF ATTACHED EQUIPMENT AND APPURTENANCES INCLUDED IN THE SCOPE OF THIS PROJECT ARE REQUIRED TO BE SECURED TO THE UNDERLYING BUILDING STRUCTURE. THE FASTENING SYSTEMS SHALL BE DESIGNED TO WITHSTAND A 140 MPH WIND LOAD.
33. CONTRACTOR SHALL PROVIDE TO LOCAL AHJ OR PERMITTING AGENCY A COPY OF ALL MAJOR EQUIPMENT CUTS SHEETS AT TIME OF APPLICATION.
34. PROVIDE PRICING FOR A REPAIR AND REUSE OF AN EXISTING 9000 BTUH WALL PACK AND DX CONDENSER FOR REUSE IN THE IT ROOM ON THE 5TH FLOOR. UNIT INCLUDES NEW CONDENSATE PUMP AND TCC MONITORING.

NOTE:

THESE ARE STANDARD SYMBOLS AND MAY NOT ALL APPEAR ON THE PROJECT DRAWINGS; HOWEVER WHEREVER THE SYMBOL APPEARS ON THE PROJECT DRAWINGS, THE ITEM SHALL BE PROVIDED AND INSTALLED.

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749–3063
FAX (941) 749–3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

MECHANICAL LEGEND AND GENERAL NOTES

Project Number
IFAS# WO100354; WA#32

Drawn by
DC

Checked by
JDC

Date
9–17–2010

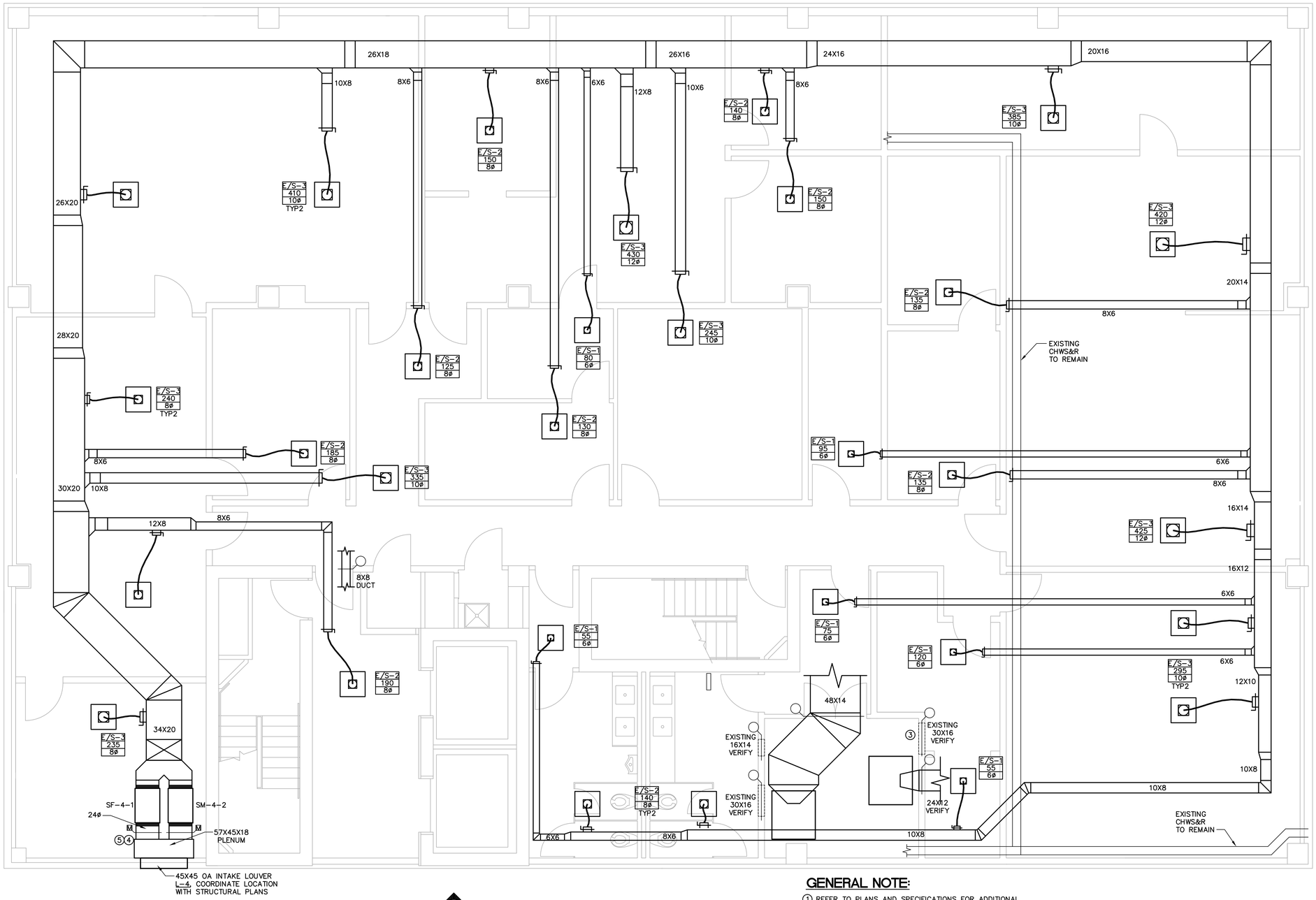
JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'–0"

Set

Drawing Number

M1.0



MECHANICAL 4TH FLOOR

1/4"=1'-0"

GENERAL NOTE:

1. REFER TO PLANS AND SPECIFICATIONS FOR ADDITIONAL SCOPE OF WORK.
2. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO START OF WORK. ANY QUESTIONS SHALL BE ANSWERED BY THE ENGINEER AND PROJECT MANAGER PRIOR TO START WORK.
3. VERIFY ALL REUSED WALL PENETRATIONS PRIOR TO ORDER OF FIRE/SMOKE DAMPERS.
4. INSULATE SMOKE PLENUM UP TO AND INCLUDING THE DAMPERS TO REDUCE CONDENSATION.
5. INSULATE OUTSIDE AIR DUCT AND PLENUM COMPLETELY.
6. VERIFY FINAL LOCATION OF GRILLE AND DUCTWORK IN EXISTING GRID PRIOR TO INSTALLATION

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

MECHANICAL EXISTING 4TH FLOOR PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
DC

Checked by
JDC

Date
9-17-2010

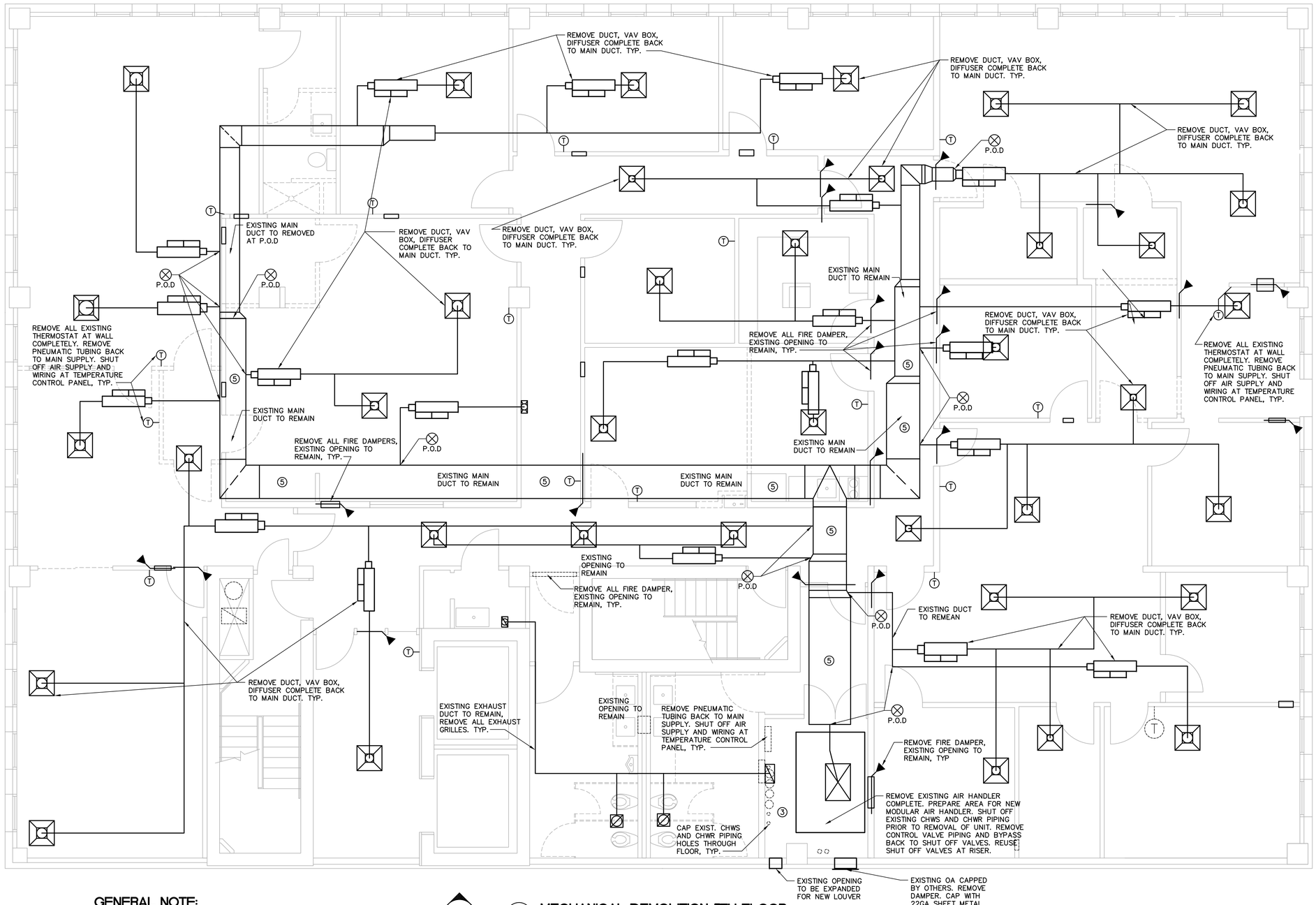
JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'-0"

Set

Drawing Number

M2.0



GENERAL NOTE:

1. REFER TO PLANS AND SPECIFICATIONS FOR ADDITIONAL SCOPE OF WORK.
2. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO START OF WORK. ANY QUESTIONS SHALL BE ANSWERED BY THE ENGINEER AND PROJECT MANAGER PRIOR TO START WORK.
3. CAP AND FIRE STOP ALL UNUSED PIPING PENETRATIONS TO THE FLOOR BELOW AND FLOOR ABOVE.
4. SHEET METAL PATCH AND DUCT SEAL ALL UNUSED DUCT TAKEOFFS AND WRAP DUCT WITH 2 INCH THICK FIBERGLASS FOIL FACE DUCT INSULATION.
5. REPAIR, CLEAN, CERTIFY, AND SEAL ALL EXISTING REUSED DUCT.

1/M2.1 MECHANICAL DEMOLITION 5TH FLOOR

1/4"=1'-0"

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

MECHANICAL EXISTING 5TH FLOOR DEMOLITION PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
DC

Checked by
DDC

Date
9-17-2010

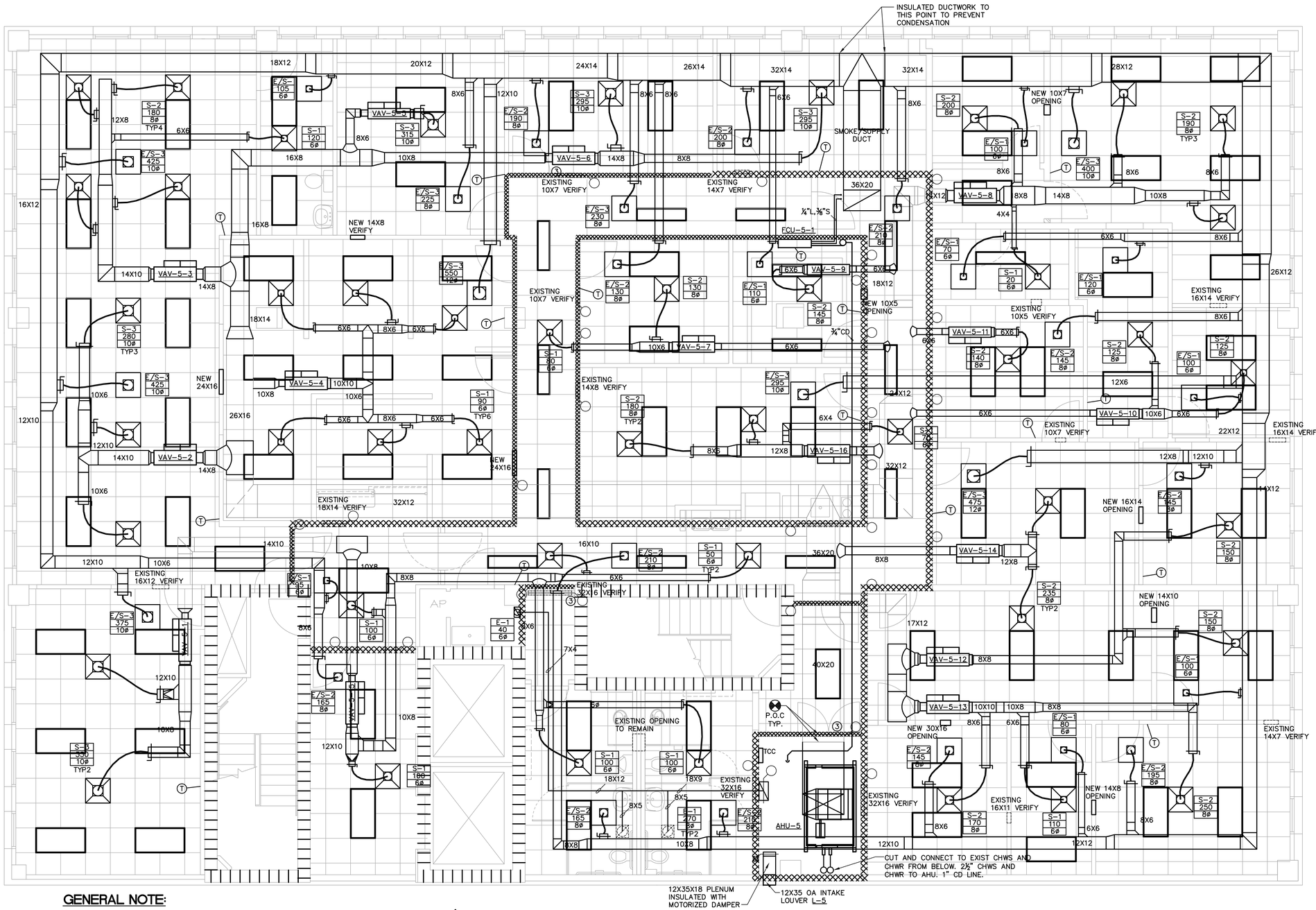
JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'-0"

Set

Drawing Number

M2.1



GENERAL NOTE:

1. REFER TO PLANS AND SPECIFICATIONS FOR ADDITIONAL SCOPE OF WORK.
2. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO START OF WORK. ANY QUESTIONS SHALL BE ANSWERED BY THE ENGINEER AND PROJECT MANAGER PRIOR TO START WORK.
3. VERIFY ALL REUSED WALL PENETRATIONS PRIOR TO ORDER OF FIRE/SMOKE DAMPERS. ALL SMOKE FIRE DAMPERS ARE NEW
4. SHEET METAL PATCH AND DUCT SEAL ALL UNUSED DUCT TAKEOFFS AND WRAP DUCT WITH 2 INCH THICK FIBERGLASS FOIL FACE DUCT INSULATION.
5. INSULATE SMOKE PLENUM UP TO AND INCLUDING THE DAMPERS TO REDUCE CONDENSATION.
6. INSULATE OUTSIDE AIR DUCT AND PLENUM COMPLETELY.
7. ALL LIGHTS ARE RETURN TROFFER TYPE EXCEPT AS NOTED IN ELECTRICAL PLANS
8. ALL OPENINGS ARE ABOVE THE CEILING FOR RETURN AIR TRANSFER.

1/M2.2 MECHANICAL NEW 5TH FLOOR

1/4"=1'-0"

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

MECHANICAL 5TH FLOOR NEW PLAN

Project Number
IFAS# WO100354; WA#32

Drawn by
DC

Checked by
DDC

Date
9-17-2010

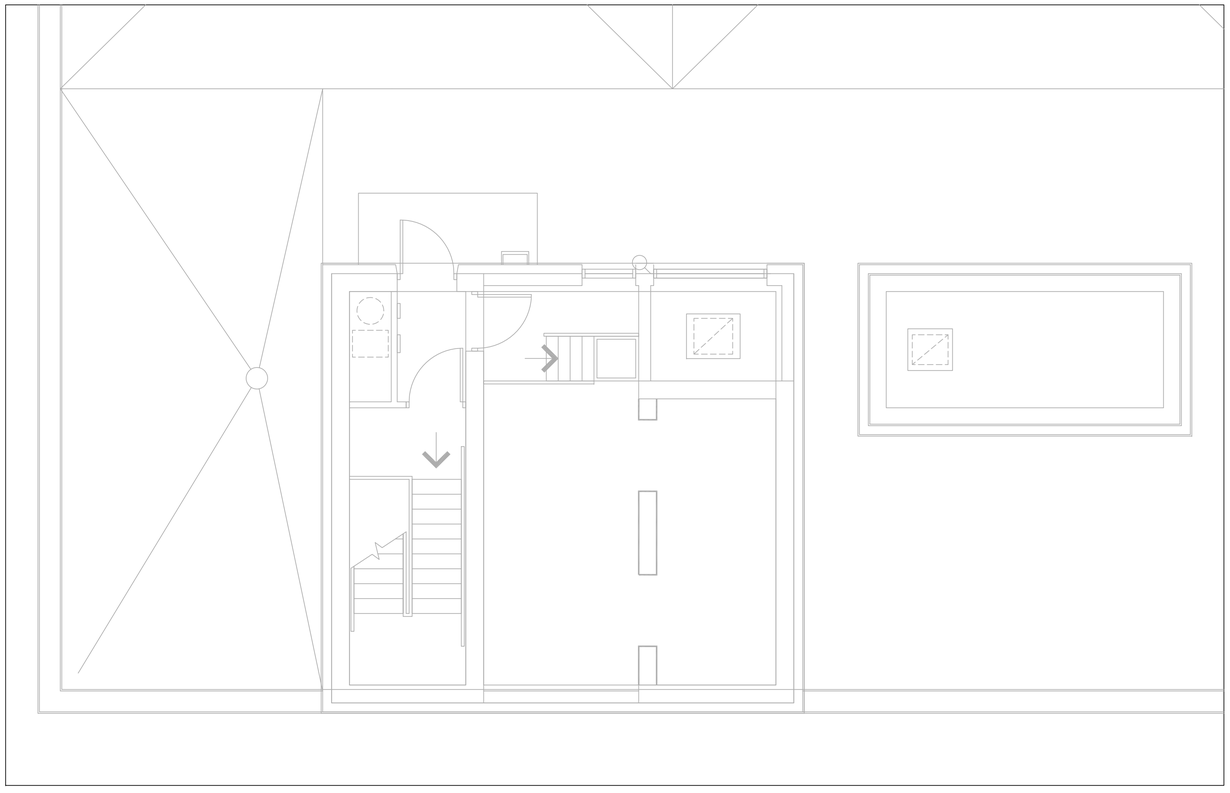
JOHN D. CAMDEN, PE
FL#53458

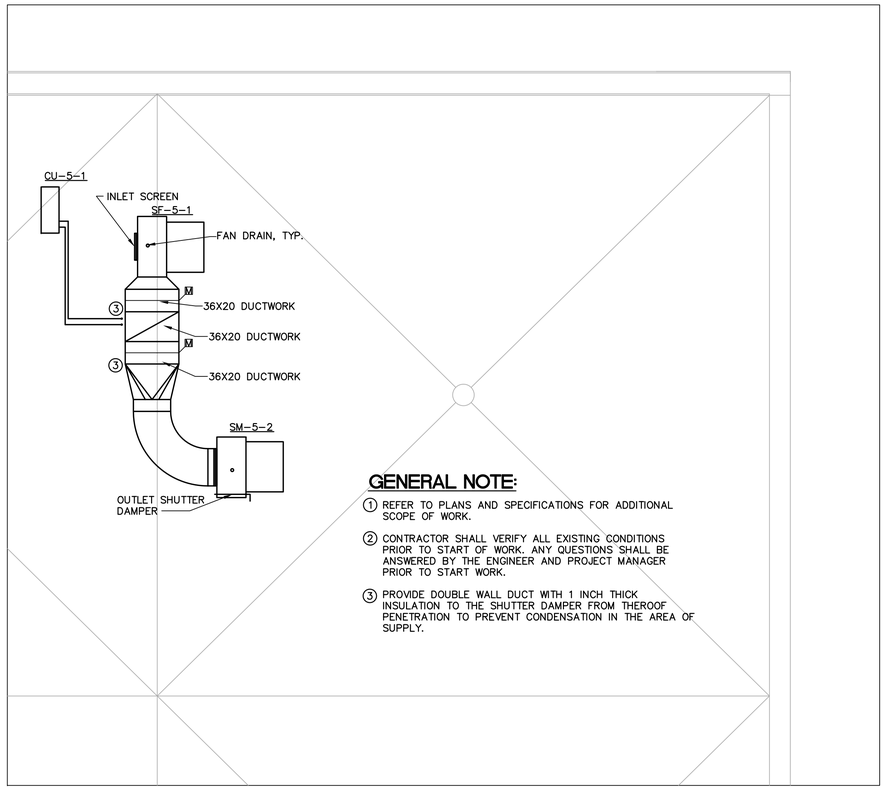
Scale 1/4" = 1'-0"

Set

Drawing Number

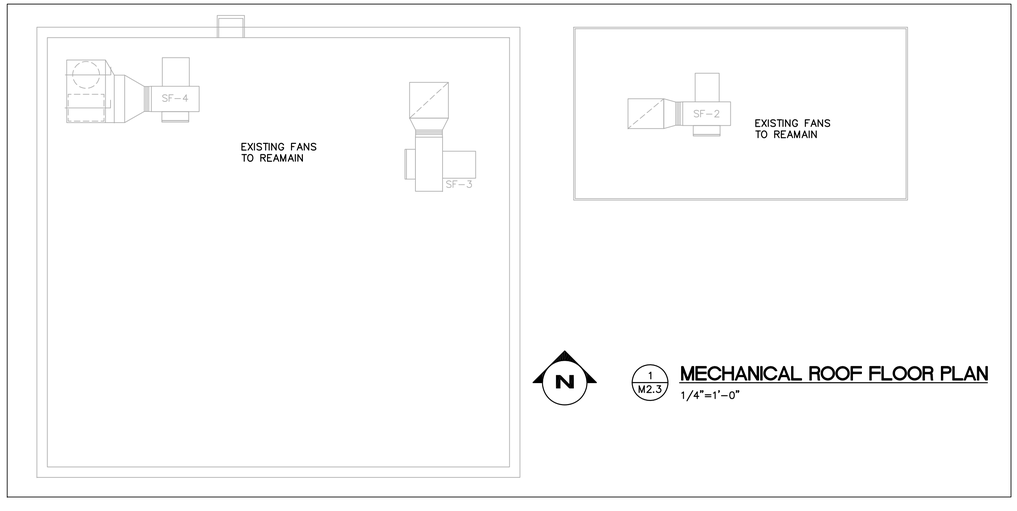
M2.2



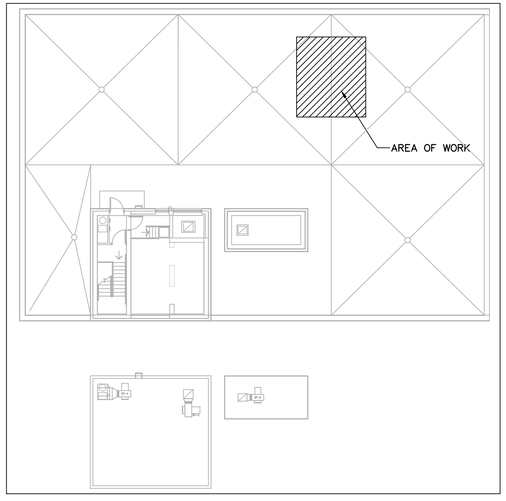


GENERAL NOTE:

1. REFER TO PLANS AND SPECIFICATIONS FOR ADDITIONAL SCOPE OF WORK.
2. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO START OF WORK. ANY QUESTIONS SHALL BE ANSWERED BY THE ENGINEER AND PROJECT MANAGER PRIOR TO START WORK.
3. PROVIDE DOUBLE WALL DUCT WITH 1 INCH THICK INSULATION TO THE SHUTTER DAMPER FROM THEROOF PENETRATION TO PREVENT CONDENSATION IN THE AREA OF SUPPLY.



1 / M2.3 **MECHANICAL ROOF FLOOR PLAN**
1/4"=1'-0"



2 / M2.3 **ROOF KEY PLAN**
NOT TO SCALE

MANATEE COUNTY GOVERNMENT

Property Management

1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206

(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
3 RD AND 5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

MECHANICAL ROOF PLAN

Project Number
IFAS# W0100354; WA#32

Drawn by
DC

Checked by
JDC

Date
9-17-2010

Scale
1/8" = 1'-0"

Set

Drawing Number

M2.3

GRILLE, REGISTER AND DIFFUSER SCHEDULE

TAG NO.	PATTERN	NECK SIZE	MODULE SIZE	FRAME STYLE	MATERIAL	FINISH	CFM RANGE	ACCESSORIES	MANUFACTURER	MODEL NO.	REMARKS
S-1	4 WAY	6"ø	24X24	TBAR	ALUM	WHITE	0-120	1	TITUS	PAS-AA	2
S-2	4 WAY	8"ø	24X24	TBAR	ALUM	WHITE	105-230	1	TITUS	PAS-AA	2
S-3	4 WAY	10"ø	24X24	TBAR	ALUM	WHITE	165-415	1	TITUS	PAS-AA	2
S-4	4 WAY	12"ø	24X24	TBAR	ALUM	WHITE	240-525	1	TITUS	PAS-AA	2
S-5	4 WAY	14"ø	24X24	TBAR	ALUM	WHITE	320-700	1	TITUS	PAS-AA	2
S-6	DBL DFL	10X12	12X14	SURF	ALUM	WHITE	216-504	1	TITUS	300FL	2,7
S-7	DBL DFL	12X12	14X14	SURF	ALUM	WHITE	264-616	1	TITUS	300FL	2,7
E-1	35	12X8	13 X9	SURF	ALUM	WHITE	0-400	1	TITUS	350FL	2,3
E/S-1	EGG/TBAR	6X6	24X24	SURF	ALUM	WHITE	0-120	1	TITUS	50FNT	2,4
E/S-2	EGG/TBAR	14X6	24X24	SURF	ALUM	WHITE	105-230	1	TITUS	50FNT	2,5
E/S-3	EGG/TBAR	12X12	24X24	SURF	ALUM	WHITE	240-525	1	TITUS	50FNT	2,6
E/S-4	EGG/SURF.	6X6	8X8	SURF	ALUM	WHITE	0-152	1	TITUS	50F	2,4

NOTES:
1. COORDINATE CEILING FRAMES WITH CEILING TYPE ON ARCHITECTURAL PLANS. E/S GRILLES ARE USED IN SMOKE SYSTEM USE.
2. OPPOSED BLADE DAMPER, ADJUSTABLE FROM UNIT FRONT
3. CEILING MOUNT GRILLE, PROVIDE RECTANGULAR BOX WITH ROUND TRANSITION. MIN. 8 INCH ROUND.
4. CEILING MOUNT GRILLE, PROVIDE RECTANGULAR BOX WITH ROUND TRANSITION. MIN. 6 INCH ROUND.
5. CEILING MOUNT GRILLE, PROVIDE RECTANGULAR BOX WITH ROUND TRANSITION. MIN. 8 INCH ROUND.
6. CEILING MOUNT GRILLE, PROVIDE RECTANGULAR BOX WITH ROUND TRANSITION. MIN. 10 INCH ROUND.
7. FIELD MEASURE AND ADAPT EXISTING DUCTWORK FOR REPLACEMENT SMOKE SUPPLY GRILLES

FAN SCHEDULE

ITEM NO.	---	EF-17- EXIST.	SF-4-1	SM-4-2	SF-5-1	SM-5-2	
SERVICE	---	TOILET	4TH FLOOR SUPPLY	4TH FLOOR	5TH FLOOR	5TH FLOOR	
AIR QUANTITY	CFM	2650	6470	6470	6420	6420	
EXT. STATIC PRESSURE	IN. WTR.	EXIST.	1.30	1.30	1.3	1.33	
FAN TYPE	---	ROOF CENTRIF.	BARREL	BARREL	CENTRIF UTILITY	CENTRIF UTILITY	
DRIVE	---	BELT	DIRECT/ VS	DIRECT/ VS	DIRECT/ VS	DIRECT/ VS	
LWA	---	EXIST.	74	74	79	79	
MOTOR	HP	EXIST.	5.0/3.15	5.0/3.15	3/2.16	3/2.16	
FAN SPEED	RPM	EXIST.	2163	2319	969	969	
ELECTRICAL	V/PH./HZ.	EXIST.	460/3/60	460/3/60	460/3/60	460/3/60	
CONTROLS	---	TIMER/TCC	SMOKE/ TCC	SMOKE/ TCC	SMOKE/ TCC	SMOKE/ TCC	
LOCATION/ WEIGHT	---	ROOF/ EXIST	CEILING/ 220#	CEILING/220 #	ROOF/569#	ROOF/569#	
MANUFACTURER	---	GREENHECK	GREENHECK	GREENHECK	GREENHECK	GREENHECK	
MODEL NO.	---	SB-400HP-7-X	QEI-16-1	QEI-16-1	SWB-224-30	SWB-224-30	

NOTES:
1. SF-4-1, SM-4-2 MOTORS ARE SMOKE RATED , WHILE ALL OTHER MOTORS ON THE ROOF ARE TEFC. ALL FANS ARE CLASS 1 FANS, DIRECT DRVIEN. WITH VFD MOTORS, MG 1.0 RATED.SERVICE FACTOR =1.5
2. SF-4-1, SM -4-2 UNITS ARE PROVIDED WITH STEEL INLET AND OUTLET FLANGE, CEILING VIBRATION ISOLATION HANGERS, HEAT SHIELD, MOTOR TUNNEL, UL181 LISTED, AND 120 VOLT DAMPER GREENHECK LOW LEAKAGE DISCHARGE DAMPER. UNITS PROVIDED WITH PIGTAIL AND LUBRICATION LINE EXTENSIONS. DISCONNECT BY EC.
3. SF-5-1 AND SM-5-2 FANS HAVE STEEL DRAIN, INLET COWL, WITH INLET ELBOW, FAN BIRD SCREEN, STEEL INLET AND OUTLET FLANGES, HEAT SHIELD, STEEL 120 VOLT OUTLET DAMPER GREENHECK MOTORIZED LOW LEAKAGE DAMPER, ISOLATION ROOF BASE, UL181 LISTED, OSHA COVER, SPRING ISOLATION, AND ROOF CURB. UNITS PROVIDED WITH PIGTAIL AND LUBRICATION LINE EXTENSIONS. DISOCNNECT BY EC. REFER TO PLANS FOR DISCHARGE CONFIGURATION.
4. REFER TO ROOF PLAN FOR SF-5-1, SM-5-2 LOCATION
5. PROVIDE AND INSTALL DOUBLE WALL DUCTWORK PENETRATING THE ROOF TO THE FIRST TEE IN CEILING . INSULATE ALL DUCT WORK, PLENUM, AND LOUVER CONNECTION IN ROOM OFF OF FAN INLET/ DISCHARGE

VARIABLE AIR VOLUME BOX SCHEDULE (VAV)

ITEM NO.	---	VAV-5-1	VAV-5-2	VAV-5-3	VAV-5-4	VAV-5-5	VAV-5-6	VAV-5-7	VAV-5-8	VAV-5-9	VAV-5-10
BOX CAPACITY	CFM	660	840	840	540	315	590	210	790	145	250
CONTROL CFM VOLUME	MAX./MIN.	960/195	960/360	960/360	960/195	550/170	960/195	350/115	960/225	350/115	350/115
MAX. STATIC PRESS. DROP	IN. WTR.	.035	.025	.025	.035	0.06	0.04	0.03	0.04	0.03	0.03
ELECTRIC HEATER SIZE	(KW)/STEPS	2.0	5.0	5.0	2.0	1.75	2.0	1.25	3.0	---	1.25
ELECTRICAL	V/PH/HZ	277/1/60	277/1/60	277/1/60	277/1/60	277/1/60	277/1/60	277/1/60	277/1/60	120/1/60	277/1/60
MANUFACTURER	---	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC
MODEL NO.	---	SDR-EH-8	SDR-EH-10	SDR-EH-10	SDR-EH-8	SDR-EH-6	SDR-EH-8	SDR-EH-5	SDR-EH-10	SDR-5	SDR-EH-5

NOTES:
1. VAV BOX MANUFACTURER TO FACTORY MOUNT CONTROLLER WHICH IS TO BE FURNISHED BY THE CONTROLS CONTRACTOR.
2. ALL ELECTRICAL HEAT SHALL BE 277V-1 PHASE, SINGLE STAGE, 30 DEGREE RISE AT LOW FLOW.
3. FACTORY MOUNTED DISCONNECT SWITCH WITH INTEGRAL FUSING FOR THE ELECTRIC HEATER AND CONTROLS.
4. DISCHARGE NC LEVELS FOR BOX 5=20 BOXES 7,9,10,11=21, BOXES 1,4,6,8 = 24, BOXES 2,3 = 26
5. ONE BOX SERVES iT ROOM REQUIRES NO HEAT. INTEGRAL FUSING REQUIRED.

FAN COIL UNIT SCHEDULE

ITEM	---	FCU-5-1
TOTAL SUPPLY AIR	CFM	327
STATIC PRES. EXT.	IN. WTR.	---
MOTOR, UNIT MCA- NO ELECT HT.	DC	13VDC
ELECTRICAL	V/PH/HZ	---
COOLING COIL-HEAT PUMP		
TOTAL COOLING CAPACITY	MBH	9.21
TOTAL HEATING CAPACITY	MBH	---
MANUFACTURER	---	PAYNE
MODEL NO.	---	PW13HAM009000AA

NOTES:
1. UNIT SUPPLIED WITH VIBRATION ISOLATION, STANDARD FILTER, FAN COIL DRAIN PAN, THERMOSTAT, EXPANSION VALVE, REFRIGERANT LINE SET CONNECTIONS, AND DISCONNECT. WALL FRAME UNIT 6 FT ABOVE FLOOR ON DRYWALL.
2. COOLING CAPACITY RATED AT COIL ENTERING 80°F DB/67°F FWB, REFRIGERANT R410A.
3. UNIT SHALL BE HAVE FILTER ACCESS, AND CONDENSATE RETURN. CONDENSATE PUMPS SHALL BE SEPARATE.
4. PROVIDE DRAIN PAN CUT OUT SWITCH WIRED IN SERIES WITH INLINE FLOAT SWITCH AT FCU PRIOR TO CONDENSATE LINE TRAP
5. REPAIR AND RECONDITION EXISTING UNIT FOR REMOUNT IN NEW LOCATION.UNIT AND CONDENSER SUPPLIED BY OWNER.
6. PROVIDE LITTLE GIANT VCMA-20ULS CONDENSATE UNIT WITH SAFETY SWITCH, ALARM, AND 6 FT 120 VOLT CORD, 120V/1/60, 1.5A, ¾ INCH PVC LINE TERMINATED IN FLOOR DRAIN IN MECH ROOM.

AIR COOLED CONDENSER SCHEDULE - EXISTING REUSED (CU-)

Tag No.	Equipment Location	Area Served	Capacity MBH	Refrigerant Type	Operating Charge LBS	E.E.R.	Compressors				Motor			Electrical Data				Manufacturer	Model No.	Weight	Remarks
							Expansion Type	No.	HP/KW Each	Unload Steps	No. of Fans	HP/KW Each	RPM	Volts	Phase	Hertz	Min. fan Speed				
CU-5-1	ROOF	NOTE 3 IT	9	R410A	11.8	13	STD	1	--	ONE	1	23W	900	120	1	60	---	PAYNE	PW13AAM09000AA	70	1,2,3

NOTES:
1. MCA 12 A (120/ 1PH), MOCP 20 A , ONE CONNECTION, DISCONNECT BY EC. DC WIRING REQUIRED TO EVAP UNIT BY EC, AND MC FINAL CONNECTION.
2. COORDINATE LOCATION WITH PROJECT MANAGER. PROVIDE AND INSTALL ROOF SUPPORT, AND TIE DOWN, ROOF PIPE PENETRATION, NEW VIBRATION IOSLATORS.
3. UNITS ARE MATCHED TO FANCOIL IN SPACE. TIE TO UNITS AS INSTRUCTED BY MANUFACTURER TO PROVIDE FINAL PIPING ARRANGEMENT AND SIZING. 1/4" L, 3/8 " S
4. REPAIR EXISTING UNIT TO OPERATIONAL USE, AND INSTALL THE CONDENSER ON THE ROOF.

AIR HANDLING UNIT SCHEDULE (AHU)

ITEM NO.	---	AHU-5
LOCATION	---	MECH EQUIP. RM
TOTAL SUPPLY AIR	CFM	7700
RETURN AIR	CFM	6430
OUTSIDE AIR	CFM	1270
STATIC PRESS. EXT./TOTAL	IN. WTR.	2.00/3.24
MAX. FAN SPEED/TYPE/SIZE	RPM/--/IN.	1875/AIRFOIL/18.00
MOTOR	BHP/HP	6.17/7.5
ELECTRICAL	V/PH/HZ	480/3/60
COOLING COIL	ROWS/FINS	6/9
TOTAL COOLING CAPACITY	BTUH	272463
SENSIBLE COOLING CAPACITY	BTUH	195629
CHILLED WATER FLOW	GPM	53.4
COIL WATER P.D. (MAX)	FT	6.9
CHILLED WATER TEMP. (ENT/LVG)	°F/°F	45/55
ENTERING AIR (DB/WB)	°F/°F	78/65.7
LEAVING AIR (DB/WB)	°F/°F	55/53
FACE VELOCITY	FPM	460
AIR PRESSURE DROP	IN.	.61
FILTERS	---	6 MERV 7
WEIGHT	LBS	2186
MANUFACTURER		MCQUAY
MODEL NO.	---	CAH017GDAC

NOTES:
1. PROVIDE NEW MODULAR DOUBLE WALL AIR HANDLER WITH FLANGED SECTIONS FOR INSTALLATION IN AN EXISTING ROOM FROM AN EXISTING ELEVATOR.
2. PROVIDE UNIT WITH FILTER FRAME, OUTLET FLANGE, VFD DRIVEN FAN MOTOR L SHAPED FILTER SECTION, WITH VIBRATION ISOLATED FRAME, COOLING COIL SECTION WITH DRAIN PAN AND CHWS/ CHWR PIPE CONNECTIONS, AND SMOKE DETECTION, FAN SECTION WITH FLEX CONNECTION OUTLET. DISCONNECT BY EC.
3. PROVIDE & INSTALL 2 WAY CHW CONTROL VALVE WITH MANUAL BYPASS WITH BELIMO ACTUATOR, PROVIDE NEW OA DAMPER AND ACTUATOR ON EXISTING LOUVER. REFER TO DETAILS FOR PIPING FIT UP.

VARIABLE AIR VOLUME BOX SCHEDULE (VAV)

ITEM NO.	---	VAV-5-11	VAV-5-12	VAV-5-13	VAV-5-14	VAV-5-15	VAV-3-16
BOX CAPACITY	CFM	140	300	530	470	650	430
CONTROL CFM VOLUME	MAX./MIN.	200/95	315/170	960/195	960/195	960/195	960/195
MAX. STATIC PRESS. DROP	IN. WTR.	0.01	0.06	0.035	0.035	.035	0.035
ELECTRIC HEATER SIZE	(KW)/STEPS	1.0	1.75	2.0	2.0	2.0	2.0
ELECTRICAL	V/PH/HZ	277/1/60	277/1/60	277/1/60	277/1/60	277/1/60	277/1/60
MANUFACTURER	---	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC	ENVIRO-TEC
MODEL NO.	---	SDR-EH-5	SDR-EH-6	SDR-EH-8	SDR-EH-8	SDR-EH-8	SDR-EH-8

NOTES:
1. VAV BOX MANUFACTURER TO FACTORY MOUNT CONTROLLER WHICH IS TO BE FURNISHED BY THE CONTROLS CONTRACTOR.
2. ALL ELECTRICAL HEAT SHALL BE 277V-1 PHASE, SINGLE STAGE, 30 DEGREE RISE AT LOW FLOW.
3. FACTORY MOUNTED DISCONNECT SWITCH WITH INTEGRAL FUSING FOR THE ELECTRIC HEATER AND CONTROLS.
4. DISCHARGE NC LEVELS FOR BOXE 12=20 BOXES 13,14,15,16=24.

LOUVER SCHEDULE (L)

TAG NO.	LOCATION	MAX CFM	S.P.	INTAKE RELIEF EXHAUST	OPENING		NO. OF PANELS	MANUFACTURER	MODEL NO.	REMARKS
					WIDTH IN.	HEIGHT IN.				
L-4	4TH FLOOR	6470	.1	I/E	45	45	1	GREENHECK	ESD635	1,2
L-5	5TH FLOOR	1270	.1	I	12	35	1	GREENHECK	ESD635	1,2,3

(1) VERIFY COLOR WITH PROJECT MANAGER PRIOR TO ORDER. BIRD SCREEN, AND INSECT SCREEN.
(2) COORDINATE INSTALLATION FRAME WITH PROJECT MANAGER. UNIT SHALL BE A FLORIDA APPROVED PRODUCT WITHIN DRAINABLE BLADE.
(3) UNIT RPOVIDED WITH NEW MOTORZIED DAMPER AND 12 INCH DEEP INSULATED INTAKE PLENUM.

OUTDOOR AIR LOAD CALCULATIONS

(FMC TABLE 403.3 AND ASHRAE STD 62 2010

5TH FLOOR
50 CFM/ WC RESTROOMS
OFFICE 5154.2 SF
5 / 1000SF X 17= 438 CFM
CORRIDOR AND STORAGE 1109.3 SF
1109.3 X.06 CFM/SF = 6.558
CONFERENCE
LOBBY
TOTAL REQUIRED OA =445 CFM
920 CFM SCHEDULED
2 RESTROOMS, 1 UR, 4WC = 250 CFM TOTAL EXHAUST
375 CFM SCHEDULED
ALL SMOKE EVACUATION CALCULATIONS WERE MADE BASED UPON ASHRAE APPLICATIONS 2003 HANDBOOK CHAPTER 52 AND NFPA 92A. STATIC PRESSURE MAXIMUM IS .14 FOR STAIRS AND ELEVATORS
SMOKE EVACUATION SYSTEMS ARE OPERATIONAL FOR 4TH & 5TH FLOORS AND ALL EXIST. STAIRS AND ELEVATORS. SYSTEMS ARE TIED TO THE EXISTING JUDICIAL CENTER SMOKE CONTROL.
ALL VOLUMES AS CROSS-CHECKED EXCEED 6 AIR CHANGES FOR THE STAIRS, ELEVATOR AREAS. DOOR PULLS WERE VERIFIED IN ACCORDANCE WITH TABLE A.5.2.2 OF NFPA 92A

HVAC LOAD CALCULATIONS SUMMARY

	AHU 5	
SIZING METHOD	CARRIER E-20ii	
AREA (SQ. FEET)	6919	
TOTAL COOLING REQUIRED W/ OUTSIDE AIR (MBH)	265.5	
OUTDOOR DRY BULB USED	93	
OUTDOOR WET BULB USED	79	
RELATIVE HUMIDITY %	44%	
INDOOR DRY BULB	78	
TOTAL HEATING REQUIRED W/ OUTSIDE AIR (MBH)	VAV RH	
TOTAL SENSIBLE GAIN (MBH)	176.2	
TOTAL LATENT GAIN (MBH)	89.3	
L.B. / L.B. SPECIFIC HUMIDITY ACROSS COIL	.00218	

REFERENCE: 13-407.1.ABC.1 SIZING, 2007/9 FLORIDA BUILDING CODE

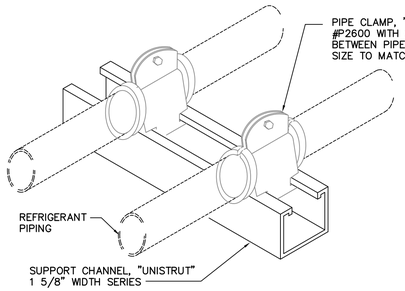
MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA
MECHANICAL SCHEDULES

Project Number
IFAS# W0100354; WA#32
Drawn by
DC
Checked by
JDC
Date
9-17-2010

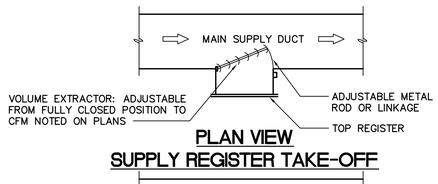
JOHN D. CAMDEN, PE
FL#53458
Scale
1/4" = 1'-0"
Set
Drawing Number
M3.0



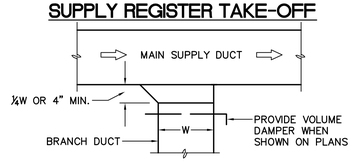
1. ALL REFRIGERANT PIPING SHALL BE HARD COPPER, TYPE "L" WITH LONG RADIUS ELBOWS.
2. TRAPS SHALL BE SINGLE PIECE, WROUGHT COPPER.
3. INSULATE SUCTION LINE WITH ½" ARMAFLEX INSULATION FULL LENGTH. DO NOT SPLIT DURING INSULATION BUTT JOINTS WITH ARMAFLEX SEALANT, AND APPLY ARMAFLEX PRESERVATIVE ON ALL LINES.
4. ROUTING OF ALL REFRIGERANT PIPING SHALL BE PLUMB AND SHALL RUN TRUE WITH THE BUILDING LINES. HORIZONTAL RUNS OF SUCTION LINES OVER 25' SHALL BE PITCHED "ONE-HALF" BUBBLE TOWARD THE COMPRESSOR, FOR OIL RETURN.
5. SUPPORT OF ALL PIPING AT COMPRESSORS, CONDENSERS, AND AIR HANDLING UNITS SHALL BE AS SHOWN ABOVE. SUPPORT OF PIPING IN BETWEEN THE UNITS SHALL BE WITH STRAP MATERIAL, USING ARMAFLEX INSULATION AS SADDLES. NO METAL-TO-METAL CONTACT.
6. BRAZE REFRIGERANT PIPING WITH FLOW OF DRY NITROGEN DURING BRAZING.
7. SOLDER SHALL BE 15% SILVER "SIL-FOS" OR EQUAL.
8. CHANGE FILTER-DRIER CORES AFTER 30 DAYS OF OPERATION.
9. PROVIDE LOW VOL SEALANT IN ACCORDANCE WITH LEED REQUIREMENTS.
10. COORDINATE HG, DISCH, S, AND L LINE LENGTHS FOR INDIVIDUAL UNITS WITH MFG.

1 M4.0 REFRIGERANT PIPING DETAIL

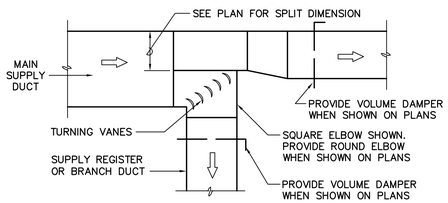
NOT TO SCALE



PLAN VIEW SUPPLY REGISTER TAKE-OFF



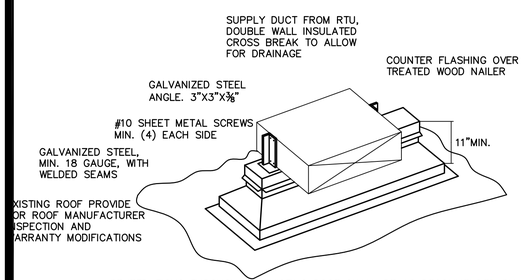
PLAN VIEW BRANCH DUCT TAKE-OFF



PLAN VIEW AIR SPLIT TYPE DUCT TAKE-OFF

5 M4.0 SUPPLY DUCT TAKE-OFFS

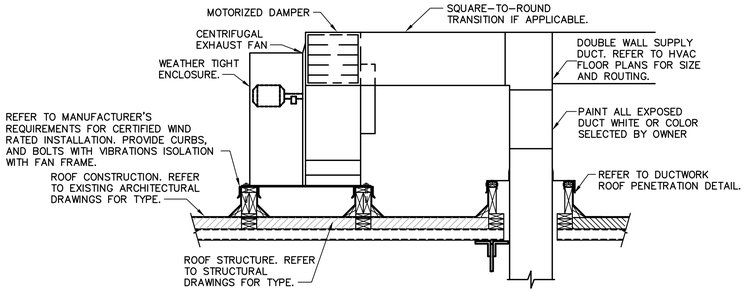
NOT TO SCALE



PENETRATIONS THROUGH AN EXISTING ROOF SHALL BE AS RECOMMENDED BY THE ROOFING MANUFACTURER. OWNERS WARRANTY SHALL BE MAINTAINED DURING CONSTRUCTION.

8 M4.0 EQUIPMENT RAIL FOR ROOF MOUNTING

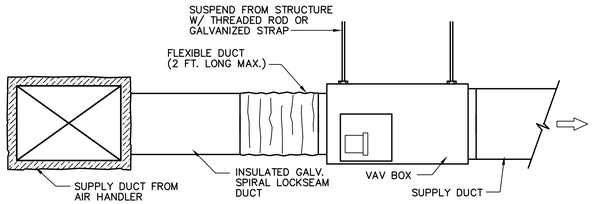
NOT TO SCALE



PENETRATIONS THROUGH AN EXISTING ROOF SHALL BE AS RECOMMENDED BY THE ROOFING MANUFACTURER. OWNERS WARRANTY SHALL BE MAINTAINED DURING CONSTRUCTION.

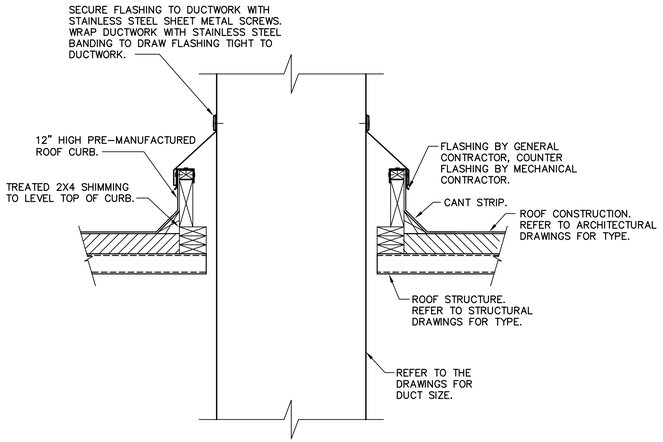
2 M4.0 ROOF-MOUNTED CENTRIFUGAL EXHAUST FAN INSTALLATION DETAIL

NOT TO SCALE



4 M4.0 VAV BOX DETAIL

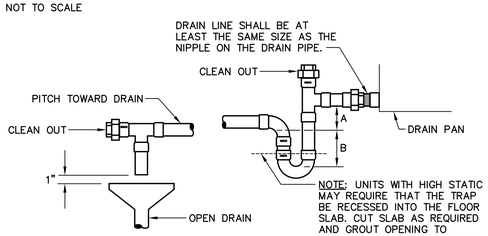
NOT TO SCALE



PENETRATIONS THROUGH AN EXISTING ROOF SHALL BE AS RECOMMENDED BY THE ROOFING MANUFACTURER. OWNERS WARRANTY SHALL BE MAINTAINED DURING CONSTRUCTION.

6 M4.0 DUCT PENETRATION THROUGH ROOF

NOT TO SCALE

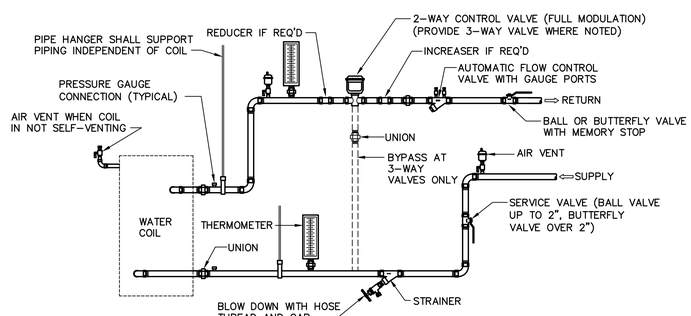


UNIT TYPE	A	B
DRAW THRU	X + 1"	2"
BLOW THRU	1" MIN.	2.0 X

WHERE X = STATIC PRESSURE IN PAN

9 M4.0 AIR HANDLING UNIT CONDENSATE TRAP DETAIL

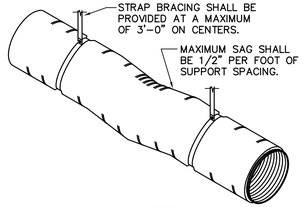
NOT TO SCALE



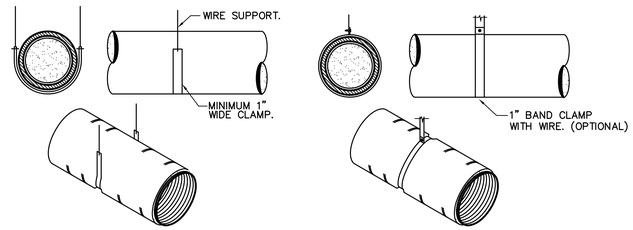
NOTES:
1. PIPING SHALL BE INSTALLED IN SUCH MANNER THAT IT WILL NOT BLOCK THE SWING OR USE OF ACCESS DOORS OR PANELS. NEITHER SHALL IT BLOCK THE SERVICING OF FILTERS, VALVES OR EQUIPMENT.
2. PROVIDE ALL VALVES WITH EXTENDED STEMS AND ALL GAUGE PORTS WITH EXTENSIONS TO PROTRUDE BEYOND INSULATION.

3 M4.0 AIR HANDLING UNIT COIL PIPING WITH AUTOMATIC FLOW CONTROL VALVE

NOT TO SCALE



DETAIL 1

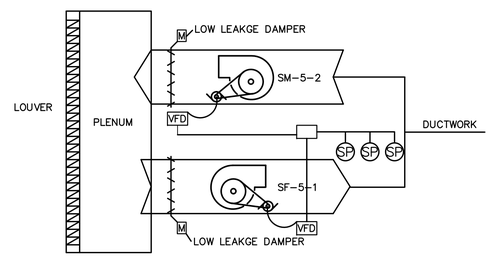


DETAIL 2 **DETAIL 3**

NOTES:
1. METALLIC FLEXIBLE DUCTWORK SHALL BE ATTACHED USING A MINIMUM OF THREE (3) #8 SHEET METAL SCREWS EQUALLY SPACED AROUND THE DUCTWORK CIRCUMFERENCE. DUCTWORK LARGER THAN 12" SHALL HAVE A MINIMUM OF FIVE (5) #8 SHEET METAL SCREWS. SCREWS SHALL BE LOCATED AT LEAST 1/2" FROM THE DUCTWORK END.
2. NONMETALLIC FLEXIBLE DUCTWORK SHALL BE SECURED TO THE SLEEVE OR COLLAR USING A DRAW BAND. IF THE DUCTWORK COLLAR EXCEEDS 12", THE DRAW BAND MUST BE POSITIONED BEHIND A BEAD ON THE METAL COLLAR.
3. INSULATION AND VAPOR BARRIERS PRESENT ON FACTORY-FABRICATED DUCTWORK SHALL BE FITTED OVER THE CORE CONNECTION AND SHALL BE SUPPLEMENTALLY SECURED WITH A DRAW BAND.
4. FLEXIBLE DUCTWORK SEALING SHALL BE A CLASS "B" SEAL FOR LOW PRESSURE DUCTWORK.
5. SUPPORT SYSTEM SHALL NOT DAMAGE OR CAUSE OUT-OF-ROUND SHAPE.

7 M4.0 INSULATION FLEXIBLE DUCTWORK DETAIL

NOT TO SCALE



SEQUENCE OF OPERATIONS

IN CASE OF FIRE ON THE FLOOR, SMOKE EXHAUST SM-5-2 DAMPER SHALL OPEN SMOKE FAN SHALL OPERATE TO MAINTAIN NEGATIVE PRESSURE IN THE SPACE.

IN CASE OF FIRE ON ANY OTHER FLOOR IN THE BUILDING OR COMPLEX, THE SMOKE FAN SM-5-2 SHALL REMAIN OFF WITH DAMPER CLOSED.

SF-5-1 DAMPER SHALL OPEN
SF-5-1 FAN SHALL OPERATE

NFPA 92A MAX. PRESSURE .14 IN WC. PROVIDE STATIC PRESSURE SENSOR IN 3 SPACES.

IN CASE OF NORMAL SEQUENCE BOTH FANS SM-1, SF-1 SHALL BE OFF. DAMPERS CLOSED.

10 M4.0 SF-4 DETAIL

NOT TO SCALE

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

MECHANICAL DETAILS

Project Number
IFAS# W0100354; WA#32

Drawn by
DC

Checked by
JDC

Date
9-17-2010

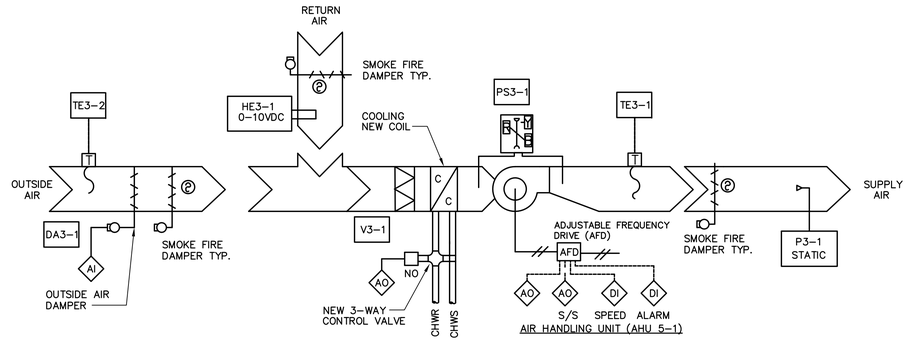
JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'-0"

Set

Drawing Number

M4.0



1/M4.1 AIR HANDLING UNIT #5 CONTROL DIAGRAM (VARIABLE VOLUME UNIT)

NOT TO SCALE

TEMPERATURE CONTROLS POINT SCHEDULE

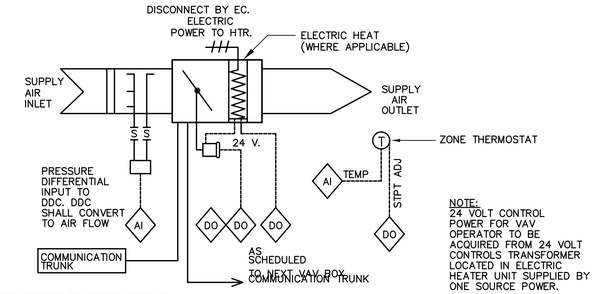
SYSTEM / POINT DESCRIPTION	HARDWARE OUTPUT DIGITAL: CONTROL RELAY	START/STOP	CONTACTOR (AS REQ'D.)	VALVE POSITIONS	DAMPER POSITIONS	VALVE POSITIONS	HARDWARE OUTPUT ANALOG	HARDWARE INPUT DIGITAL: PRESSURE SWITCH STATUS	FLOW SWITCH	SWITCH CLOSURE	AUXILIARY CONTACT	KW	FAN STATUS	HARDWARE INPUT ANALOG: TEMPERATURE	RELATIVE HUMIDITY	PRESSURE SENSOR	POSITION	FLOW	CURRENT	EQUIPMENT STATUS	MAINTENANCE	SOFTWARE ALARMS DIGITAL: HIGH LIMIT	LOW LIMIT	RUN TIME	SOFTWARE ALARMS ANALOG	EMCS FUNCTIONS: SCHEDULED START/STOP	VENTILATION RECIRCULATION	TEMPERATURE CONTROL	HUMIDITY CONTROL	VAV CONTROL	NOTES
AIR HANDLING UNIT AHU-5:																															
AIR HANDLING UNIT AHU-5 (ON/OFF) (MS5-1)		X																								X	X	X	X	X	
AIR HANDLING UNIT AHU-5 (STATUS) (PS51)								X											X			X									
AIR HANDLING UNIT AHU-5 (VFD) (A5-1)		X							X																					X	
AIR HANDLING UNIT AHU-5 (SA TEMP) (TE5-1)													X																		
AIR HANDLING UNIT AHU-1 (DUCT STATIC PRESSURE) (P5-1)																X						X									
AIR HANDLING UNIT AHU-1 (CHW VALVE) (V5-1)				X																									X		
AIR HANDLING UNIT AHU-1 (REL. HUMIDITY) (HE5-1)															X															X	
AIR HANDLING UNIT AHU-1 (OA TEMP) (TE5-2)														X																	
FAN COIL FC-5-1 RM TEMP/ ALARM																														X	

NOTES:

1. PROVIDE STARTING RELAY AND CONTACTOR IN CONTROL PANEL RATED FOR MOTOR LOAD.
2. REFER TO VAV SCHEDULE FOR BOXES WITH ELECTRIC HEAT.
3. THE CHWP SHALL RUN AND THE CHW CONTROL VALVE SHALL OPEN TO THE COIL WHEN TS3-1, TS3-2 INDICATES A TEMPERATURE OF 35°F OR LOWER.
4. THE OUTSIDE AIR DAMPER SHALL CLOSE WHEN ATS1 INDICATES A TEMPERATURE OF 35°F OR LOWER.
5. VFD ON AHU-5-1 SHALL HAVE AUXILIARY CONTROLS FOR INPUT/OUTPUT FOR FAN SPEED CONTROL.
6. AIR HANDLING UNIT SHALL SHUT DOWN IN SMOKE SUPPLY AND SMOKE EXHAUST MODE . SMOKE AND OA DAMPERS CLOSED. FAN SHALL BE DISABLED.
7. PROVIDE THERMOSTAT MONITOR FOR IT ROOM DX SYSTEM, SET FOR OPERATIONAL ALARM ABOVE 85 DEGREES F . BACK UP DX UNIT TO PROVIDE AIR IN IN SPACE ON NITES AND WEEKENDS.

CONTROL POINT ABBREVIATION LEGEND

DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
S/S	START/STOP
IVA	INLET VANE ACTUATOR
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
T	TEMPERATURE
H	HUMIDITY
C	CO_2
SP	STATIC PRESSURE
FS	FLOW SWITCH
LAT	LEAVING AIR TEMPERATURE
S	STARTER
FM	FLOW METER
SP	STATIC PRESSURE SENSOR



NOTE: 24 VOLT CONTROL POWER FOR VAV OPERATOR TO BE ACQUIRED FROM 24 VOLT CONTROLS TRANSFORMER LOCATED IN ELECTRIC HEATER UNIT SUPPLIED BY ONE SOURCE POWER.

SEQUENCE OF OPERATIONS

THE VAV TERMINALS SHALL BE CONTROLLED DIRECTLY FROM THE DDC. CONNECT TO THE TERMINAL MANUFACTURER'S AIR FLOW PORTS TO SENSE PRESSURE DIFFERENTIAL. CALIBRATE PRESSURE DIFFERENTIAL TO VOLUMETRIC AIR FLOW. AIR FLOW SENSORS SHALL HAVE A RANGE OF 0.00 TO 0.75 INCH W.G. AND OFFER A RESOLUTION OF 0.02 INCHES OF WATER AND AN ACCURACY OF + 0.05 INCHES OF W.G. OR BETTER. PROVIDE TRI-STATE MOTOR.

IN THE COOLING MODE, THE VAV TERMINAL DAMPER SHALL MODULATE TO MAINTAIN ROOM SETPOINT TEMPERATURE, 75 DEGREES F ± 2 DEGREE F (ADJUSTABLE). IN THE HEATING MODE, THE VAV BOX WILL HAVE OBTAINED MINIMUM POSITION AND THEN THE ELECTRIC HEAT SHALL BE STAGED TO MAINTAIN MINIMUM SPACE SETPOINT TEMPERATURE 70 DEGREES F±1°F (ADJUSTABLE). PROVIDE A MINIMUM DEAD BAND BETWEEN THE HEATING AND COOLING MODE OF 4 DEGREES F WHERE NO CONTROL ACTION OCCURS. THE SOFTWARE ROUTINE SHALL PROVIDE PRESSURE INDEPENDENT CONTROL WITH SOFTWARE ADJUSTABLE MINIMUM AND MAXIMUM AIR FLOW SETPOINT AS SCHEDULED FOR THE VAV TERMINAL UNITS SCHEDULE.

WHEN THE AIR HANDLING UNIT'S SUPPLY AIR TEMPERATURE IS ABOVE THE HIGHEST ROOM TEMPERATURE SET POINT, THEN THE AIR HANDLING SYSTEM WILL FUNCTION IN THE HEATING MODE.

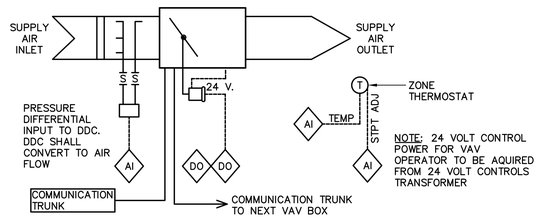
WHEN THE BUILDING'S AIR HANDLING SYSTEM IS IN THE HEATING MODE, THE VAV TERMINAL DAMPER SHALL MODULATE TO MAINTAIN ROOM SETPOINT AS IN THE COOLING MODE. WHEN THE TERMINAL DAMPER IS OPEN TO THE 100% POSITION AND THE ROOM TEMPERATURE IS 2 DEGREES BELOW THE SETPOINT, THE ELECTRIC HEAT (WHERE APPLICABLE) SHALL BE ENERGIZED AS A SECOND STAGE HEAT. ALL HEATING IS SIZE AT 70 CFM/KW.

CLOSE ALL VAV BOXES 100% OFF IN CASE OF FIRE.

POINTS TO BE MONITORED AND CONTROLLED AT THE "FRONT END" ARE AS FOLLOWS:
SPACE TEMPERATURE (F)
AIRFLOW (CFM)
ELECTRIC HEAT OUTPUTS — HEATING SETPOINT
DAMPER OUTPUT — COOLING SETPOINT

5/M4.1 VARIABLE AIR VOLUME TERMINAL

NOT TO SCALE



NOTE: 24 VOLT CONTROL POWER FOR VAV OPERATOR TO BE AQUIRED FROM 24 VOLT CONTROLS TRANSFORMER

SEQUENCE OF OPERATIONS

THE VAV TERMINALS SHALL BE CONTROLLED DIRECTLY FROM THE DDC. CONNECT TO THE TERMINAL MANUFACTURER'S AIR FLOW PORTS TO SENSE PRESSURE DIFFERENTIAL. CALIBRATE PRESSURE DIFFERENTIAL TO VOLUMETRIC AIR FLOW. AIR FLOW SENSORS SHALL HAVE A RANGE OF 0.00 TO 0.75 INCH W.G. AND OFFER A RESOLUTION OF 0.02 INCHES OF WATER AND AN ACCURACY OF + 0.05 INCHES OF W.G. OR BETTER. PROVIDE TRI-STATE MOTOR.

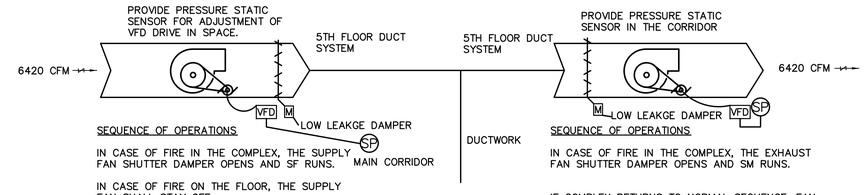
IN THE COOLING MODE, THE VAV TERMINAL DAMPER SHALL MODULATE TO MAINTAIN ROOM SETPOINT TEMPERATURE, 75 DEGREES F ± 1 DEGREE F (ADJUSTABLE). PROVIDE A MINIMUM DEAD BAND BETWEEN THE HEATING AND COOLING MODE OF 4 DEGREES F WHERE NO CONTROL ACTION OCCURS. THE SOFTWARE ROUTINE SHALL PROVIDE PRESSURE INDEPENDENT CONTROL WITH SOFTWARE ADJUSTABLE MINIMUM AND MAXIMUM AIR FLOW SETPOINTS AS SCHEDULED FOR THE VAV TERMINAL UNITS SCHEDULE.

WHEN THE AIR HANDLING UNIT'S SUPPLY AIR TEMPERATURE IS ABOVE THE HIGHEST ROOM TEMPERATURE SET POINT, THEN THE AIR HANDLING SYSTEM WILL FUNCTION IN THE HEATING MODE.

WHEN THE BUILDING'S AIR HANDLING SYSTEM IS IN THE HEATING MODE, THE VAV TERMINAL DAMPER SHALL MODULATE TO MAINTAIN ROOM SETPOINT AS IN THE COOLING MODE.
CLOSE ALL VAV BOXES 100% OFF IN CASE OF FIRE.
POINTS TO BE MONITORED AND CONTROLLED AT THE "FRONT END" ARE AS FOLLOWS:
SPACE TEMPERATURE (F)
AIRFLOW (CFM)
DAMPER OUTPUT
HEATING SETPOINT
COOLING SETPOINT

6/M4.1 VARIABLE AIR VOLUME TERMINAL DETAIL

NOT TO SCALE, IT ROOM ONLY



SEQUENCE OF OPERATIONS

IN CASE OF FIRE IN THE COMPLEX, THE SUPPLY FAN SHUTTER DAMPER OPENS AND SF RUNS.

IN CASE OF FIRE ON THE FLOOR, THE SUPPLY FAN SHALL STAY OFF

IF COMPLEX RETURNS TO NORMAL SEQUENCE, FAN SHUTTER DAMPER SHALL BE CLOSED, SUPPLY FAN SHALL BE OFF.

SEQUENCE OF OPERATIONS

IN CASE OF FIRE IN THE COMPLEX, THE EXHAUST FAN SHUTTER DAMPER OPENS AND SM RUNS.

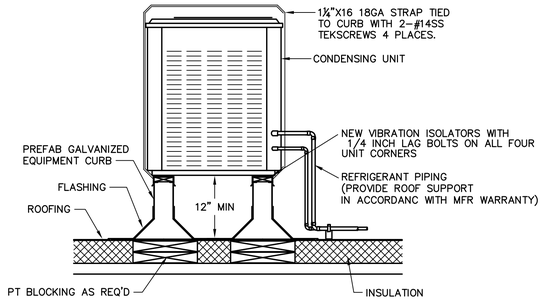
IF COMPLEX RETURNS TO NORMAL SEQUENCE, FAN SHUTTER DAMPER SHALL BE CLOSED, SMOKE FAN SHALL BE OFF.

2/M4.1 SF-5-1 DETAIL

NOT TO SCALE

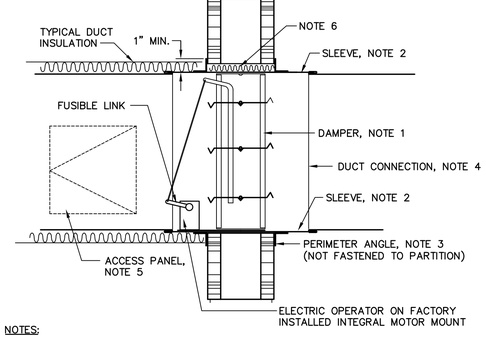
3/M4.1 SM-5-2 DETAIL

NOT TO SCALE



4/M4.1 CONDENSING UNIT ON ROOF DETAIL

NOT TO SCALE
PENETRATIONS THROUGH AN EXISTING ROOF SHALL BE AS RECOMMENDED BY THE ROOFING MANUFACTURER. OWNERS WARRANTY SHALL BE MAINTAINED DURING CONSTRUCTION.



NOTES:

1. A VERTICAL DAMPER IS SHOWN. HORIZONTAL DAMPER INSTALLATION IS SIMILAR. FOLLOW DAMPER MANUFACTURER'S INSTRUCTIONS, INCLUDING FASTENER OPTIONS AND GAUGES FOR SLEEVE AND PERIMETER ANGLES. FIRE DAMPERS MUST BE INSTALLED IN THE PARTITION OR FLOOR, NOT OUTSIDE THE PARTITION.
2. GALVANIZED SLEEVE: GAGE NOT LESS THAN CONNECTING DUCT. FASTEN SLEEVE TO DAMPER FRAME AND TO PERIMETER ANGLES.
3. PERIMETER ANGLES: GALVANIZED STEEL, NOT LESS THAN 1½" X 1½" 14 GAUGE, TO PROVIDE 1 INCH MINIMUM OVERLAP OF OPENING ON ALL 4 SIDES.
4. BREAKAWAY DUCT CONNECTION: CONTRACTOR'S OPTION OF TYPES SHOWN IN SMACNA LPDS, FIG. 2-13. SEAL JOINTS.
5. ACCESS PANELS: SIZE AND LOCATION TO PERMIT SERVICING THE FUSIBLE LINK AND OPERATOR.
6. PROVIDE ¼ TO ½ INCH CLEARANCE ON HEIGHT AND WIDTH. FILL OPEN SPACE WITH ROCK WOOL FIRE STOP FIBER.
7. ALL DUCT WORK RISERS WHICH ARE RUN EXPOSED, SUCH AS THRU ATTIC FLOORS AND MECHANICAL ROOM FLOORS, SHALL BE PROVIDED WITH A 3" HIGH CONCRETE CURB AROUND OPENING FOR DUCT.

OPERATION:

A. FIRE DAMPER MODE: HIGH TEMPERATURE MELTS THE FUSIBLE LINK, CLOSING FIRE DAMPER.

B. SMOKE DAMPER MODE: ACTIVATED BY THE BUILDING FIRE ALARM SYSTEM TO CLOSE WHEN THE ZONE IN WHICH THE DAMPER IS LOCATED OR THE ASSOCIATED AIR HANDLING UNIT IS IN ALARM.

7/M4.1 FIRE/SMOKE DAMPER DETAIL

NOT TO SCALE

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS
1	08/11/11	RECORD DRAWINGS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA
MECHANICAL DETAILS

Project Number
IFAS# WO100354; WA#32

Drawn by
DC

Checked by
JDC

Date
9-17-2010

JOHN D. CAMDEN, PE
FL#53458

Scale
1/4" = 1'-0"

Set

Drawing Number

M4.1

STRUCTURAL NOTES

ELECTRONIC VERSIONS OF STRUCTURAL DRAWINGS ARE THE SOLE, COPYRIGHTED PROPERTY OF KARINS ENGINEERING GROUP INC. ELECTRONIC VERSIONS SHALL NOT BE TRANSFERRED OR SHARED WITHOUT THE EXPRESS, WRITTEN PERMISSION OF KARINS ENGINEERING GROUP INC.

STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH JOB SPECIFICATIONS, PRODUCT SPECIFICATIONS, AND ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING, AND SITE DRAWINGS. CONSULT THESE OTHER DOCUMENTS FOR SLEEVES, DEPRESSIONS, FLASHING, WATERPROOFING, ROOFING AND OTHER NON-STRUCTURAL DETAILS.

DIMENSIONS AND EXISTING CONDITIONS THROUGHOUT THE PROJECT SHALL BE FIELD VERIFIED. DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER-OF-RECORD BEFORE PROCEEDING WITH THE AFFECTED PART OF THE WORK.

THE STRUCTURE IS DESIGNED TO BE SELF SUPPORTING AND STABLE AFTER THE BUILDING IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURES AND SEQUENCE TO INSURE SAFETY OF THE BUILDING AND ITS COMPONENTS DURING ERECTION. THIS INCLUDES THE ADDITION OF NECESSARY SHORING, SHEETING, TEMPORARY BRACING, GUYS OR TIEDOWNS.

PROPOSED CHANGES AND REQUEST FOR INFORMATION OR SUBSTITUTION SHALL BE SUBMITTED TO THE ARCHITECT OF RECORD. ARCHITECT OF RECORD SHALL REVIEW AND APPROVE PROPOSAL OR REQUEST PRIOR TO SUBMITTING TO ENGINEERING OF RECORD. ENGINEER OF RECORD SHALL REVIEW AND RETURN TO ARCHITECT BEFORE CHANGES IN-FIELD PROCEED.

DESIGN BASED ON STRUCTURAL DRAWINGS DATED APRIL 17, 1981 BY W. R. FRIZZELL ARCHITECTS, INC.

DESIGN LOADS:

THE STRUCTURAL SYSTEM FOR BUILDING DEPICTED HEREON HAS BEEN DESIGNED ACCORDING TO THE 2007 EDITION AND 2009 SUPPLEMENTS OF THE FLORIDA BUILDING CODE – EXISTING BUILDING, ALTERATION LEVEL 2, CHAPTER 7.

THE STRUCTURE HAS BEEN DESIGNED TO RESIST THE FOLLOWING SUPERIMPOSED LOADS.
ROOF:
LIVE LOAD: 20 psf
DEAD LOAD: 25 psf

WIND:

ASCE 7-05: BASIC WIND SPEED 130 MPH 3-SEC. GUST, IMPORTANCE FACTOR 1.0, BUILDING CATEGORY II, EXPOSURE CATEGORY C, ENCLOSED BUILDING
GCpi = ±0.18

A CONTINUOUS LOAD PATH BETWEEN FOUNDATIONS, WALLS AND ROOFS ARE INTENDED BY THESE DRAWINGS AND SHALL BE FIELD VERIFIED.

PENETRATIONS:

UNLESS CLEARLY SHOWN ON THE STRUCTURAL DRAWINGS, NO PENETRATIONS SHALL BE MADE IN ANY STRUCTURAL MEMBER WITHOUT A PRIOR WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER. IT SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO IDENTIFY SUCH PENETRATIONS BASED ON INFORMATION PROVIDED BY ALL SUBCONTRACTORS AND TO SUBMIT DETAILED AND DIMENSIONED FLOOR PLANS TO THE STRUCTURAL ENGINEER FOR REVIEW AND APPROVAL PRIOR TO IMPLEMENTATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ANY LABOR AND MATERIALS ASSOCIATED WITH ADDITIONAL REINFORCEMENT OF STRUCTURAL MEMBERS RESULTING FROM INTRODUCTION OF SUCH PENETRATIONS.

STRUCTURAL STEEL:

STRUCTURAL STEEL: SHALL CONFORM TO ASTM A-36 AND THE "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC. ALL SHOP CONNECTIONS TO BE WELDED (UTILIZING E70XX ELECTRODES) AND FIELD CONNECTIONS TO BE BOLTED, UNLESS OTHERWISE NOTED ON STRUCTURAL DRAWINGS. STEEL TO RECEIVE ONE SHOP COAT AND ONE FIELD TOUCH UP COAT OF APPROVED PAINT, EXCEPT WHERE GALVANIZING IS INDICATED ON THE DRAWINGS.

ANCHOR BOLTS SHALL CONFORM TO ASTM A-307 OR A-36 (THREADED ROD).

STRUCTURAL STEEL SHALL CONFORM TO THE "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION INC. UNLESS OTHERWISE NOTED ON THE STRUCTURAL DRAWINGS. STEEL IS TO BE HOT DIPPED GALVANIZED. FOLLOWING FABRICATION AND INSTALLATION, APPLY ONE FIELD TOUCH-UP COAT OF APPROVED PAINT.

WELDING: ALL WELDING SHALL CONFORM TO THE LATEST EDITION OF THE STRUCTURAL WELDING CODE (AMERICAN WELDING SOCIETY), D1.1.

CARBON FIBER REINFORCING:

CARBON FIBER REINFORCING SHALL BE DESIGNED BY SPECIALTY ENGINEER.

CONTRACTOR TO SUBMIT EXTERNALLY BONDED FRP STRENGTHENING SYSTEM TO KARINS ENGINEERING GROUP, INC. FOR REVIEW.

SHOP DRAWINGS WILL BE REVIEWED FOR GENERAL COMPLIANCE WITH THE DESIGN INTENT OF THE CONTRACT DOCUMENTS ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY COMPLIANCE WITH THE CONTRACT DOCUMENTS AS TO QUANTITY, LENGTH, ELEVATIONS, DIMENSIONS, ETC. ALL SHOP DRAWINGS SHALL BE REVIEWED BY THE CONTRACTOR PRIOR TO SUBMITTAL TO THE ARCHITECT/ENGINEER. DRAWINGS SUBMITTED WITHOUT REVIEW WILL BE RETURNED UNCHECKED. SHOP DRAWING SUBMITTALS SHALL INCLUDE FOUR SETS. ONE SET OF PRINTS WILL BE RETAINED BY THE ENGINEER, ONE BY THE ARCHITECT, ONE BY THE LOCAL BUILDING DEPARTMENT (WHERE REQUIRED) AND THE CONTRACTOR SHALL MAKE COPIES FROM THE FOURTH SET AS REQUIRED FOR DISTRIBUTION. ADDITIONAL COPIES REQUIRED FOR DISTRIBUTION (IF ANY) SHALL BE MADE FROM THE CONTRACTORS SET. IN ALL INSTANCES, THE CONTRACT DOCUMENTS SHALL GOVERN OVER THE SHOP DRAWINGS, UNLESS OTHERWISE SPECIFIED IN WRITING BY THE ENGINEER-OF-RECORD.

SPECIALTY ENGINEERED MATERIALS SHALL BE SUPPLIED ONLY BY FIRMS HAVING LOCAL REPRESENTATION, AND STAFFED WITH A FLORIDA LICENSED STRUCTURAL ENGINEER HAVING A MINIMUM OF 3 YEARS DESIGN EXPERIENCE IN THE DESIGN AND CONSTRUCTION OF THE SPECIALTY ENGINEERED SYSTEM.

ALL CONCRETE SURFACES SHALL BE DRY WITH NO EVIDENCE OF SURFACE MOISTURE AT THE TIME OF FRP INSTALLATION.

CONTRACTOR TO ENSURE AN OPEN PORE STRUCTURE OF THE SUBSTRATE. USE LIGHT ABRASIVE BLASTING (SANDBLASTING) TO ACHIEVE A CONCRETE SURFACE PROFILE CSP-3 OR BETTER (AS DEFINED BY ICRI GUIDELINES 03732).

MINOR REPAIRS SUCH AS BUG HOLES, SURFACE DEVIATIONS, AND LOCALIZED OUT-OF-PLANE VARIATIONS (UP TO 1") CAN BE SMOOTHED OVER USING PUTTY AFTER PRIMING THE SURFACES. FUMED SILICA MAY BE ADDED TO ACHIEVE PROPER CONSISTENCY PER MANUFACTURER'S SPECIFICATIONS AT A MAXIMUM MIX RATIO OF 1 PART FUMED SILICA TO 1 PART RESIN BY VOLUME.

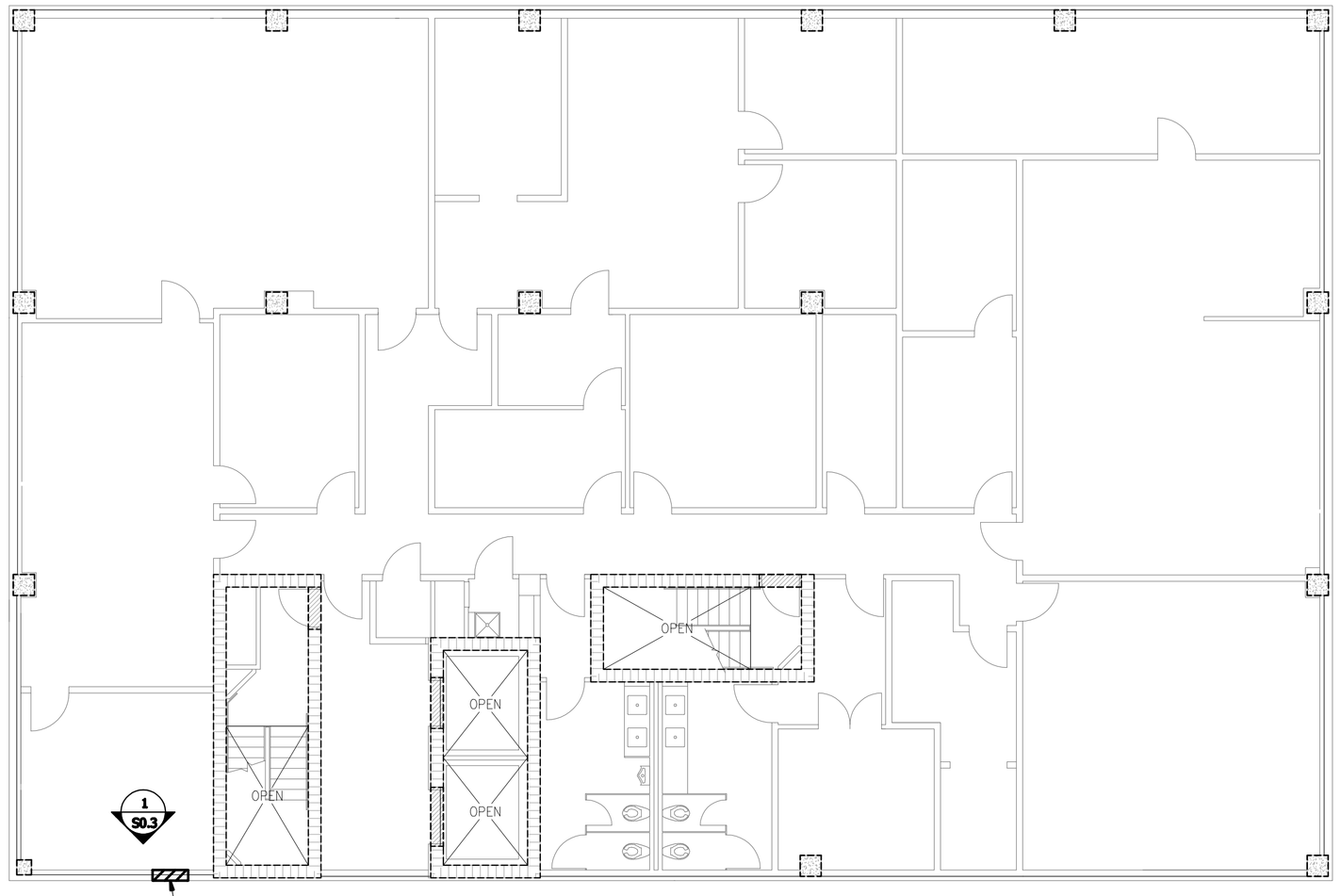
OUT-OF-PLANE VARIATIONS SMALLER THAN 1-1/2" CAN BE BUILT UP USING AN APPROPRIATE REPAIR MORTAR SUCH AS SIKATOP 123 PLUS OR APPROVED EQUAL. OUT-OF-PLANE VARIATIONS LARGER THAN 1-1/2" CAN BE BUILT UP USING AN APPROPRIATE REPAIR MORTAR SUCH AS EMACO T430 OR APPROVED EQUAL.

ROUND ALL CORNERS TO RECEIVE FRP TO ½" RADIUS (MINIMUM).

CHEMICAL ANCHORS:

ALL CHEMICAL ANCHORS SHALL BE SUBMITTED FOR ENGINEER APPROVAL PRIOR TO INSTALLATION. CHEMICAL ANCHORS SHALL BE SUBMITTED FOR EACH SPECIFIC USE AND CONDITION.

NOTE:
DO NOT USE STRUCTURAL DRAWINGS ALONE FOR BUILDING LAYOUT. DO NOT SCALE THESE DRAWINGS MANUALLY OR ELECTRONICALLY. COORDINATE LOCATIONS OF ALL STRUCTURAL ELEMENTS, INCLUDING COLUMNS, WALLS, SLAB EDGES, DEPRESSIONS AND OPENINGS WITH ARCHITECTURAL DRAWINGS AND RESOLVE ANY CONFLICTS PRIOR TO BUILDING LAYOUT. A REGISTERED SURVEYOR SHALL PERFORM BUILDING LAYOUT AND LOCATION OF ALL STRUCTURAL ELEMENTS AT ALL LEVELS.



N

1 **4TH FLOOR PLAN**
SCALE: 1/8"=1'-0"

ROOF PLAN NOTES:

1. [ ] DENOTES EXISTING BEARING WALL.
2. [ ] DENOTES EXISTING COLUMN.
3. [ ] DENOTES EXISTING BEAM BELOW.
4. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND LOCATIONS OF PROPOSED OPENINGS PRIOR TO FABRICATION AND CONSTRUCTION.

11DS-0432

Karins Engineering Group, Inc.
FL. Cert. of Auth. # 8371
2017 Main Drive
Sarasota, FL 34231
(941) 927-8525/ Fax (941) 927-8075
John P. Bennett, PhD, PE
FL. Registration # 63063

SEAL

TO THE BEST OF MY KNOWLEDGE AND ABILITY, THE COMPLETED STRUCTURE DEPICTED ON THESE PLANS COMPLIES WITH APPLICABLE MINIMUM BUILDING CODES

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REV.	DATE	REMARKS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
3 RD AND 5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

Project Number
IFAS# W0100354; WA#32

Drawn by
AS/GAT

Checked by
JB

Date
09-07-2011

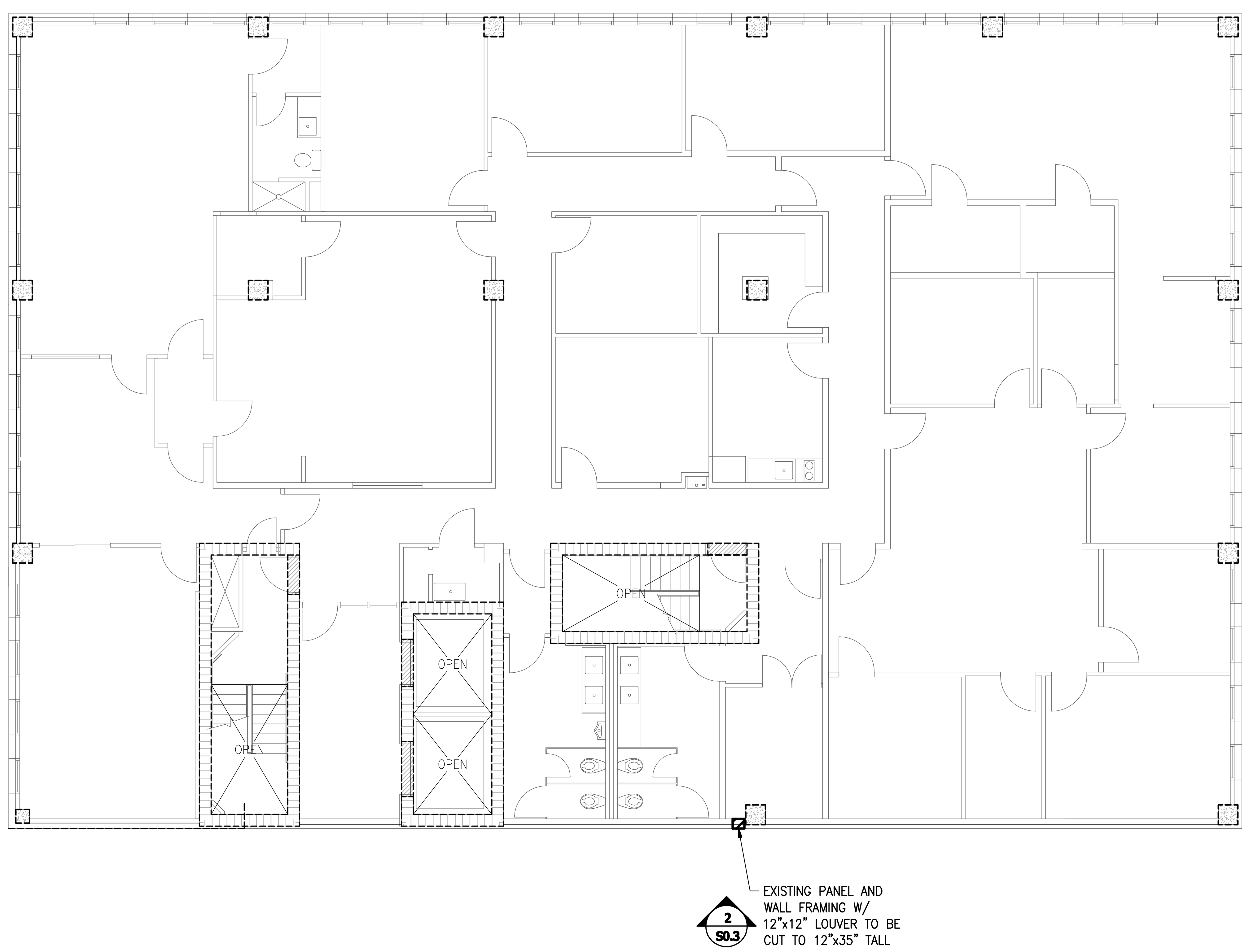
4th FLOOR PLAN

Scale
AS NOTED

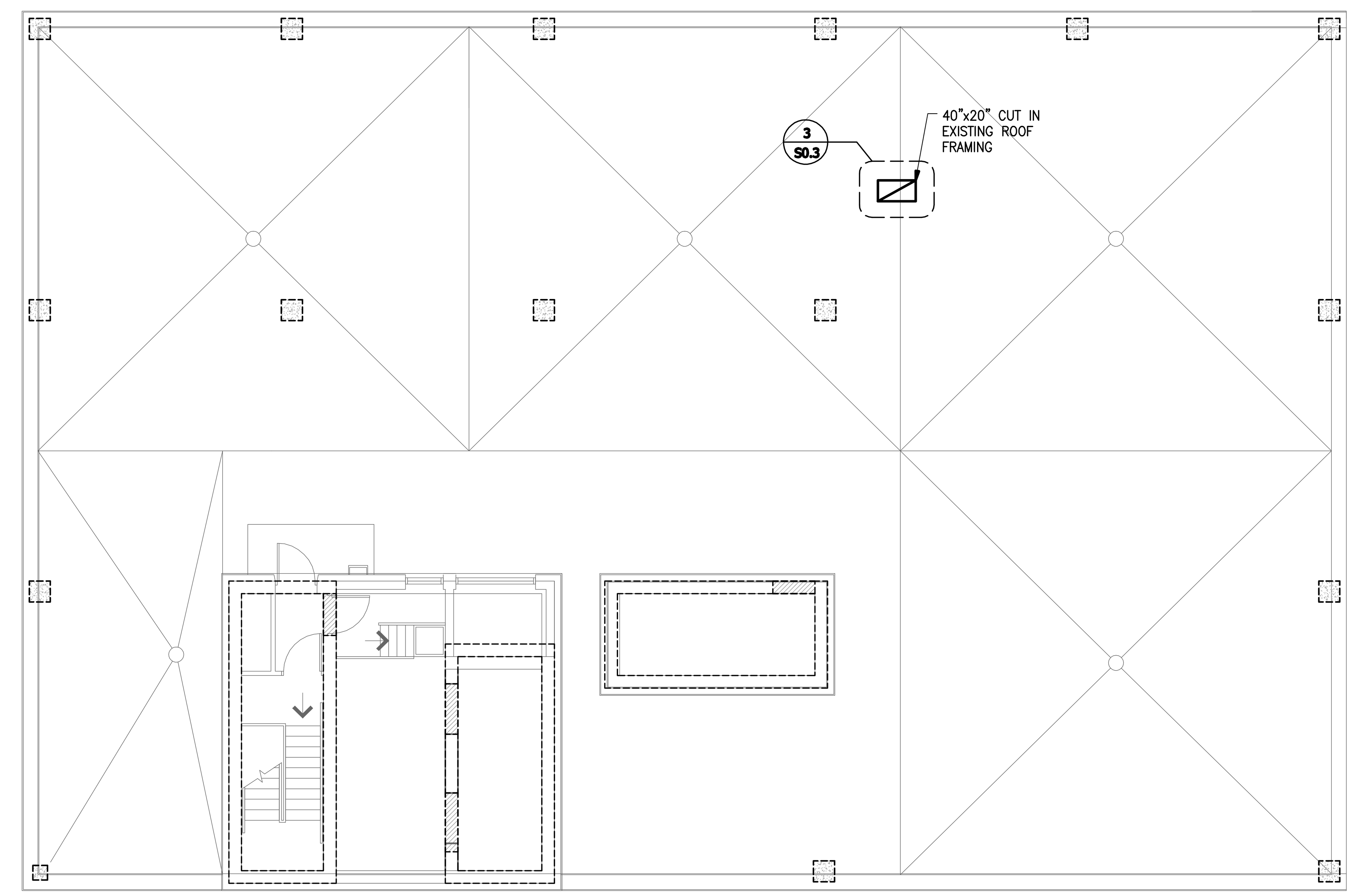
Set

Drawing Number

S0.1



N
1 **5TH FLOOR PLAN**
SCALE: 1/8"=1'-0"



N
1 **ROOF PLAN**
SCALE: 1/8"=1'-0"

ROOF PLAN NOTES:

1. [ー ー ー] DENOTES EXISTING BEARING WALL.
2. [ ] DENOTES EXISTING COLUMN.
3. [ー ー ー] DENOTES EXISTING BEAM BELOW.
4. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND LOCATIONS OF PROPOSED OPENINGS PRIOR TO FABRICATION AND CONSTRUCTION.

NOTE:
DO NOT USE STRUCTURAL DRAWINGS ALONE FOR BUILDING LAYOUT. DO NOT SCALE THESE DRAWINGS MANUALLY OR ELECTRONICALLY. COORDINATE LOCATIONS OF ALL STRUCTURAL ELEMENTS, INCLUDING COLUMNS, WALLS, SLAB EDGES, DEPRESSIONS AND OPENINGS WITH ARCHITECTURAL DRAWINGS AND RESOLVE ANY CONFLICTS PRIOR TO BUILDING LAYOUT. A REGISTERED SURVEYOR SHALL PERFORM BUILDING LAYOUT AND LOCATION OF ALL STRUCTURAL ELEMENTS AT ALL LEVELS.

11DS-0432

Karins Engineering Group, Inc.
FL. Cert. of Auth. # 8371
2017 Fiesta Drive
Sarasota, FL 34231
(941) 927-8525/ Fax (941) 927-8075
John F Bonacci, PhD, PE
FL. Registration # 63063

SEAL

TO THE BEST OF MY KNOWLEDGE AND ABILITY, THE COMPLETED STRUCTURE DEPICTED ON THESE PLANS COMPLIES WITH APPLICABLE MINIMUM BUILDING CODES

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

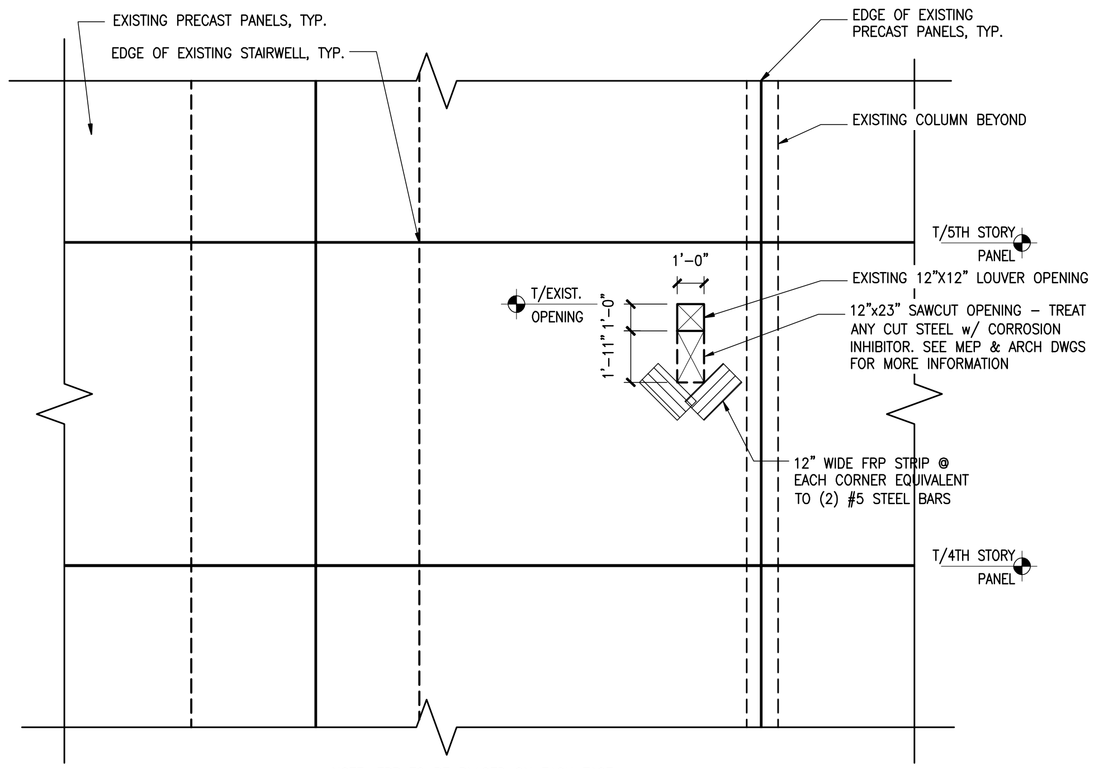
REV.	DATE	REMARKS

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
3 RD AND 5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

Project Number: IFAS# WO100354; WA#32
Drawn by: AS/GAT
Checked by: JB
Date: 09-07-2011

5TH FLOOR PLAN & ROOF PLAN

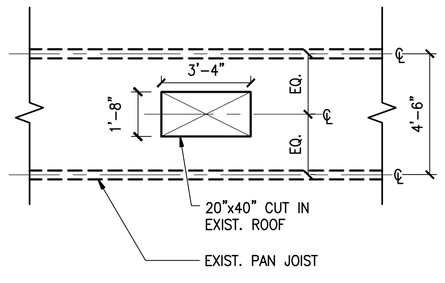
Scale: AS NOTED
Set
Drawing Number: **S0.2**



NOTE: FRP TO BE PLACED ON EACH FACE.

2 5TH FLOOR PARTIAL PANEL ELEVATION

SCALE: N.T.S.

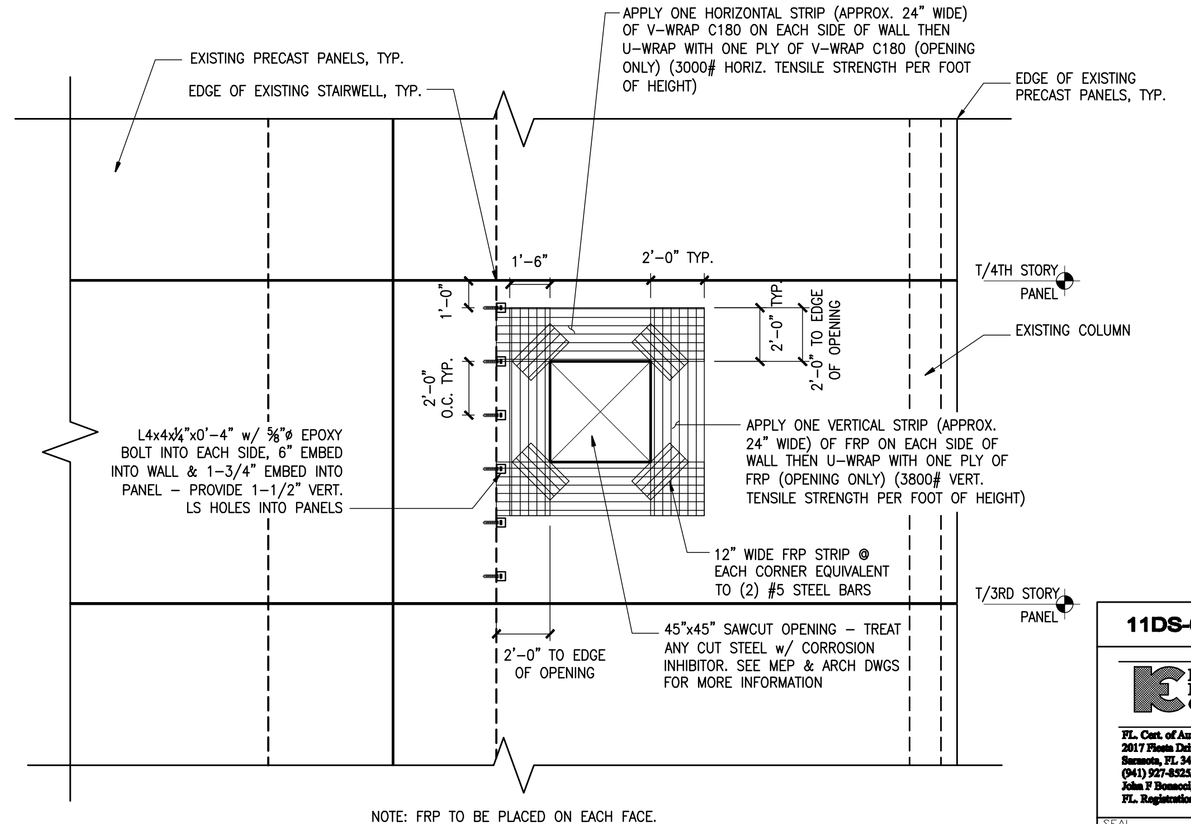


NOTE: CONTRACTOR TO COORD. CUT IN ROOF FROM BELOW TO AVOID CONFLICT WITH EXIST. PAN JOISTS

3 ROOF PENETRATION

SCALE: N.T.S.

NOTE:
DO NOT USE STRUCTURAL DRAWINGS ALONE FOR BUILDING LAYOUT. DO NOT SCALE THESE DRAWINGS MANUALLY OR ELECTRONICALLY. COORDINATE LOCATIONS OF ALL STRUCTURAL ELEMENTS, INCLUDING COLUMNS, WALLS, SLAB EDGES, DEPRESSIONS AND OPENINGS WITH ARCHITECTURAL DRAWINGS AND RESOLVE ANY CONFLICTS PRIOR TO BUILDING LAYOUT. A REGISTERED SURVEYOR SHALL PERFORM BUILDING LAYOUT AND LOCATION OF ALL STRUCTURAL ELEMENTS AT ALL LEVELS.



NOTE: FRP TO BE PLACED ON EACH FACE.

1 4TH FLOOR PARTIAL PANEL ELEVATION

SCALE: N.T.S.

TO THE BEST OF MY KNOWLEDGE AND ABILITY, THE COMPLETED STRUCTURE DEPICTED ON THESE PLANS COMPLIES WITH APPLICABLE MINIMUM BUILDING CODES

MANATEE COUNTY GOVERNMENT
Property Management
1112 Manatee Avenue West
Suite 868, P.O. Box 1000
Bradenton, Florida 34206
(941) 749-3063
FAX (941) 749-3018

REMARKS | DATE | REV.

OLD MANATEE COUNTY PUBLIC SAFETY CENTER
3 RD AND 5 TH FLOOR INTERIOR REMODEL
MANATEE COUNTY, FLORIDA

Project Number
IFAS# WO100354; WA#32

Drawn by
AS/GAT

Checked by
JB

Date
09-07-2011

DETAILS

Scale
AS NOTED

Set

Drawing Number

S0.3

11DS-0432

Karins Engineering Group, Inc.
FL. Cert. of Auth. # 8371
2017 Main Drive
Sarasota, FL 34231
(941) 927-8525/ Fax (941) 927-8075
John P. Bennett, PhD, PE
FL. Registration # 63063

SEAL