

21 March 2012

From the Office of:

ZGA Architects and Planners, Chartered  
408 E. Parkcenter Blvd, Suite 205  
Boise, Idaho 83706

Re: **ADDENDUM NO. ONE**  
**VAMC Building 85 Replace and Modernize Surgery / I.C.U.**  
**VA Project # 531-371**  
500 West Fort Street Boise, ID 83702  
ZGA Project No. 1018.00

**TO ALL CONTRACTORS SUBMITTING BIDS ON THE ABOVE SUBJECT:**

This Addendum is hereby made a part of the project requirements and Contract Documents pertaining to the above project and shall be binding upon each contractor submitting bids. Be sure to acknowledge this addendum on your Bid/Proposal Form. Failure to do so may subject the bidder to disqualification. It shall further be the responsibility of each General Contractor to notify his subcontractors concerning the contents of this addendum as they specifically apply to them.

**1. GENERAL**

- a. During the bidding process, the design team has received multiple phone calls notifying us that portions of the Construction Documents are missing. The error appears to be with the documents available from third-party plan rooms. The only government authorized website for this solicitation posting is the FedBizOpps site. Please use the authorized website to download all the solicitation document and attachments.

**2. GENERAL**

- a. At the Pre-Bid Walkthrough, a PowerPoint presentation was given to familiarize contractors to the project area and to explain a few of the special circumstances. For those not present, the slides from that PowerPoint presentation are included with this addendum as an attachment.

**3. SPECIFICATION – 01 00 00 – GENERAL REQUIREMENTS**

- a. 1.5 Fire Safety, Paragraph B Fire Safety Plan. Provide weekly reports, listing all hazards identified and corrective actions taken to the Resident Engineer, in lieu of the COTR.
- b. 1.5 Fire Safety, Paragraph E Temporary Construction Partitions, Subparagraph 2 shall read, "Close all openings in smoke barriers and fire-rated construction (walls, floors, and ceilings) to maintain fire ratings. This includes any existing holes as well as contractor caused holes. Holes are to be sealed as soon as possible and as a minimum by the end of each workday with temporary or permanent fire sealant. Seal penetrations with listed through-penetration fire stop materials in accordance with Section 07 84 00 FIRESTOPPING PENETRATIONS, JOINTS AND PERIMETER FIRE CONTAINMENT."
- c. 1.5 Fire Safety, Paragraph M Hot Work shall read, "Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. The Contractor shall be responsible for assigning an authorized supervisory representative to issue hot work permits. Before any cutting or welding with open flame is conducted, the contractor or subcontractor shall obtain permission from the contractor's authorized representative by issuance of this permit. Coordinate with Project Manager prior to issuing of any hot work permits. See Attachment

for sample of hot work permit.”

- d. 1.5 Fire Safety, Paragraph P Smoking shall read, “Smoking is prohibited in and adjacent to construction areas, inside existing buildings, on building roofs, in crawl spaces, etc. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.”
- e. Add 1.41 MINIMUM CLEANLINESS FOR TURNOVER OF AREA to read,

“A. DESCRIPTION OF SERVICES. The contractor shall provide all management, tools, equipment, supplies, materials, and labor necessary to ensure the following custodial services are performed.

  - 1. Hard Floors. All floors, except carpeted areas, shall be swept, dust mopped, damp mopped, wet mopped, and waxed (if appropriate), to ensure they have a uniform, glossy appearance and are free of dirt, debris, dust, scuff marks, heel marks, other stains, and discoloration, and other foreign matter.
  - 2. Vacuum Carpets. Vacuum carpeted areas. After vacuuming, the areas shall be free of all visible dirt, debris, litter, and other foreign matter. Any spots shall be removed by carpet manufacturer’s approved methods as soon as noticed.
  - 3. Clean Interior Glass/Mirrors. Clean all interior glass, including glass in doors, partitions, walls, display cases, directory boards, windbreaks at entrances, mirrors, etc. After glass cleaning, there shall be no traces of film, dirt, smudges, water, or other foreign matter. All adjacent sills, frames, ledges, etc. shall be cleaned.
  - 4. Clean Drinking Fountains. Clean and disinfect all porcelain and polished metal surfaces, including the orifices and drains, as well as exterior surfaces of fountains. Drinking fountains shall be free of streaks, stains, spots, smudges, scale, and other obvious soil.
  - 5. General Dusting. All horizontal surfaces from eight (8) feet to twenty (20) feet above the floor level must be dusted or cleaned to eliminate dust collection, to include window blinds. Typewriters, copier machines, and equipment of similar nature shall not be dusted. Surfaces eight (8) feet and below are included in “Low Dust”. Surfaces above eight (8) feet to twenty (20) feet are included in “High Dust”.
  - 6. Clean and Disinfect. Completely clean and disinfect all surfaces of sinks, toilet bowls, urinals, lavatories, showers, shower mats, dispensers, mirrors, plumbing fixtures, saunas, partitions, doors, walls, and other such surfaces, using a germicidal detergent. After cleaning, surfaces will be free of deposits, dirt, streaks, stains, scale, scum, and odors. Disinfect all surfaces of partitions, stalls, stall doors, entry doors, (including handles, kick plates, ventilation grates, metal guards, etc.), and wall areas adjacent to wall mounted lavatories, urinals, and toilets.”

**4. SPECIFICATION – 01 33 23 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES (INCLUDES SUBSTITUTION PROCEDURES)**

- a. 2.1 Substitutions, Paragraph A Substitutions for Convenience. Substitutions will no longer be considered by Architect prior to bid date. The successful bidder will be given the opportunity to negotiate proposed substitutions with the Owner and design team after the contract is awarded. Contractors shall incorporate all specified items into their bid numbers or shall assume the liability for having their substitutions denied post-bid. The conditions outlined in Section 01 33 23 shall remain in force after the bid.

**5. SPECIFICATION – 06 20 00 – FINISH CARPENTRY, MILLWORK & COUNTERTOPS**

- a. 2.1 Plastic Laminate Faced Architectural Cabinets, Paragraph G Laminate Cladding for Exposed Surfaces, Subparagraph 3 shall read, “Vertical Surfaces: Grade VGP.”
- b. 2.2 Plastic Laminate Countertops, Paragraph D Core Material shall read, “Use industrial grade particle board, medium density, grade M-2, unless otherwise specified.”
- c. 2.2 Plastic Laminate Countertops, Paragraph E Core Material at Sinks shall read, “Use industrial grade particle board, medium density, grade M-2, exterior grade.”
- d. 2.3 Chemical-Resistant Plastic Laminate Countertops, Paragraph E Core Material shall read, “Use industrial grade particle board, medium density, grade M-2, unless otherwise specified.”
- e. 2.3 Chemical-Resistant Plastic Laminate Countertops, Paragraph F Core Material at Sinks shall read, “Use industrial grade particle board, medium density, grade M-2, exterior grade.”

**6. SPECIFICATION – 08 71 00 – BUILDERS HARDWARE**

- a. 3.3 Hardware Schedule, Paragraph C Hardware Sets. Delete Set 23.0 in its entirety. Add Door 357 to Set 29.0.

**7. SPECIFICATION – DIVISION 23 – MECHANICAL SYSTEMS**

- a. Manufacturer design basis technical specification is being included as part of Addendum no. 1 to assist in the bid process and to provide additional information for determining an approved equal for the air handling units if desired by the contractor. It is important to note that approved alternates will not be entertained until after the bid has been awarded as directed by the VA. It is in the best interest of the bidding contractor to become familiar with the construction requirements of the Temtrol product prior to submitting substitution requests. Any substitution requests that fail to meet the requirements of the Temtrol construction will not be approved as alternates. See attached Engineering Guide Specifications for Temtrol Custom Air Handling Units (Air Handling Units and Isolation Room Exhaust Fans).

**8. DRAWINGS – G3.0 SITE STAGING PLAN**

- a. Modify boxed note at center of sheet to read, “Note: Contractor is to repair all damage to existing site paving, curbing, landscaping, *utilities*, drainage systems and other installed structures and equipment.”

**9. DRAWINGS – A1.1 FIRST FLOOR DEMOLITION PLAN**

- a. Add Demolition Note L to read, “The existing emergency room admitting structural framing consists of metal roof decking over structural steel (wide flange) framing. Steel connections are typically bolted, but there are numerous cantilevered beams with welded connections. The vertical structure consists of steel tube columns supported by spread footings. First floor slab is 4-inch slab on grade. The VA has as-builts of this area on file. They are available for viewing at B.50. The successful bidder will have full access to all as-builts.”

**10. DRAWINGS – A1.3 THIRD FLOOR DEMOLITION PLAN, A2.3A THIRD FLOOR DIMENSION PLAN, A2.3C THIRD FLOOR NOTATED PLAN, A2.9 THIRD FLOOR FINISH PLAN, A9.3 THIRD FLOOR REFLECTED CEILING PLAN, EL1.3 THIRD FLOOR LIGHTING DEMOLITION PLAN, EP1.3 THIRD FLOOR POWER DEMOLITION PLAN, EC1.3 THIRD FLOOR COMM AND FIRE ALARM DEMOLITION PLAN, EL2.3 THIRD FLOOR LIGHTING PLAN, EP2.3 THIRD FLOOR**

**POWER PLAN, EC2.3 THIRD FLOOR COMMUNICATIONS PLAN AND FA2.3 THIRD FLOOR FIRE ALARM PLAN**

- a. New construction, modifications and alternations of Rooms 308C (OR 2), 308D (Anesthesia Workroom), 308F (OR 1), 310 (Suture Storage), 311 (Orthopedic Storage), C33 (Corridor) and C34 (Corridor) shall be deleted from the contract. Existing conditions shall remain.
- b. Modify Sheet A1.3, Building 85 – Third Floor Demolition Plan per sketch AA-01.
- c. Modify Sheet A2.3A, Building 85 – Third Floor Dimension Plan per sketch AA-02.
- d. Modify Sheet A2.3C, Building 85 – Third Floor Notated Plan per sketch AA-03 and AA-04.
- e. Modify Sheet A2.9, Building 85 – Third Floor Finish Plan per sketch AA-05. Rooms 309A (ICU/Surgery Storage) and 363 (Clean Supply) shall no longer require FRP wainscot. Walls shall receive paint full-height. Both sides of dividing wall between Corridor 33 and Corridor 44 shall receive paint per Specifications. Changes made within these sketches and addendum shall take precedence over finishes listed in the Finish Schedule.
- f. Modify Sheet A9.3, Building 85 – Third Floor Reflected Ceiling Plan per sketch AA-06.
- g. Retain and protect existing electrical in Anesthesia Workroom 308D, Room 311, Room 308E, and Corridor C33. No new electrical outfitting shall be done in corresponding rooms Anesthesia Workroom 308D, Suture Storage 310, or Orthopedic Storage 311. Coordinate extents of existing area to remain with architectural sketches.
- h. Mechanical contractor shall omit from their bid the removal of all associated mechanical HVAC demolition and new mechanical HVAC / piping associated with the Anesthesia Workroom 308D, Suture Storage 310, or Orthopedic Storage 311 found on sheets M2.2B and M2.7B. Coordinate extents of existing area to remain with architectural sketches.

**11. DRAWINGS – A2.3B THIRD FLOOR NOTATED PLAN, A8.8 EQUIPMENT SCHEDULE & EP2.3 THIRD FLOOR POWER PLAN**

- a. Clarification of E98 – Pneumatic Tube System. Pneumatic tube system shall be furnished and installed by the Owner. However, all framing and finishes surrounding the installation shall be the responsibility of the Contractor. Contractor shall provide power for all components of the system, including stations, transfer units and additional blowers, should any be required. Contractor shall provide two core-drills through the floor slab at the locations requested by the Owner and as approved by the Architect. Contractor shall coordinate installation and finishing of the pneumatic tube areas with the Owner.

**12. DRAWINGS – A2.3C THIRD FLOOR NOTATED PLAN, A8.1 ICU INTERIOR ELEVATIONS, EL2.3 THIRD FLOOR LIGHTING PLAN, EP2.3 THIRD FLOOR POWER PLAN, EC2.3 THIRD FLOOR COMMUNICATIONS PLAN & FA2.3 THIRD FLOOR FIRE ALARM PLAN**

- a. Room 357 (Clinical Nurse Specialist) is being modified from a single occupant office with built-in casework to a four occupant office with furniture-type workstations.
- b. Modify Sheet A2.3C , Building 85 – Third Floor Notated Plan – Area B, Room 357 (Clinical Nurse Specialist). Relocate Door 357 to center of room as shown in sketch AA-07 and modify hardware set as indicated above. Delete all built-in casework from room.
- c. Delete Sheet A8.1, ICU Interior Elevations 4, 5 & 6 in their entirety. Workstations shown in sketch AA-07 will be provided as furniture by the Owner.
- d. Modify Sheet EL2.3, Third Floor Lighting Plan. Relocate light switches in Clinical Nurse Specialist 357 next to new door location. No sketch.
- e. Modify Sheet EP2.3, Third Floor Power Plan in Clinical Nurse Specialist 357 per sketch EA-01.
- f. Modify Sheet EC2.3, Third Floor Communications Plan in Clinical Nurse Specialist 357 per sketch EA-02.
- g. Modify Sheet FA2.3, Third Floor Fire Alarm Plan in Clinical Nurse Specialist 357 per sketch EA-03.

**13. DRAWINGS – A2.5 ROOF PLAN & M0.6 MECHANICAL CONSTRUCTION PHASING PLAN**

- a. Temporary relocation of roof top equipment - M0.6 indicates the relocation of mechanical equipment. Some of these locations are temporary and are not shown on A2.5 Roof Plan since they will not remain in the final construction. Each piece of equipment is no more than 200 lbs max. and the existing roof structure is adequate to support the relocation. The contractor may utilize existing strut and curb assemblies as long as they are not compromised during demolition, otherwise new unistrut and curb assemblies will need to be provided. Flash each curb into existing roof per Detail D1 on Sheet A7.1. Once equipment is removed, patch and repair roof per roofing manufacturer's recommendations to maintain warranty.

**14. DRAWINGS – A2.8 & A2.9 FLOOR FINISH PLANS**

- a. Clarification – There is no Second Floor Finish Plan. Other than the stairs, this is an unfinished, shelled space. As per the Specification, all unfinished concrete slabs shall be sealed. Any disturbed areas not already covered in the Finish Schedule, shall be restored to a new condition and shall match existing finishes and colors.

**15. DRAWINGS – A10.3B THIRD FLOOR ALTERNATE FLOOR PLAN**

- a. Clarification of Bid Alternate No. 7 – If this deductive alternate is taken, PACU #358 will be shelled with limited improvements as described in the drawings. Whether this alternate is accepted or not, Public Corridor C42 will be finished per the Finish Schedule.

**16. DRAWINGS – EL1.3, EP1.3, EC1.3, EL2.3, EP2.3, EC2.3, and FA2.3 THIRD FLOOR LIGHTING, POWER, COMM AND FIRE ALARM DEMOLITION PLANS, AND THIRD FLOOR LIGHTING, POWER, COMMUNICATIONS, AND FIRE ALARM PLANS**

- a. Retain and protect existing electrical in Anesthesia Workroom 308D, Room 311, Room 308E, and Corridor C33. No new electrical outfitting shall be done in corresponding rooms Anesthesia Workroom 308D, Suture Storage 310, or Orthopedic Storage 311. Coordinate extents of existing area to remain with architectural sketches.

**17. DRAWINGS – E3.1 ELECTRICAL SCHEDULES**

- a. Luminaire schedule: Light fixture type CL1 shall have (2) 42 watt, triple tube compact fluorescent lamps, instead of (1) as shown. No sketch.

## **ATTACHMENTS**

1. Power Point presentation displayed at Pre-Bid Walkthrough Conference.
2. Permit for Hot Work Operations.
3. Engineering Guideline Specifications (two sections).
4. Architectural Addendum sketches AA-01 through AA-07.
5. Electrical Addendum sketches EA-01 through EA-03.

**END OF ADDENDUM NO. ONE**

## DEPARTMENT OF VETERANS AFFAIRS

BUILDING 85 REPLACE AND MODERNIZE SURGERY/I.C.U.



PRE-BID WALK-THROUGH  
& PRESENTATION

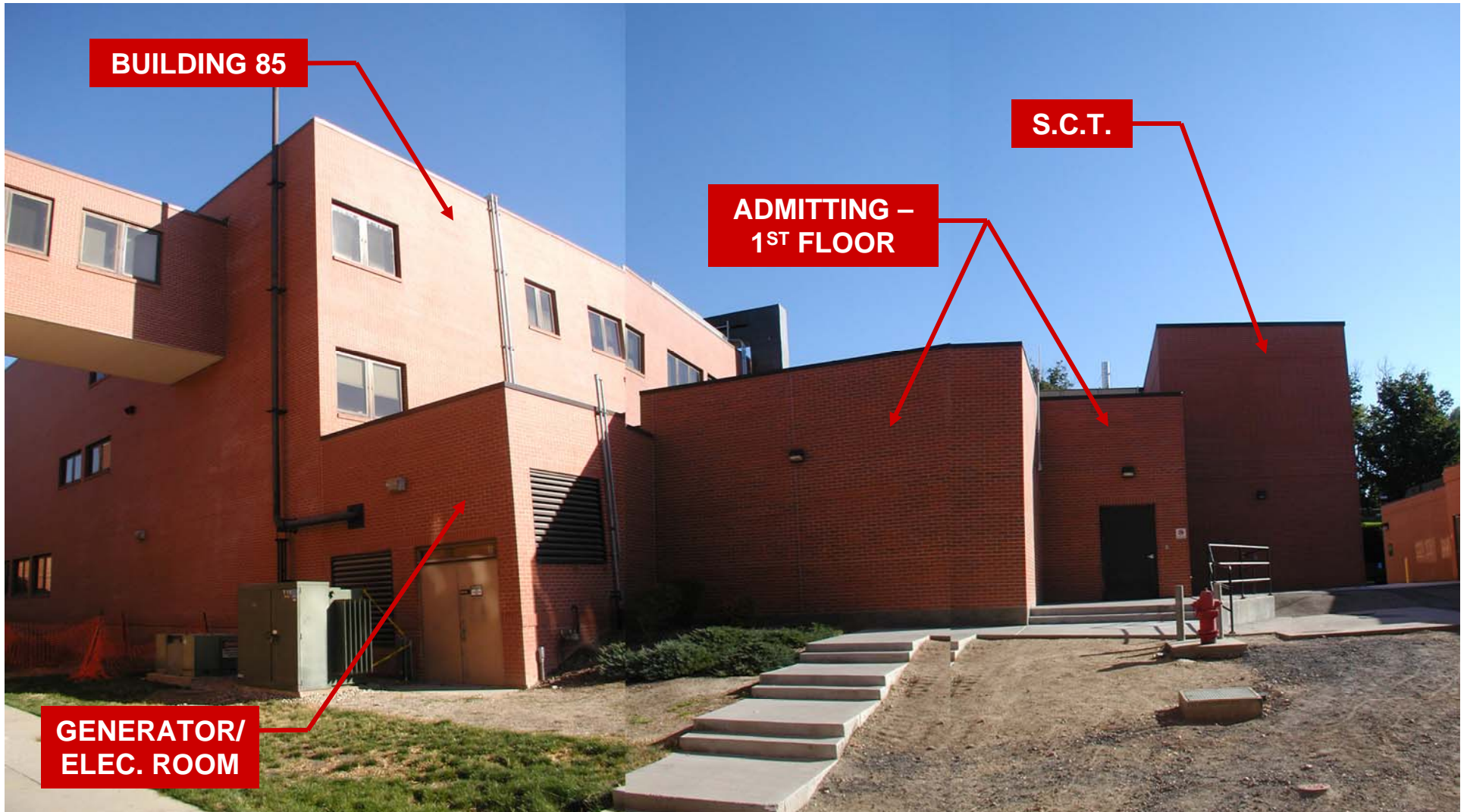


## BUILDING 85 - EXISTING CONDITIONS



**EAST ENTRANCE**

## BUILDING 85 - EXISTING CONDITIONS



**WEST SIDE**



## BUILDING 85 - EXISTING CONDITIONS



**AERIAL VIEW**

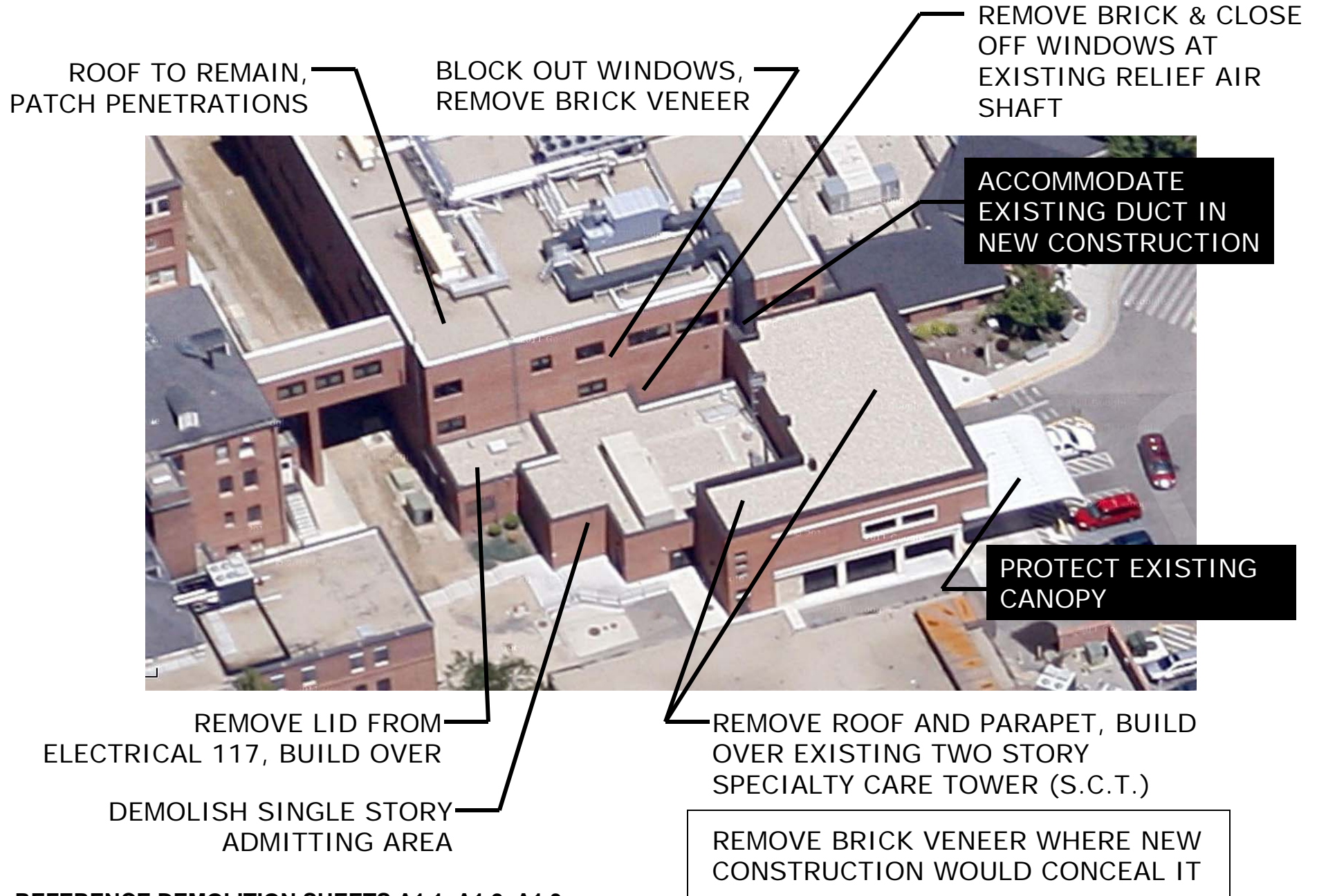
## BUILDING 85 – AFTER CONSTRUCTION



**AERIAL VIEW**



## DEMOLITION - OVERVIEW



## BUILDING 85 - EXISTING INTERIOR CONDITIONS



# **SPECIAL CIRCUMSTANCES TO BE AWARE OF**



## **SPECIAL CIRCUMSTANCE: PROJECT PHASING**

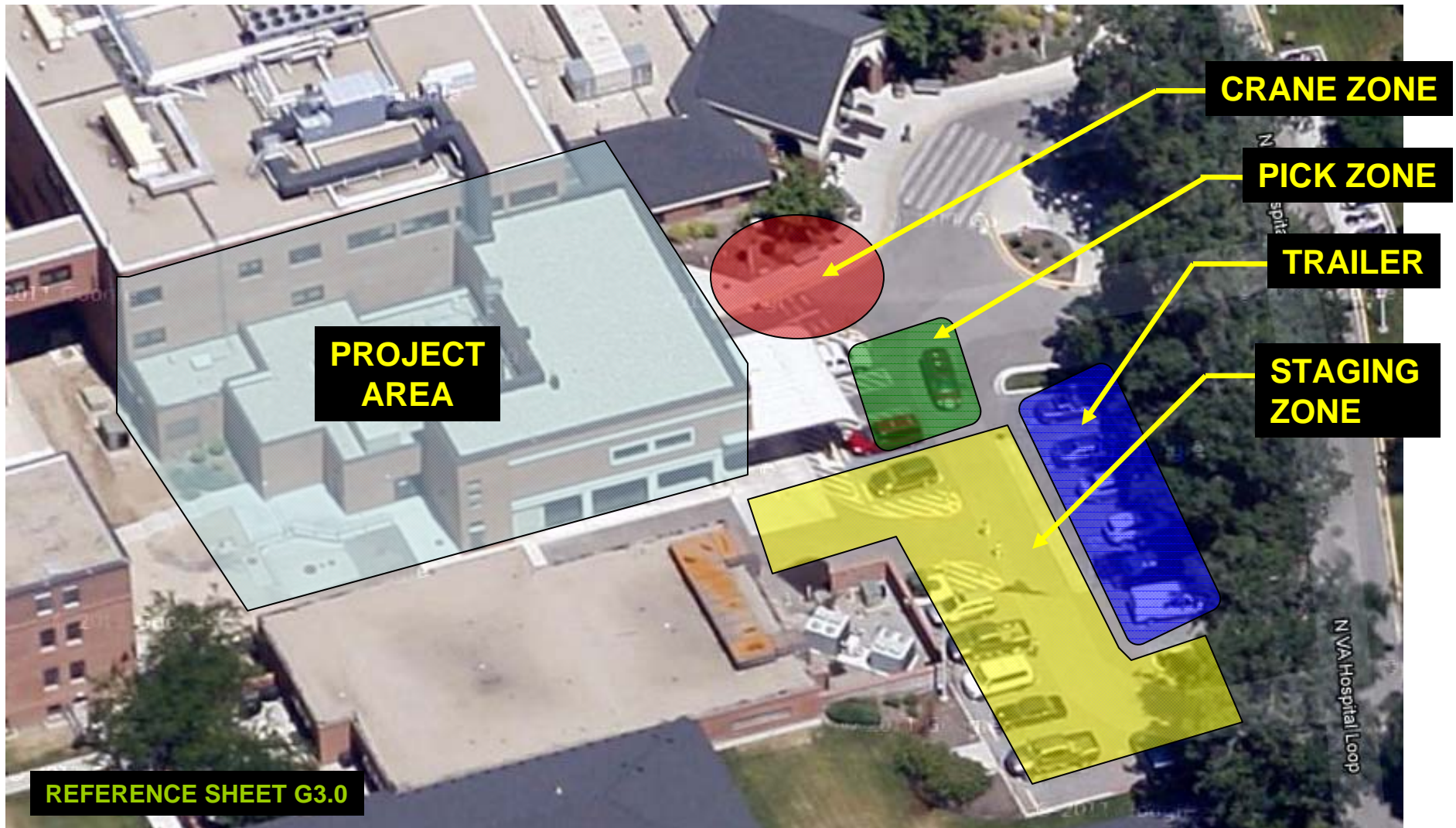
- PHASING WILL PLAY A KEY ROLE IN CONSTRUCTION OF THIS PROJECT.
- THERE ARE (8) DESIGNATED PHASES TO THE PROJECT. EACH IS LISTED IN DETAIL IN SECTION 010000 – 'GENERAL REQUIREMENTS' WITHIN THE SPECIFICATIONS.
- COORDINATION WITH THE VA'S C.O.T.R. (CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE) IS IMPERATIVE FOR PHASING.

### **VA DEPARTMENTS THAT WILL BE INVOLVED IN PHASING:**

- 1<sup>ST</sup> FLOOR EXISTING E.R., ADMITTING, AND TRIAGE
- 1<sup>ST</sup> FLOOR EXISTING 'PURPLE TEAM'
- 2<sup>ND</sup> FLOOR EXISTING LABORATORY
- 3<sup>RD</sup> FLOOR EXISTING INTENSIVE CARE UNIT
- 3<sup>RD</sup> FLOOR EXISTING SURGICAL DEPARTMENT

## **SPECIAL CIRCUMSTANCE: SITE STAGING PLAN**

- CONSTRUCTION STAGING SPACE WILL BE VERY LIMITED
- PATIENT PARKING AT E.R. ENTRY WILL BE TEMPORARILY DECREASED
- PARKING AREA FOR CONSTRUCTION CREW WILL BE DETERMINED BY THE VA

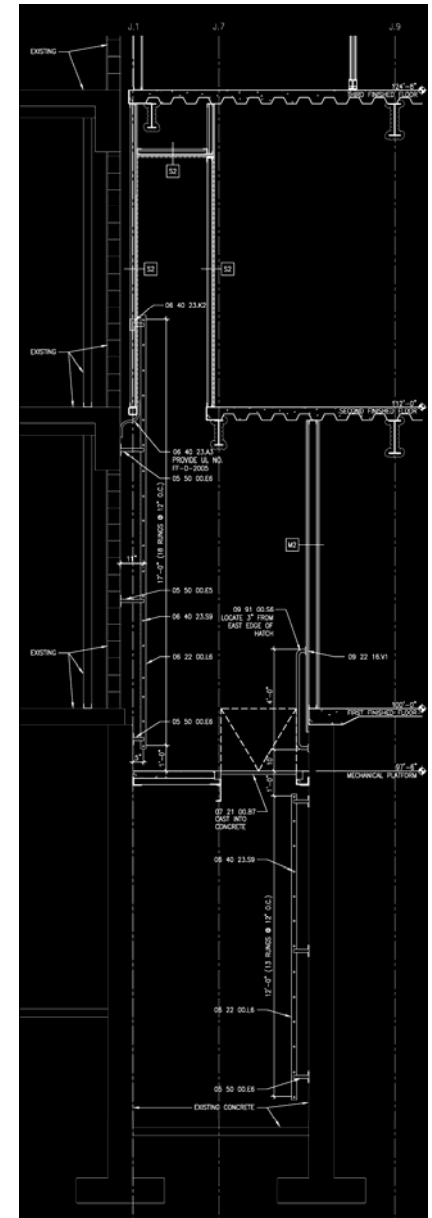




## **SPECIAL CIRCUMSTANCE: EXISTING RELIEF AIR SHAFT**



## SPECIAL CIRCUMSTANCE: EXISTING RELIEF AIR SHAFT



REFERENCE SECTION #5 ON SHEET A5.2



## **SPECIAL CIRCUMSTANCE: EXISTING GENERATOR/ELECTRICAL ROOM**





## **DEPARTMENT OF VETERANS AFFAIRS**

**BUILDING 85 REPLACE AND MODERNIZE SURGERY/I.C.U.**



**THANK YOU**

**PERMIT  
FOR HOT WORK OPERATIONS**

VA Project No.: \_\_\_\_\_

Name of Contractor's Firm: \_\_\_\_\_

Date: \_\_\_\_\_

Building No: \_\_\_\_\_ Floor: \_\_\_\_\_

Dept: \_\_\_\_\_ Room: \_\_\_\_\_

Work To Be Done:  
\_\_\_\_\_  
\_\_\_\_\_

Special Precautions:  
\_\_\_\_\_  
\_\_\_\_\_

Is Fire Watch Required? \_\_\_\_\_ Yes \_\_\_\_\_ No

The location where this work is to be done as been examined,  
necessary precautions taken, and permission is granted for this  
work (See page 2).

Signed: \_\_\_\_\_  
(Contractor's Individual Responsible for Authorizing Hot  
Work)

Permit Expires: \_\_\_\_\_ (Date and Time/Initial)  
(Completed by Project Engineer)

Time Started: \_\_\_\_\_ Completed: \_\_\_\_\_  
(Completed by Contractor)

\*\*\*\*\*

**FINAL CHECK-UP**

Work area and all adjacent areas to which sparks and heat might  
have spread (including floors above and below and on opposite  
sides of walls) were inspected 30 minutes after the work was  
completed and were found fire safe.

Signed: \_\_\_\_\_  
(Contractor's Fire Watcher)

### **ATTENTION**

Before approving any hot work permit, the Contractor's authorized representative or his appointee will inspect the work area and confirm that precautions have been taken to prevent fire in accordance with NFPA 51B.

### **PRECAUTIONS**

- [ ] Sprinklers in service.
- [ ] Cutting and welding equipment in good repair.

### **WITHIN 35 FEET OF WORK**

- [ ] Floors swept clean of combustibles.
- [ ] Combustible floors wet down, covered with damp sand, metal, or other shields.
- [ ] No combustible material or flammable liquids.
- [ ] Combustibles and flammable liquids protected with covers, guards, or metal shields.
- [ ] All wall and floor openings covered.
- [ ] Covers suspended beneath work to collect sparks.

### **WORK ON WALLS OR CEILINGS**

- [ ] Construction noncombustible and without combustible covering.
- [ ] Combustibles moved away from opposite side of wall.

### **WORK ON ENCLOSED EQUIPMENT**

- (Tanks, containers, ducts, dust collectors, etc.)
- [ ] Equipment cleaned of all combustibles.
  - [ ] Containers purged of flammable vapors.
  - [ ] Confined Space Permit obtained.

### **FIRE WATCH**

- [ ] To be provided during and 30 minutes after operation.
- [ ] Supplied with extinguisher.
- [ ] Trained in use of equipment and in sounding fire alarm.

### **FINAL CHECK-UP**

- [ ] To be made 30 minutes after completion of any operation unless fire watch is provided.

Signed: \_\_\_\_\_  
(Contractor's Authorized Representative)

SECTION 1558X – AIR HANDLING UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

Design, performance criteria, controls, and installation requirements for Custom Air Handling Units.

1.02 REFERENCES

- A. AMCA Standard 99: Standards Handbook
- B. AMCA /ANSI Standard 204: Balance Quality and Vibration Levels for Fans
- C. AMCA Standard 210: Laboratory Methods of Testing Fans for Ratings
- D. AMCA Standard 300: Reverberant Room Method for Sound Testing of Fans
- E. AMCA Standard 500: Test Methods for Louvers, Dampers and Shutters
- F. ARI Standard 410: Forced-Circulation Air-Cooling and Air-Heating Coil
- G. ASHRAE Standard 52: Gravimetric and Dust Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter
- H. ASHRAE/ANSI Standard 111: Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems
- I. UL Standard 1995: Heating and Cooling Equipment
- J. ASTM A-525: Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Division 1.
- B. Submittals shall include the following:
  - 1. Dimensioned plan and elevation view drawings, including motor starter and control cabinets, required clearances, and location of all field connections.
  - 2. Summary of all auxiliary utility requirements such as: electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
  - 3. Ladder type schematic drawing of the power and ancillary utility field hookup requirements, indicating all items that are furnished.
  - 4. Manufacturer's performance of each unit. Selection shall indicate, as a minimum, the following:
    - a. Input data used for selection.
    - b. Model number of the unit.
    - c. Net capacity.
    - d. Rated load amp draw.
    - e. Noise levels produced by equipment.
    - f. Fan curves.
    - g. Approximate unit shipping weight.

1.04 OPERATION AND MAINTENANCE DATA

- A. Include data on design, inspection and procedures related to preventative maintenance. Operation and Maintenance manuals shall be submitted at the time of unit shipment.

#### 1.05 QUALIFICATIONS

- A. Manufacturer shall be a company specializing in the design and manufacture of commercial / industrial custom HVAC equipment. Manufacturer shall have been in production of custom HVAC equipment for a minimum of 5 years.
- B. Each unit shall bear an ETL or UL label under UL Standard 1995 indicating the complete unit is listed as an assembly. ETL or UL listing of individual components, or control panels only, is not acceptable.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under the supervision of the owner.

#### 1.07 SEQUENCING AND SCHEDULING

- A. Coordinate work performed under this section with work performed under the separate installation contract.

#### 1.08 WARRANTY

- A. The complete unit shall be covered by a parts warranty issued by the manufacturer covering the first year of operation. This warranty period shall start upon receipt of start-up forms for the unit or eighteen months after the date of shipment, whichever occurs first.
- B. The installing contractor shall provide labor warranty during the unit's first year of operation.

### PART TWO: PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Provide custom (indoor / outdoor) air handling units as manufactured by Temtrol as the basis-of-design. Equipment manufactured by Huntair or TMI shall be considered provided the construction specifications capacities and performance criteria are met.

#### 2.02 GENERAL

- A. Furnish and install where shown on the plans, mechanical frame style (ITF) air handling units with construction features as specified below. The units shall be provided and installed in strict accordance with the specifications. All units shall be complete with all components and accessories as specified. Any exceptions must be clearly defined. The contractor shall be responsible for any additional expenses that may occur due to any exception made.
- B. If unit manufacturer cannot provide "sole source" for major components: (*fans, coils, dampers*) they must list supplier and quote lead time for replacement parts on bid. If units are built outside the USA list country of origin on bid.



- C. Air handling units shall meet the seismic design requirements set forth in the International Building Code (IBC 2009). Equipment manufacturer shall provide certificate of compliance stating units have been certified for the seismic requirements indicated on the structural drawings and in accordance with ASCE 7-05 / ICC-ES AC-156. Unit certification shall be based on a maximum Sds value of 1.93g. Certification of the Air Handling Equipment shall be through engineering analysis performed by an independent registered professional consulting engineer specializing in seismic analysis. The analysis performed shall include structural calculations, static and dynamic finite element analysis and shake table testing in accordance with ASCE-7-05 / ICC-ES-AC-156. A Copy of the Seismic Certification shall also be submitted to the engineer with the submittals for review and approval. Certificate of Compliance shall also be submitted to the code enforcement official for review and acceptance. The air handler shall be provided with IBC Compliant Labeling.

## 2.03 Factory Testing and Quality Control

- A. Standard Factory Tests: The fans shall be factory run tested to ensure structural integrity and proper RPM. All electrical circuits shall be tested to ensure correct operation before shipment of unit. Units shall pass quality control and be thoroughly cleaned prior to shipment.

## 2.04 UNIT CONSTRUCTION DESCRIPTION

- A. General: Provide factory-fabricated air handling units with capacity as indicated on the schedule. Units shall have overall dimensions as indicated and fit into the space available with adequate clearance for service as determined by the Engineer. Units shall be completely assembled. Multiple sectioned units shall be shipped as a single factory assembled piece (except where shipping limitations prevent) de-mounted into modular sections in the field by the contractor. Units shall be furnished with sufficient gasket and bolts for reassembly in the field by the contractor. Unit manufacturer shall provide certified ratings conforming to the latest edition of AMCA 210, 310, 500 and ARI 410. All electrical components and assemblies shall comply with NEMA standards. Unit internal insulation must have a flame spread rating not over 25 and smoke developed rating no higher than 50 complying with NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems." Units shall comply with NFPA 70, "National Electrical Code," as applicable for installation and electrical connections of ancillary electrical components of air handling units. Tags and decals to aid in service or indicate caution areas shall be provided. Electrical wiring diagrams shall be attached to the control panel access doors. Operation and maintenance manuals shall be furnished with each unit. Units shall be UL or ETL listed.
- B. Rigging Provision – Multiple Piece Units: Units shipped in multiple sections shall be engineered for field assembly. The base frame shall have integral lifting lugs. The lifting lugs shall be fabricated from structural steel with an appropriate rigging hole. Lifting lugs shall be located at the corner of each section (and along the sides if required) and sized to allow rigging and handling of the unit. All gasket and necessary assembly hardware shall ship loose with unit. Junction boxes with a factory supplied numbered terminal strip shall be supplied at each shipping split for reconnection of control wiring.

Unit Base - Floor: Unit perimeter base shall be completely welded and fabricated using heavy gauge structural steel tubing. (Note: bolted bases are not acceptable) C-Channel

cross supports shall be welded to perimeter base steel tubing and located on maximum 24" centers to provide support for internal components. Base rails shall include lifting lugs welded to perimeter base at the corner of the unit or each section if de-mounted. Entire base frame is to be painted with a phenolic coating for long term corrosion resistance. Internal walk-on floor shall be mechanically fastened, caulk seams with 12 gauge aluminum tread plate.

- C. The outer sub-floor of the unit shall be made from 20 gauge galvanized steel. The floor cavity shall be spray foam insulated with floor seams gasketed for thermal break and sealed for airtight / watertight construction. Where access is provided to the unit interior, floor openings shall be covered with walk on phenolic coated steel safety grating. Single wall floors with glued and pinned insulation and no sub floor are not acceptable. Base frame shall be attached to the unit at the factory.
- D. The unit shall be furnished with floor drains or drain pans shall be installed as shown on drawings. The floor drains shall be large capacity with a protective cover. All floor drains shall be fully piped to the unit exterior with steel pipe.)
- E. Unit Casing – The construction of the air handling unit shall consist of a steel frame with formed 16 gauge galvanized steel exterior casing panels. The exterior casing panels shall be attached to the gasketed (1 x 2) steel frame with corrosion resistant fasteners. All casing panels shall be completely removable from the unit exterior without affecting the unit's structural integrity. (Units without framed type of construction shall be considered, provided the exterior casing panels are made from 14 gauge galvanized steel, maximum panel center lines are less than 20 inches and deflection is less than L/200 @ 9" positive pressure). The air handling unit casing shall be of the "no-through-metal" design. The casing shall incorporate insulating thermal breaks as required so that, when fully assembled, there's no path of continuous unbroken metal to metal conduction from inner to outer surfaces. Provide necessary support to limit casing deflection to L/200 of the narrowest panel dimension. If panels cannot meet this deflection, additional internal reinforcing is required. All panel seams shall be caulked and sealed for an airtight unit. Leakage rates shall be less than 1% at design static pressure or 9" W.C. whichever is greater.

The exterior panel finish shall be painted with a polyester resin coating designed for long term corrosion resistance meeting or exceeding (ASTM B-117) Salt Spray Resistance at 95 degrees F. 1,000 hrs. and (ASTM D-2247) Humidity Resistance at 95 degrees F. 1000 hrs. The color shall be sandstone.

- F. Double Wall Liner - Each unit shall have double wall construction with 20 gauge solid galvanized liner in the entire unit. The double wall interior panel shall be removable from the outside if the unit without affecting the structural integrity of the unit.
- G. Insulation - Entire unit to be insulated with a full 3" (R12.5) thick non-compressed fiberglass insulation. The insulation shall have an effective thermal conductivity (C) of .24 (BTU in./sq.ft. F°) and a noise reduction coefficient (NRC) of 0.70 / per inch thick (based on a type "A" mounting). The coefficients shall meet or exceed a 3.0 P.C.F. density material rating. Insulation shall meet the erosion requirements of UL 181 facing the air stream and fire hazard classification of 25/50 (per ASTM-84 and UL 723 and CAN/ULC S102-M88) and meet NFPA 90A and 90B. All insulation edges shall be encapsulated within the panel. All perforated sections shall have Micromat® or equal

insulation with non-woven mat facing, 5000 fpm rating and non-hygroscopic fibers as manufactured by Johns Manville or approved equal.

- H. Access Doors - The unit shall be equipped with a solid double wall insulated (same as the unit casing), hinged access doors as shown on the plans. The doorframe shall be extruded aluminum, foam filled with a built in thermal break barrier and full perimeter gasket. The door hinge assembly shall be completely adjustable die cast stainless steel. There shall be a minimum of two heavy duty handles per door. Provide ETL, UL 1995, and CAL-OSHA approved tool operated safety latch on all fan section access doors.

Note: If manufacturer cannot provide thermal break door design it must be noted as an exception on the bid.

- a. Access doors designated sections shall be provided with a 10 x 10 dual thermal pane safety glass window.

## 2.05 UNIT COMPONENT DESCRIPTION

### A. FANWALL TECHNOLOGY

1. The multiple fan array systems shall include multiple, direct driven, arrangement 4 plenum fans constructed per AMCA requirements for the duty specified class III as required. Class I fans are not acceptable. Fans shall be rated in accordance with and certified by AMCA for performance. All fans shall be selected to deliver the specified airflow quantity at the specified operating Total Static Pressure and specified fan/motor speed. The fan array shall be selected to operate at a system Total Static Pressure that does not exceed 90% of the specified fan's peak static pressure producing capability at the specified fan/motor speed. Each fan/motor cube or cell shall include a minimum 10 gauge, G 90 Galvanized steel intake wall, .100 aluminum spun fan inlet funnel, and a 10 gauge G90 Galvanized steel motor support plate rail and structure. All motors shall be standard foot mounted type TEAO selected at the specified operating voltage, RPM, and efficiency as specified or as scheduled elsewhere. Motors shall meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2. Motors shall be as manufactured by Baldor, Siemens, or Toshiba for use in multiple fan arrays that operate at varying synchronous speeds as driven by an approved VFD. Motor HP shall not exceed the scheduled HP as indicated in the AHU equipment schedule(s). Steel cased motors and/or ODP motors are not acceptable. All motors shall include permanently sealed (L10-400,000 hr) bearings and AEGIS™ shaft grounding to protect the motor bearings from electrical discharge machining due to stray shaft currents. Each fan/motor assembly shall be dynamically balanced to meet AMCA standard 204-96, exceeding category BV-5, to meet or exceed an equivalent Grade G.55, producing a maximum rotational imbalance of .03" per second peak, filter in ( .55mm per second peak, filter in). Fan and motor assemblies submitted for approval incorporating larger than 22" wheel size and 215 T frames size motors shall be balanced in three orthogonal planes to demonstrate compliance with the G.55 requirement with a maximum rotational imbalance of .03" per second peak filter in ( .55 mm per second peak, filter in). Copies of the certified balancing reports shall be provided with the unit O&M manuals at the time of shipment. Submittals that do not include a statement of compliance with this requirement will be returned to the contractor without review.

2. The multiple fan array AHU unit shall provide the specified acoustical performance as scheduled for the unit supply discharge opening(s), RA opening(s), and the OSA and Exhaust Air opening(s). Listed or alternate manufacturers, other than the basis of design, providing multiple fan arrays that incorporate fans which are not manufactured by the AHU manufacturer, must provide modeled acoustical performance of the AHU unit for pre-bid approval by the engineer 10 working days before the project bid date. Submitted sound and performance data for preapproval showing only single fan performance for multiple fan arrays will be returned without review. Approved alternate or listed manufacturers that do not manufacture their own fans for the specific purpose of use in multiple fan arrays, shall provide a letter guaranteeing submitted AHU performance for flow, pressure, and acoustics at the perimeter boundary of the unit signed by an officer of the OEM fan manufacturer being submitted on. The letter from the OEM fan manufacturer must clearly state that the submitted air handling unit perimeter boundary performance in the submitted AHU configuration is guaranteed, and that any deficiencies in performance from that as scheduled will be corrected at no cost to the owner. Submittals for listed and alternate manufacturers that do not contain the letter of guarantee as described above will be returned to the contractor disapproved and must be resubmitted for approval. Any corrective acoustical treatment, added airway tunnel lengths, increased electrical service, and any structural modifications necessary to meet specified and scheduled performance shall be provided at no additional cost to the owner to meet the specified performance criteria. All proposed corrective actions, when required, must be submitted for approval and shall include a guarantee of performance, as listed above, at no additional cost to the owner.
3. The fan array shall consist of multiple fan and motor "cubes" or "cells", spaced in the air way tunnel cross section to provide a uniform air flow and velocity profile across the entire air way tunnel cross section and components contained therein. In order to assure uniform velocity profile in the AHU cross section, the fan cube dimensions must be variable, such that each fan rests in an identically sized cube or cell, and in a spacing that must be such that the submitted array dimensions fill a minimum of 90% of the cross sectional area of the AHU air way tunnel. There shall be no blank off plates or "spacers" between adjacent fan columns or rows to position the fans across the air way tunnel. The array shall produce a uniform air flow profile and velocity profile within the airway tunnel of the air handling unit to equal the specified cooling coil and/or filter bank face velocity by +/- 10% when measured at a point 36" from the intake side of the fan array intake plenum wall, and at a distance of 72" from the discharge side of the fan array intake plenum wall. Submittals for units providing less than the scheduled quantity of fans and/or spacing of the fans for multiple fan arrays shall submit CFD modeling of the air flow profile for pre-bid approval that indicates uniform velocity and flow across all internal components without increasing the length of the AHU unit or changing the aspect ratio of the unit casing as designed.
4. Each individual cube or cell in the multiple fan arrays shall be provided with an integral back flow prevention device that prohibits recirculation of air in the event a fan or multiple fans become disabled. The system effects for the back flow prevention device(s) shall be included in the criteria for TSP determination for fan selection purposes, and shall be indicated as a separate line item SP loss in the submittals. Submitted AHU performance that does not indicate allowance for system effects for the back flow prevention device(s) and the system effect for the fan and motor enclosure in which each fan is mounted, will be returned to the contractor disapproved and will need to be resubmitted with all of the requested information

included for approval. Back Draft Damper performance data that is per AMCA ducted inlet and discharge arrangements will not be accepted. Damper data must be for the specific purpose of preventing back flow in any disabled fan cube and that is mounted directly at the inlet of each fan. Motorized dampers for this purpose are not acceptable. Submitted fan performance data which only reflect published performance for individual fans in AMCA arrangement "A" free inlet and discharge will not be accepted. AHU Manufacturers that do not manufacture the fans being submitted on must provide certified performance data for fans as installed in the AHU unit with Back Draft damper effects included. At the sole discretion of the engineer, such performance testing may be witnessed by the engineer and/or the owner's representative.

5. Each fan motor shall be individually wired to a control panel containing a single VFD as the primary VFD and a backup VFD wired in bypass, as specified elsewhere. Each VFD shall be sized for the total connected HP for all fan motors contained in the fan array. Wire sizing shall be determined, and installed, in accordance with applicable NEC standards and local code requirements. When specified and scheduled, the multiple fan array electrical panel shall include system optimization controls to actively control fan speed and to enable and disable fans in the multiple fan array. The number of active fans in the array shall be automatically determined, and the speed of the enabled fans shall be adjusted to produce the required coincidental flow and pressure at the perimeter boundary of the unit at substantially peak efficiency. The system optimization controls shall continuously monitor required flow and pressure and shall automatically optimize the operating array configuration and speed for peak efficiency. When specified, system, optimization controls shall be provided that will interface with, and be compatible with the BAS as specified elsewhere. It is the responsibility of the contractor to assure that the fan system optimization controls are compatible with the BAS system. System optimization controls shall be provided by the AHU unit manufacturer to assure single source responsibility for fan volume controls, and shall require only an input control signal from the controls contractor for SP or flow for proper operation of the system optimization controls. When specified, the AHU unit manufacturer shall provide a single communication interface with the BAS and shall coordinate with the controls contractor to make sure that all necessary data points are communicated.
6. At the sole discretion of the engineer, AHU manufacturers that are approved for bidding purposes only, other than the basis of design manufacturer, and that are submitting multiple fan arrays, shall test one or more of the submitted AHU's for flow, pressure, leakage, BHP and acoustics as submitted and approved, prior to shipment. The testing shall be witnessed by an owner's representative and approved by the engineer prior to shipment of any of the submitted AHU equipment. A test report shall be provided for each tested AHU unit and the report shall be included in the O&M manuals for the units.
7. Each fan & motor assembly shall be removable through a 24" wide, free area, access door located on the discharge side of the fan wall array without removing the fan wheel from the motor. All fan/motor access doors shall open against pressure.

All motors in the FANWALL Array shall be provided with individual Motor Protection for thermal overload protection. All motor circuit protectors can be located in starting device enclosure or, if required by design, in a separate enclosure. Motor circuit protector enclosure must be located and mounted at a minimal distance from motors



in the FANWALL Array. Provide remote indication by means of aux contacts wired in series.

Remote indication:

Current Sensors wired in parallel to the pilot lights.

Pilot Lights:

Cover mounted pilot lights for local monitoring of each fan with single alarm signal to BAS to indicate one of the fans has failed.

#### FANWALL TECHNOLOGY WITH REDUNDANT VARIABLE FREQUENCY DRIVE CONTROL:

As required by system design, provide one Yaskawa E7 Variable Frequency Drive for normal operation and a second Yaskawa E7 Variable Frequency Drive for Redundant Backup operation. Provide control wiring and control circuitry to transfer from main VFD to Redundant VFD when main drive has faulted. The Variable Frequency Drives shall be sized accordingly to start and hold all motors in the FANWALL Array. Provide service disconnect with fuses or circuit breaker.

#### B. Heat Transfer Coils – Water Coil

1. All coil assemblies shall be leak tested under water at 315 PSIG and PERFORMANCE is to be CERTIFIED under ARI Standard 410. Coils exceeding the range of ARI standard rating conditions shall be noted.
2. Cooling coils shall be mounted on stainless steel support rack to permit coils to slide out individually from the unit. Provide intermediate drain pans on all stacked cooling coils. The intermediate pan shall drain to the main drain pan through a copper downspout. Water coils shall be constructed of seamless copper tubing mechanically expanded into fin collars. All fins shall be continuous within the coil casing to eliminate carryover inherent with a split fin design. Fins are die formed Plate type.
3. Headers are to be seamless copper with die formed tube holes.
4. Connections shall be male pipe thread (MPT) Schedule 40 Red Brass with 1/8" vent and drain provided on coil header for coil drainage. All coil connections shall be extended to the exterior of the unit casing by the manufacturer. Coils shall be suitable for 250 PSIG working pressure. Intermediate tube supports shall be supplied on coils over 44" fin length with an additional support every 42" multiple thereafter.
5. Water coils shall have the following construction:

Standard 5/8":

5/8" o.d. x .020" wall copper tube with .028 return bends.

.008" aluminum fins

16 gauge galvanized steel casing ( )

.006" copper fins with 16 gauge 304 stainless steel casing on Surgery Unit cooling coil

- C. Condensate / Drain Pans - IAQ style drain pans shall be provided under all cooling coils as shown on the drawings. The drain pan shall be fabricated from 16 gauge 304 stainless steel. All pans are to be triple pitched for complete drainage with no standing water in the unit. They shall be insulated minimum 3-inch "Double Bottom" construction with welded corners. Provide stainless steel, 1-1/4" MPT drain connection extended to the exterior of the unit base rail. Units in excess of 159 inches shall have drain connections on both sides. All drain connections shall be piped and trapped separately for proper drainage.
- D. Filters - Provide filters of the type indicated on the schedule. Factory fabricated filter sections shall be of the same construction and finish as the unit. Face loaded pre and final filters shall have Type 8 frames as manufactured by BLC, FARR or equal. Filter racks over 72" in length shall require an angle center reinforcement support. Side service filter racks shall be fabricated from no less than 16 gauge galvanized steel and include hinged access doors on both sides of the unit or as indicated on unit drawings. Internal blank-offs shall be provided by the air unit manufacturer as required to prevent air bypass around the filters.
1. Filter Gauge: Each Filter bank shall be furnished with Dwyer Series 2000 filter gauge or equal.
  2. Medium Efficiency MERV 8 Pleated filters – Provide (2") filters as specified on filter schedule. The filters shall be as manufactured by AAF, FARR or equal. Filters shall be in compliance with ANSI/UL 900 – Test Performance of Air Filters.
  3. High Efficiency MERV (11 & 14) Rigid filters - Provide (12" deep) filters as specified on the filter schedule. The filters shall be listed as Class II under UL Standard 900. The filters shall be as manufactured by AAF, FARR or equal. Filters shall be in compliance with ANSI/UL 900 – Test Performance of Air Filters..
  4. HEPA Filters - Filters shall meet or exceed 99.97 efficiency on 0.3 micron particles when tested with thermally generated D.O.P. in accordance with the latest industry and military standards. The clean static pressure shall be no greater than 1.0" wg when operated at rated airflow. The media shall be glass paper. Filters shall be factory constructed and assembled of pressed wood frames, corrugated aluminum separators and 100% solid resin sealant. Holding frames shall be made of 304 SS) and upstream accessible and shall be designed for use with HEPA filters.
- E. Dampers – Temtrol TD-6, Ruskin CD-50 or approved equal. Provide Class 1 rated, ultra low leak dampers (less than 3 cfm/sq ft. @ 1" w.g.) as indicated on the unit drawings. Low leakage dampers shall have extruded aluminum airfoil blades. Flat or formed metal blades are not acceptable. The damper blade shall incorporate santoprene rubber edge seals and zinc plated or stainless steel tubular steel shaft for a non-slip operation. Shaft bearings shall be spherical – non corrosive nylon to eliminate friction and any metal to metal contact. Damper jamb seals shall be UV rated, nylon glass reinforced or stainless steel spring arcs designed for a minimum air leakage and smooth operation. Damper linkage shall be concealed within a 16 gauge galvanized steel frame. (Operator furnished and installed by section \_\_\_\_\_).

F. Ebtron Model GTX116 is basis for design. The measurement devices shall consist of one or more sensor probe assemblies a a single remote mounted, microprocessor-based transmitter. Each sensor probe assembly shall contain one or more independently wired sensor housings. The airflow and temperature readings calculated for each sensor housing shall be equally weighted and averaged by the transmitter prior to output. Pitot tubes and vortex shedding devices are not acceptable. Each sensor shall be manufactured of a U.L. listed engineered thermoplastic utilizing two hermetically sealed, bead-in-glass thermistor probes to determine airflow rate and ambient temperature. Chip or diode type thermistors are unacceptable. Sensor housing shall be calibrated at a minimum of 16 airflow rates and have an accuracy of +/-2% traceable to NIST. Temperature range shall be -20F to 160F and the humidity range shall be 0-99%. Temperature sensors shall be calibrated at a minimum of 3 temperatures and have an accuracy of +/-0.15%. Sensors shall have integral U.L. listed, plenum rated cable and terminal plug. All terminal plug interconnecting pins shall be gold plated. Sensor assemblies shall not require matching to the transmitter in the field. Sensor housing shall be mounted in extruded, gold anodized, 6063 aluminum tube probe assembly. Number of sensors shall be in accordance with area. Under 2 sqft-4 sensors, 2 to less than 4 sqft- 6sensors, 4 to less than 8 sqft -8 sensors. 8 to less than 16 sqft- 12 sensors and over 16 sqft- 16 sensors. Prove assembly mounting brackets shall be constructed of 304 SS. Operating airflow range shall be 0-5000 FPM.

G. Humidifier - Steam humidifier shall be a steam separator type providing full separation ahead of a control valve which discharges through an internal drying chamber. Steam humidifier shall be electrically controlled. The humidifier capacity shall meet or exceed the capacity specified in the mechanical schedule. The size and number of distribution manifolds shall be sized so all steam is absorbed by the air before reaching the next component in the air stream. Humidifier shall receive steam at supply pressure and discharge at atmospheric pressure. Humidifier shall be furnished with inlet strainer and float and thermostatic traps or a bucket steam trap. Separating chambers shall be of a volume and design that will disengage and remove water droplets and particle matter when the humidifier is operating. The distribution manifold shall provide uniform distribution over its entire length and be jacketed by steam to assure that vapor discharged is free of water droplets. Humidifier shall be completely factory piped and wired. Traps shall be shipped loose to avoid damage during shipment. All humidifiers shall be mounted above a pitched drain pan constructed from 16 gauge type 304 stainless steel.

## 2.05 ELECTRICAL POWER AND CONTROLS

- A. All electrical and automatic control devices not previously called out or listed below are to be furnished and installed in the field by OTHERS.
- B. All wiring shall be (75°C) Insulated copper wires.

- C. The unit shall feature a mounted permanent nameplate displaying at a minimum the manufacturer, serial number, model number and current and amps voltage. The unit must have an ETL or UL Listing and bear the appropriate mark.
- D. Conduit shall consist of a combination of EMT or flexible metal conduit as required. Liquidtight flexible metal conduit may be used outside the air tunnel for wet locations.
- E. The unit shall feature main non-fused disconnect of the proper amp rating to allow shutoff of all electrical motors and control items.
- F. Unit Convenience Features
  - 1. Each specified section shall be equipped with a vapor- proof 100 watt service light with guard.
  - 2. Lights shall be controlled by one light switch mounted as shown on drawing.
  - 3. Furnish a 120 volt GFI duplex convenience outlet on the exterior of the unit as indicated on the unit drawing.
  - 4. All lights, switches and outlets shall be wired to a fused disconnect for a separate 120 volt external source.
- G. *Optional:* Smoke Detector – A factory mounted and wired reset ionization type smoke detector(s) shall be located in return air stream (and discharge air stream) shall be provided.
- H. *Optional:* Freeze Stat – A manual reset freeze stat shall be located on the downstream side of the cooling coil and shall de-energize the unit and close outdoor air dampers if the set point is reached.

## SECTION 1558X – ISOLATION ROOM EXHAUST FANS

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

Design, performance criteria, controls, and installation requirements for Custom Air Handling Units.

#### 1.02 REFERENCES

- A. AMCA Standard 99: Standards Handbook
- B. AMCA /ANSI Standard 204: Balance Quality and Vibration Levels for Fans
- C. AMCA Standard 210: Laboratory Methods of Testing Fans for Ratings
- D. AMCA Standard 300: Reverberant Room Method for Sound Testing of Fans
- E. AMCA Standard 500: Test Methods for Louvers, Dampers and Shutters
- F. ARI Standard 410: Forced-Circulation Air-Cooling and Air-Heating Coil
- G. ASHRAE Standard 52: Gravimetric and Dust Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter
- H. ASHRAE/ANSI Standard 111: Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems
- I. UL Standard 1995: Heating and Cooling Equipment
- J. ASTM A-525: Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

#### 1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Division 1.
- B. Submittals shall include the following:
  - 1. Dimensioned plan and elevation view drawings, including motor starter and control cabinets, required clearances, and location of all field connections.
  - 2. Summary of all auxiliary utility requirements such as: electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
  - 3. Ladder type schematic drawing of the power and ancillary utility field hookup requirements, indicating all items that are furnished.
  - 4. Manufacturer's performance of each unit. Selection shall indicate, as a minimum, the following:
    - a. Input data used for selection.
    - b. Model number of the unit.
    - c. Net capacity.
    - d. Rated load amp draw.
    - e. Noise levels produced by equipment.
    - f. Fan curves.
    - g. Approximate unit shipping weight.

#### 1.04 OPERATION AND MAINTENANCE DATA

- A. Include data on design, inspection and procedures related to preventative maintenance. Operation and Maintenance manuals shall be submitted at the time of unit shipment.

#### 1.05 QUALIFICATIONS

- A. Manufacturer shall be a company specializing in the design and manufacture of commercial / industrial custom HVAC equipment. Manufacturer shall have been in production of custom HVAC equipment for a minimum of 5 years.
- B. Each unit shall bear an ETL or UL label under UL Standard 1995 indicating the complete unit is listed as an assembly. ETL or UL listing of individual components, or control panels only, is not acceptable.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under the supervision of the owner.

#### 1.07 SEQUENCING AND SCHEDULING

- A. Coordinate work performed under this section with work performed under the separate installation contract.

#### 1.08 WARRANTY

- A. The complete unit shall be covered by a parts warranty issued by the manufacturer covering the first year of operation. This warranty period shall start upon receipt of start-up forms for the unit or eighteen months after the date of shipment, whichever occurs first.
- B. The installing contractor shall provide labor warranty during the unit's first year of operation.

### PART TWO: PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS

- A. Provide custom outdoor air handling units as manufactured by Temtrol as the basis-of-design. Equipment manufactured by Huntair or TMI shall be considered provided the construction specifications capacities and performance criteria are met.

#### 2.02 GENERAL

- A. Furnish and install where shown on the plans, mechanical frame style (ITF) air handling units with construction features as specified below. The units shall be provided and installed in strict accordance with the specifications. All units shall be complete with all components and accessories as specified. Any exceptions must be clearly defined. The contractor shall be responsible for any additional expenses that may occur due to any exception made.
- B. If unit manufacturer cannot provide "sole source" for major components: (fans& dampers) they must list supplier and quote lead time for replacement parts on bid. If units are built outside the USA list country of origin on bid.



- C. Air handling units shall meet the seismic design requirements set forth in the International Building Code (IBC 2009). Equipment manufacturer shall provide certificate of compliance stating units have been certified for the seismic requirements indicated on the structural drawings and in accordance with ASCE 7-05 / ICC-ES AC-156. Unit certification shall be based on a maximum Sds value of 1.93g. Certification of the Air Handling Equipment shall be through engineering analysis performed by an independent registered professional consulting engineer specializing in seismic analysis. The analysis performed shall include structural calculations, static and dynamic finite element analysis and shake table testing in accordance with ASCE-7-05 / ICC-ES-AC-156. A Copy of the Seismic Certification shall also be submitted to the engineer with the submittals for review and approval. Certificate of Compliance shall also be submitted to the code enforcement official for review and acceptance. The air handler shall be provided with IBC Compliant Labeling.

## 2.03 Factory Testing and Quality Control

- A. Standard Factory Tests: The fans shall be factory run tested to ensure structural integrity and proper RPM. All electrical circuits shall be tested to ensure correct operation before shipment of unit. Units shall pass quality control and be thoroughly cleaned prior to shipment.

## 2.04 UNIT CONSTRUCTION DESCRIPTION

- A. General: Provide factory-fabricated air handling units with capacity as indicated on the schedule. Units shall have overall dimensions as indicated and fit into the space available with adequate clearance for service as determined by the Engineer. Units shall be completely assembled. Multiple sectioned units shall be shipped as a single factory assembled piece (except where shipping limitations prevent) de-mounted into modular sections in the field by the contractor. Units shall be furnished with sufficient gasket and bolts for reassembly in the field by the contractor. Unit manufacturer shall provide certified ratings conforming to the latest edition of AMCA 210, 310, 500 and ARI 410. All electrical components and assemblies shall comply with NEMA standards. Unit internal insulation must have a flame spread rating not over 25 and smoke developed rating no higher than 50 complying with NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems." Units shall comply with NFPA 70, "National Electrical Code," as applicable for installation and electrical connections of ancillary electrical components of air handling units. Tags and decals to aid in service or indicate caution areas shall be provided. Electrical wiring diagrams shall be attached to the control panel access doors. Operation and maintenance manuals shall be furnished with each unit. Units shall be UL or ETL listed.
- B. Rigging Provision – Multiple Piece Units: Units shipped in multiple sections shall be engineered for field assembly. The base frame shall have integral lifting lugs. The lifting lugs shall be fabricated from structural steel with an appropriate rigging hole. Lifting lugs shall be located at the corner of each section (and along the sides if required) and sized to allow rigging and handling of the unit. All gasket and necessary assembly hardware shall ship loose with unit. Junction boxes with a factory supplied numbered terminal strip shall be supplied at each shipping split for reconnection of control wiring.

Unit Base - Floor: Unit perimeter base shall be completely welded and fabricated using heavy gauge structural steel tubing. (Note: bolted bases are not acceptable) C-Channel

cross supports shall be welded to perimeter base steel tubing and located on maximum 24" centers to provide support for internal components. Base rails shall include lifting lugs welded to perimeter base at the corner of the unit or each section if de-mounted. Entire base frame is to be painted with a phenolic coating for long term corrosion resistance.

The outer sub-floor of the unit shall be made from 20 gauge galvanized steel. The floor cavity shall be spray foam insulated with floor seams gasketed for thermal break and sealed for airtight / watertight construction. Where access is provided to the unit interior, floor openings shall be covered with walk on phenolic coated steel safety grating. Single wall floors with glued and pinned insulation and no sub floor are not acceptable. Base frame shall be attached to the unit at the factory.

Provide a 12" High roof curb coordinated with the conditions of the jobsite.

- C. Unit Casing – The construction of the air handling unit shall consist of a steel frame with formed 16 gauge galvanized steel exterior casing panels. The exterior casing panels shall be attached to the gasketed (1 x 2) steel frame with corrosion resistant fasteners. All casing panels shall be completely removable from the unit exterior without affecting the unit's structural integrity. (Units without framed type of construction shall be considered, provided the exterior casing panels are made from 14 gauge galvanized steel, maximum panel center lines are less than 20 inches and deflection is less than  $L/200 @ 9"$  positive pressure). The air handling unit casing shall be of the "no-through-metal" design. The casing shall incorporate insulating thermal breaks as required so that, when fully assembled, there's no path of continuous unbroken metal to metal conduction from inner to outer surfaces. Provide necessary support to limit casing deflection to  $L/200$  of the narrowest panel dimension. If panels cannot meet this deflection, additional internal reinforcing is required. All panel seams shall be caulked and sealed for an airtight unit. Leakage rates shall be less than 1% at design static pressure or 9" W.C. whichever is greater.

The exterior panel finish shall be painted with a polyester resin coating designed for long term corrosion resistance meeting or exceeding (ASTM B-117) Salt Spray Resistance at 95 degrees F. 1,000 hrs. and (ASTM D-2247) Humidity Resistance at 95 degrees F. 1000 hrs. The color shall be sandstone.

- D. Double Wall Liner - Each unit shall have double wall construction with 20 gauge solid galvanized liner in the entire unit. The double wall interior panel shall be removable from the outside if the unit without affecting the structural integrity of the unit.
- E. Insulation - Entire unit to be insulated with a full 3" (R12.5) thick non-compressed fiberglass insulation. The insulation shall have an effective thermal conductivity (C) of .24 (BTU in./sq.ft. F°) and a noise reduction coefficient (NRC) of 0.70 / per inch thick (based on a type "A" mounting). The coefficients shall meet or exceed a 3.0 P.C.F. density material rating. Insulation shall meet the erosion requirements of UL 181 facing the air stream and fire hazard classification of 25/50 (per ASTM-84 and UL 723 and CAN/ULC S102-M88) and meet NFPA 90A and 90B. All insulation edges shall be encapsulated within the panel. All perforated sections shall have Micromat® or equal insulation with non-woven mat facing, 5000 fpm rating and non-hygroscopic fibers as manufactured by Johns Manville or approved equal.

- F. Access Doors - The unit shall be equipped with a solid double wall insulated (same as the unit casing), hinged access doors as shown on the plans. The doorframe shall be extruded aluminum, foam filled with a built in thermal break barrier and full perimeter gasket. The door hinge assembly shall be completely adjustable die cast stainless steel. There shall be a minimum of two heavy duty handles per door. Provide ETL, UL 1995, and CAL-OSHA approved tool operated safety latch on all fan section access doors.

Note: If manufacturer cannot provide thermal break door design it must be noted as an exception on the bid.

- a. Access doors designated sections shall be provided with a 10 x 10 dual thermal pane safety glass window.

## 2.05 UNIT COMPONENT DESCRIPTION

### A. FAN

1. The fan array systems shall include, a direct driven, arrangement 4 plenum fan constructed per AMCA requirements for the duty specified class III as required. Class I fans are not acceptable. Fan shall be rated in accordance with and certified by AMCA for performance. Fan shall be selected to deliver the specified airflow quantity at the specified operating Total Static Pressure and specified fan/motor speed. The fan shall be selected to operate at a system Total Static Pressure that does not exceed 90% of the specified fan's peak static pressure producing capability at the specified fan/motor speed. Fan/motor cube or cell shall include a minimum 10 gauge, G 90 Galvanized steel intake wall, .100 aluminum spun fan inlet funnel, and a 10 gauge G90 Galvanized steel motor support plate rail and structure. Motor shall be standard foot mounted type TEAO selected at the specified operating voltage, RPM, and efficiency as specified or as scheduled elsewhere. Motors shall meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2. Motors shall be as manufactured by Baldor, Siemens, or Toshiba for use in multiple fan arrays that operate at varying synchronous speeds as driven by an approved VFD. Motor HP shall not exceed the scheduled HP as indicated in the AHU equipment schedule(s). Steel cased motors and/or ODP motors are not acceptable. Motor shall include permanently sealed (L10-400,000 hr) bearings and AEGIS™ shaft grounding to protect the motor bearings from electrical discharge machining due to stray shaft currents. Fan/motor assembly shall be dynamically balanced to meet AMCA standard 204-96, exceeding category BV-5, to meet or exceed an equivalent Grade G.55, producing a maximum rotational imbalance of .03" per second peak, filter in ( .55mm per second peak, filter in). Fan and motor assemblies submitted for approval incorporating larger than 22" wheel size and 215 T frames size motors shall be balanced in three orthogonal planes to demonstrate compliance with the G.55 requirement with a maximum rotational imbalance of .03" per second peak filter in ( .55 mm per second peak, filter in). Copies of the certified balancing reports shall be provided with the unit O&M manuals at the time of shipment. Submittals that do not include a statement of compliance with this requirement will be returned to the contractor without review.
2. Fans shall be provided with an integral back flow prevention device that prohibits recirculation of air. The system effects for the back flow prevention device(s) shall be

included in the criteria for TSP determination for fan selection purposes, and shall be indicated as a separate line item SP loss in the submittals. Submitted AHU performance that does not indicate allowance for system effects for the back flow prevention device(s) and the system effect for the fan and motor enclosure in which each fan is mounted, will be returned to the contractor disapproved and will need to be resubmitted with all of the requested information included for approval. Back Draft Damper performance data that is per AMCA ducted inlet and discharge arrangements will not be accepted. Damper data must be for the specific purpose of preventing back flow in any disabled fan cube and that is mounted directly at the inlet of each fan. Motorized dampers for this purpose are not acceptable. Submitted fan performance data which only reflect published performance for individual fans in AMCA arrangement "A" free inlet and discharge will not be accepted. AHU Manufacturers that do not manufacture the fans being submitted on must provide certified performance data for fans as installed in the AHU unit with Back Draft damper effects included. At the sole discretion of the engineer, such performance testing may be witnessed by the engineer and/or the owner's representative.

Fan motor shall be wired to a control panel containing a single VFD as the primary VFD and a backup VFD wired in bypass, as specified elsewhere. VFD shall be sized for the total connected HP for all fan motors contained in the fan array. Wire sizing shall be determined, and installed, in accordance with applicable NEC standards and local code requirements.

3. At the sole discretion of the engineer, AHU manufacturers that are approved for bidding purposes only, other than the basis of design manufacturer, and that are submitting multiple fan arrays, shall test one or more of the submitted AHU's for flow, pressure, leakage, BHP and acoustics as submitted and approved, prior to shipment. The testing shall be witnessed by an owner's representative and approved by the engineer prior to shipment of any of the submitted AHU equipment. A test report shall be provided for each tested AHU unit and the report shall be included in the O&M manuals for the units.
4. Each fan & motor assembly shall be removable through an access door located on the side of the fan wall array without removing the fan wheel from the motor.

Motor shall be provided with individual Motor Protection for thermal overload protection. All motor circuit protectors can be located in starting device enclosure or, if required by design, in a separate enclosure. Motor circuit protector enclosure must be located and mounted at a minimal distance from motors. Provide remote indication by means of aux contacts wired in series.

Remote indication:

Current Sensors wired in parallel to the pilot lights.

Pilot Lights:

Cover mounted pilot lights for local monitoring of each fan with single alarm signal to BAS to indicate one of the fans has failed.

## FANWALL TECHNOLOGY WITH REDUNDANT VARIABLE FREQUENCY DRIVE CONTROL:

As required by system design, provide one Yaskawa E7 Variable Frequency Drive for normal operation and a second Yaskawa E7 Variable Frequency Drive for Redundant Backup operation. Provide control wiring and control circuitry to transfer from main VFD to Redundant VFD when main drive has faulted. The Variable Frequency Drives shall be sized accordingly to start and hold all motors in the FANWALL Array. Provide service disconnect with fuses or circuit breaker.

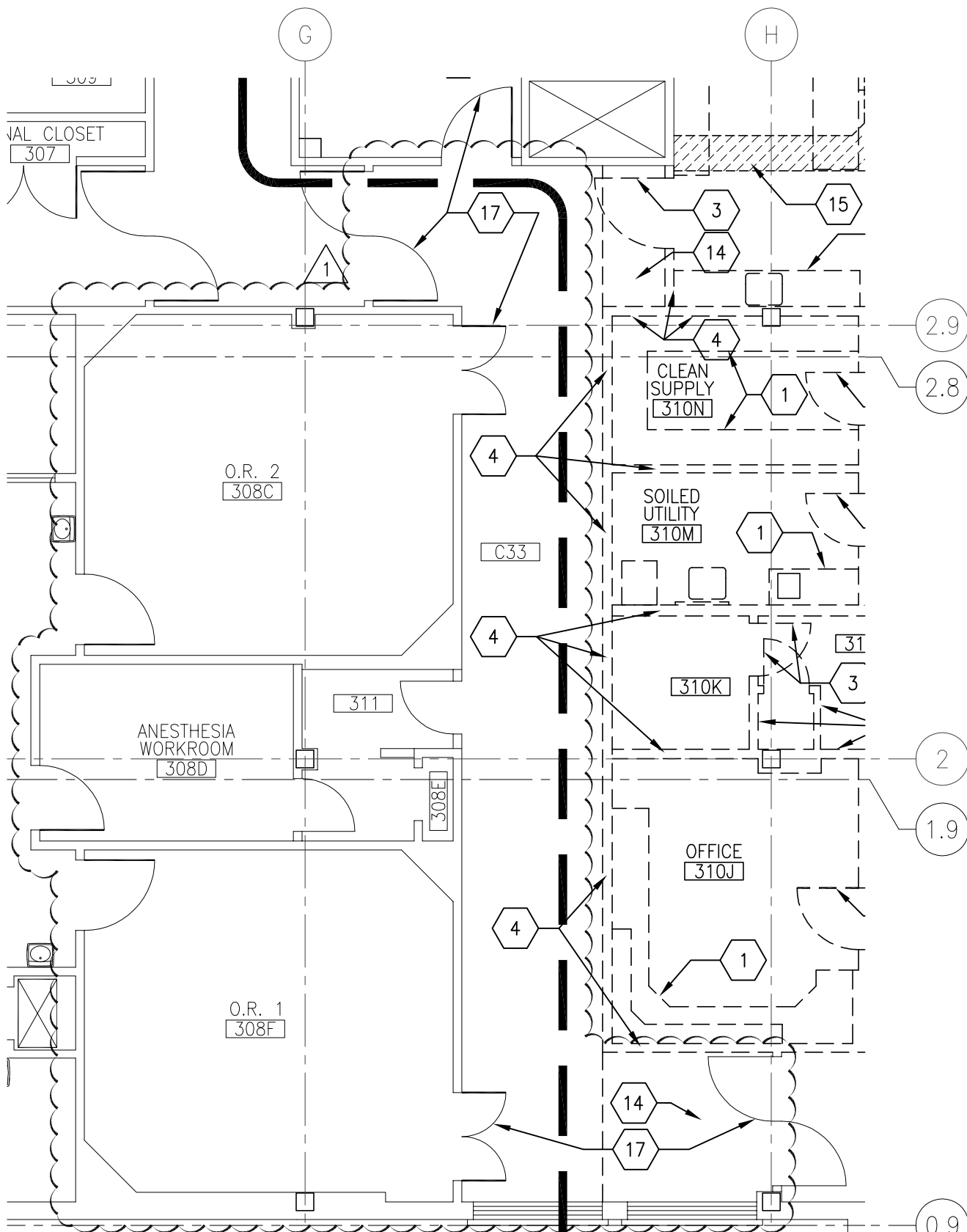
- B. Filters - Provide filters of the type indicated on the schedule. Factory fabricated filter sections shall be of the same construction and finish as the unit. Face loaded pre and final filters shall have Type 8 frames as manufactured by BLC, FARR or equal. Filter racks over 72" in length shall require an angle center reinforcement support. Side service filter racks shall be fabricated from no less than 16 gauge galvanized steel and include hinged access doors on both sides of the unit or as indicated on unit drawings. Internal blank-offs shall be provided by the air unit manufacturer as required to prevent air bypass around the filters.
1. Filter Gauge: Each Filter bank shall be furnished with Dwyer Series 2000 filter gauge or equal.
  2. Medium Efficiency MERV 8 Pleated filters – Provide (2") filters as specified on filter schedule. The filters shall be as manufactured by AAF, FARR or equal. Filters shall be in compliance with ANSI/UL 900 – Test Performance of Air Filters.
  3. HEPA Filters - Filters shall meet or exceed 99.97 efficiency on 0.3 micron particles when tested with thermally generated D.O.P. in accordance with the latest industry and military standards. The clean static pressure shall be no greater than 1.0" wg when operated at rated airflow. The media shall be glass paper. Filters shall be factory constructed and assembled of pressed wood frames, corrugated aluminum separators and 100% solid resin sealant. Holding frames shall be made of 304 SS) and upstream accessible and shall be designed for use with HEPA filters.
- C. Ebtron Model GTX116 is basis for design. The measurement devices shall consist of one or more sensor probe assemblies a a single remote mounted, microprocessor-based transmitter. Each sensor probe assembly shall contain one or more independently wired sensor housings. The airflow and temperature readings calculated for each sensor housing shall be equally weighted and averaged by the transmitter prior to output. Pitot tubes and vortex shedding devices are not acceptable. Each sensor shall be manufactured of a U.L. listed engineered thermoplastic utilizing two hermetically sealed, bead-in-glass thermistor probes to determine airflow rate and ambient temperature. Chip or diode type thermistors are unacceptable. Sensor housing shall be calibrated at a minimum of 16 airflow rates and have an accuracy of +/-2% traceable to NIST. Temperature range shall be -20F to 160F and the humidity range shall be 0-99%. Temperature sensors shall be calibrated at a minimum of 3 temperatures and have an accuracy of +/-0.15%. Sensors shall have integral U.L. listed, plenum rated cable and terminal plug. All terminal plug interconnecting pins shall be gold plated. Sensor assemblies shall not require matching to the transmitter in the field. Sensor housing shall be mounted in extruded, gold anodized, 6063 aluminum tube probe assembly.



Number of sensors shall be in accordance with area. Under 2 sqft-4 sensors, 2 to less than 4 sqft- 6sensors, 4 to less than 8 sqft -8 sensors. 8 to less than 16 sqft- 12 sensors and over 16 sqft- 16 sensors. Prove assembly mounting brackets shall be constructed of 304 SS. Operating airflow range shall be 0-5000 FPM.

## 2.05 ELECTRICAL POWER AND CONTROLS

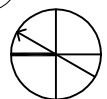
- A. All electrical and automatic control devices not previously called out or listed below are to be furnished and installed in the field by OTHERS.
- B. All wiring shall be (75°C) Insulated copper wires.
- C. The unit shall feature a mounted permanent nameplate displaying at a minimum the manufacturer, serial number, model number and current and amps voltage. The unit must have an ETL or UL Listing and bear the appropriate mark.
- D. Conduit shall consist of a combination of EMT or flexible metal conduit as required. Liquidtite flexible metal conduit may be used outside the air tunnel for wet locations.
- E. The unit shall feature main non-fused disconnect of the proper amp rating to allow shutoff of all electrical motors and control items.
- F. Unit Convenience Features
  - 1. Furnish a 120 volt GFI duplex convenience outlet on the exterior of the unit as indicated on the unit drawing.
  - 2. All lights, switches and outlets shall be wired to a fused disconnect for a separate 120 volt external source.



# BUILDING 85 – THIRD FLOOR DEMOLITION PLAN

SCALE: 1/8" = 1'-0"

PLAN  
NORTH



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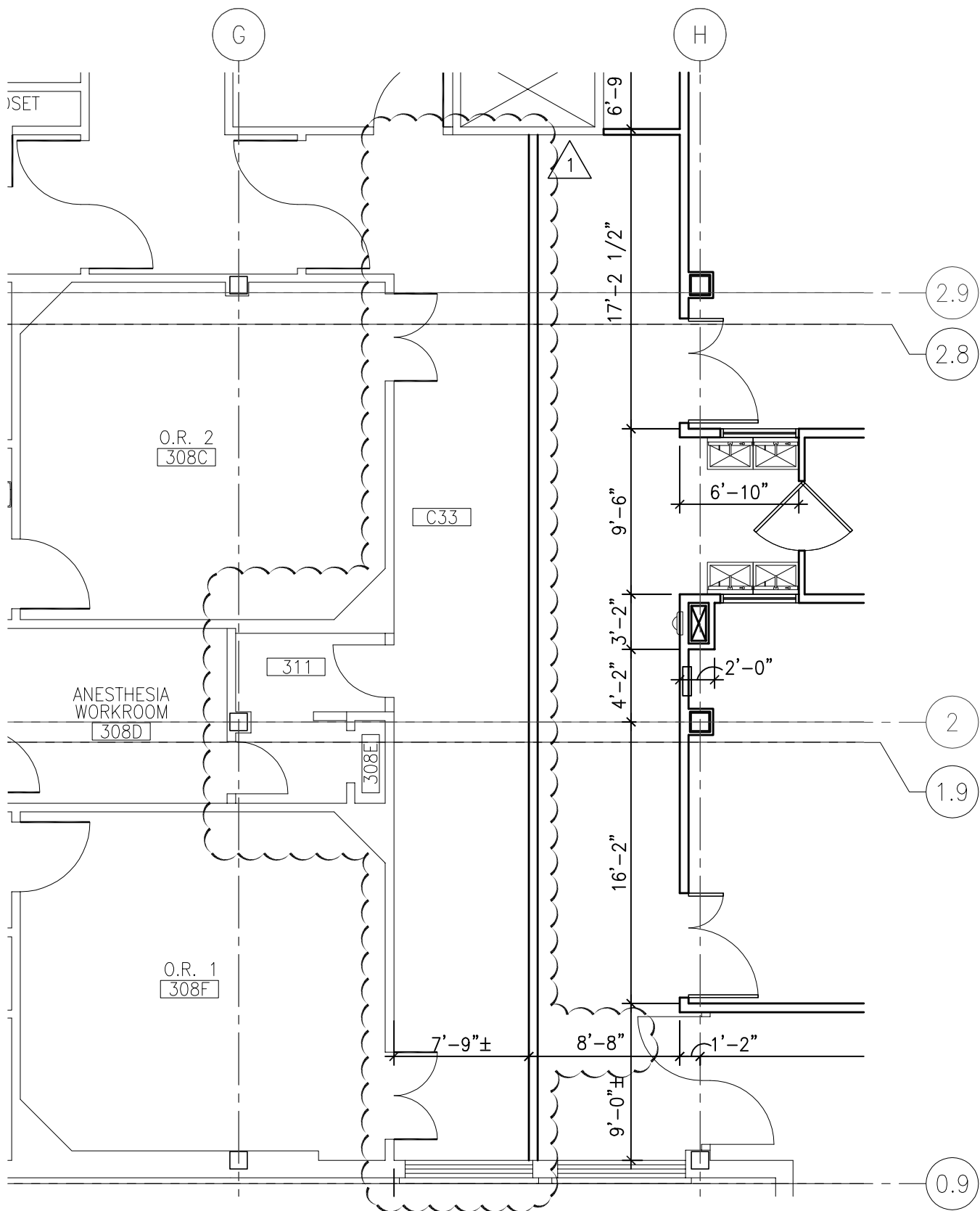
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REF. SHEET: A1.3 ISSUED WITH: AD-01

VA PROJECT  
NUMBER : 531-317

DATE: 03/21/12

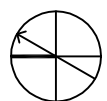
SKETCH  
NUMBER : AA-01



# BUILDING 85 – THIRD FLOOR DIMENSION PLAN

SCALE: 1/8" = 1'-0"

PLAN  
NORTH



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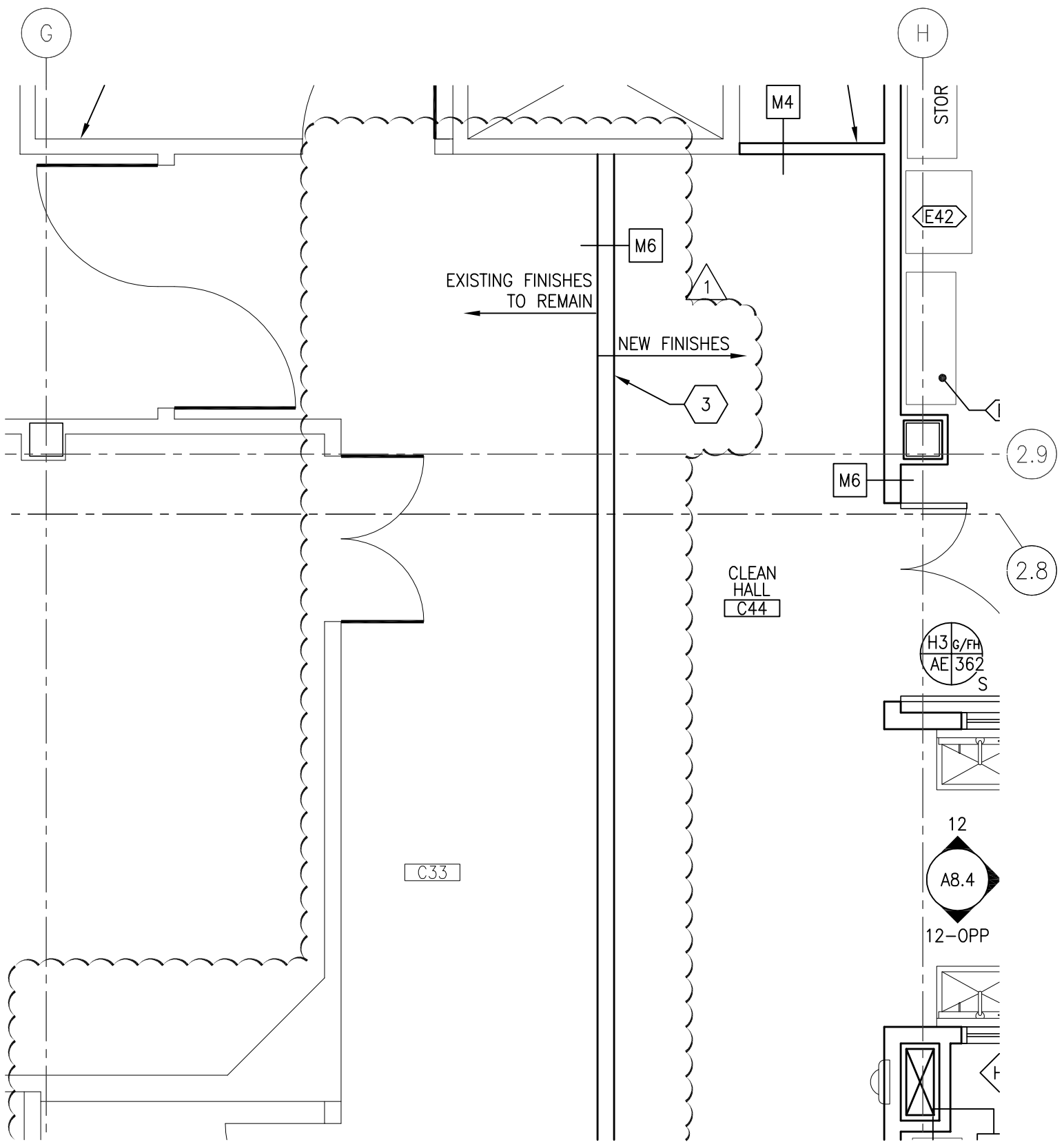
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VA PROJECT  
NUMBER : 531-317

DATE: 03/21/12

SKETCH  
NUMBER : AA-02



# BUILDING 85 – THIRD FLOOR NOTATED PLAN

SCALE: 1/4" = 1'-0"



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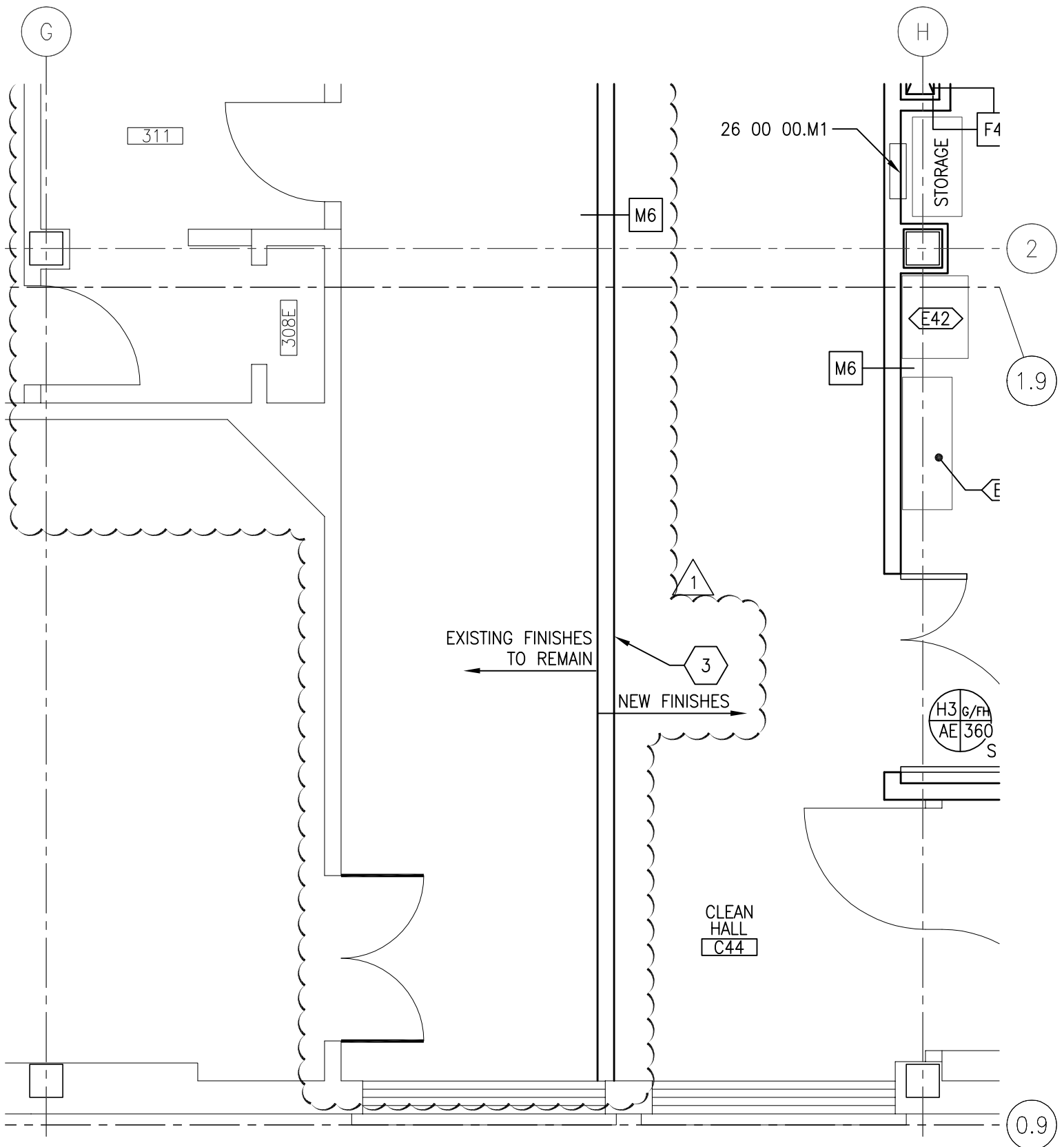
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VA PROJECT  
NUMBER : 531-317

DATE: 03/21/12

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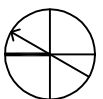




# BUILDING 85 – THIRD FLOOR NOTATED PLAN

SCALE: 1/4" = 1'-0"

PLAN  
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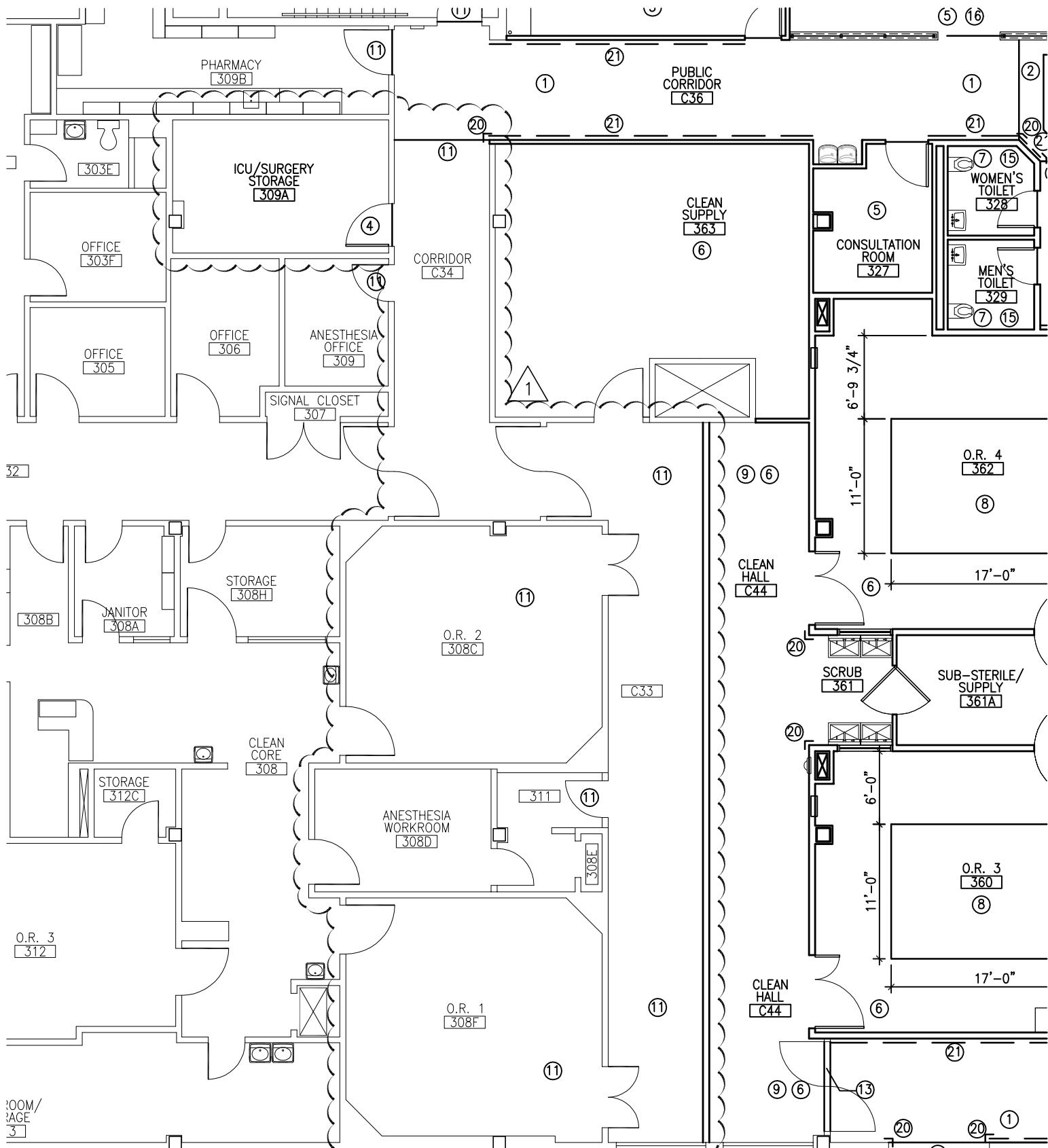
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VA PROJECT  
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DATE: 03/21/12

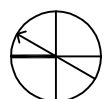
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NUMBER : AA-04



# **BUILDING 85 – THIRD FLOOR FINISH PLAN**

SCALE: 3/32" = 1'-0"

PLAN  
NORTH



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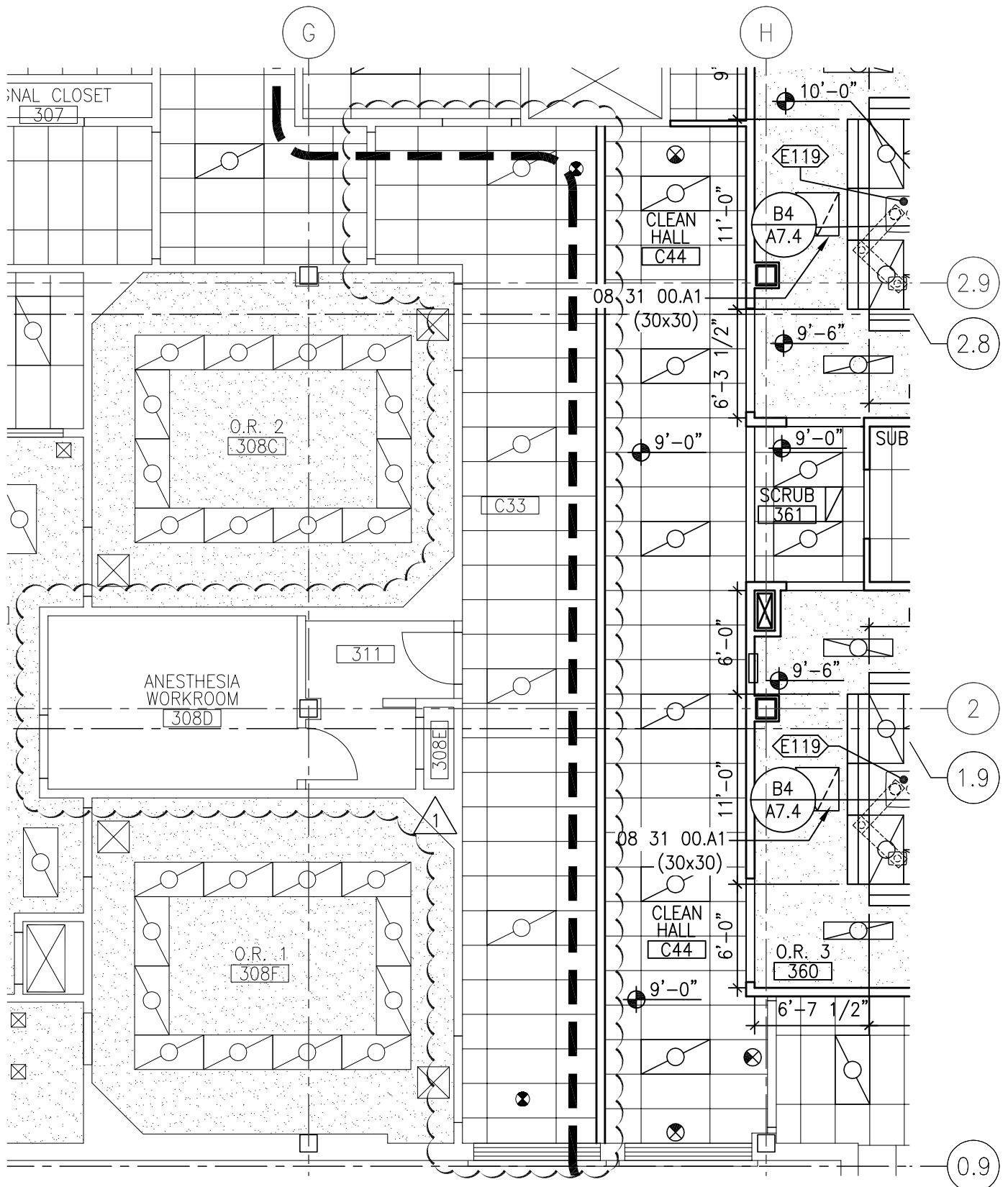
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REF. SHEET: A2.9 ISSUED WITH: AD-01

VA PROJECT  
NUMBER : 531-317

DATE: 03/21/12

SKETCH  
NUMBER : AA-05



# BUILDING 85 – THIRD FLOOR REFLECTED CEILING

SCALE: 1/8" = 1'-0"



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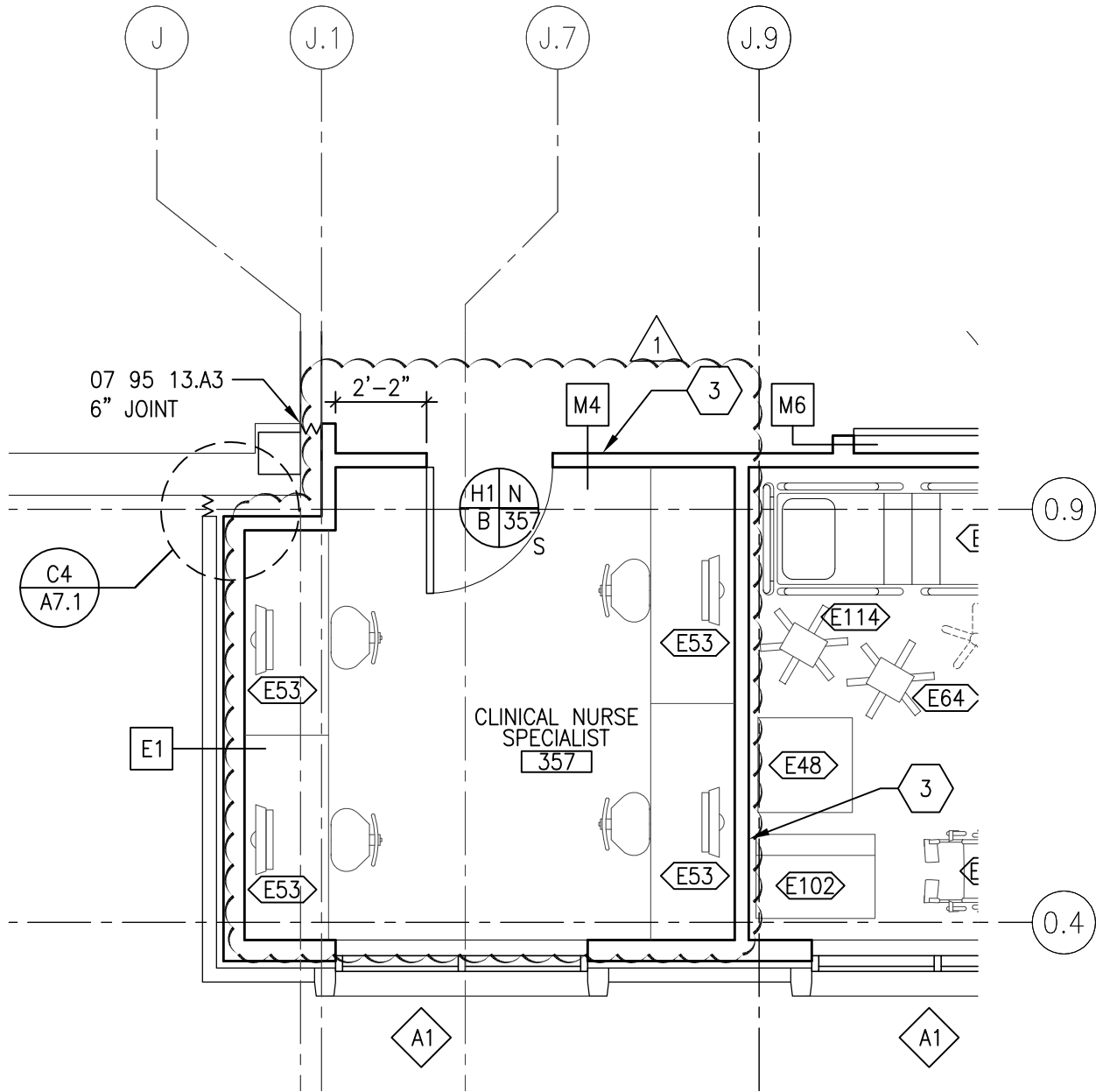
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DATE: 03/21/12

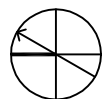
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NUMBER : AA-06



# BUILDING 85 – THIRD FLOOR NOTATED PLAN

SCALE: 1/4" = 1'-0"

PLAN  
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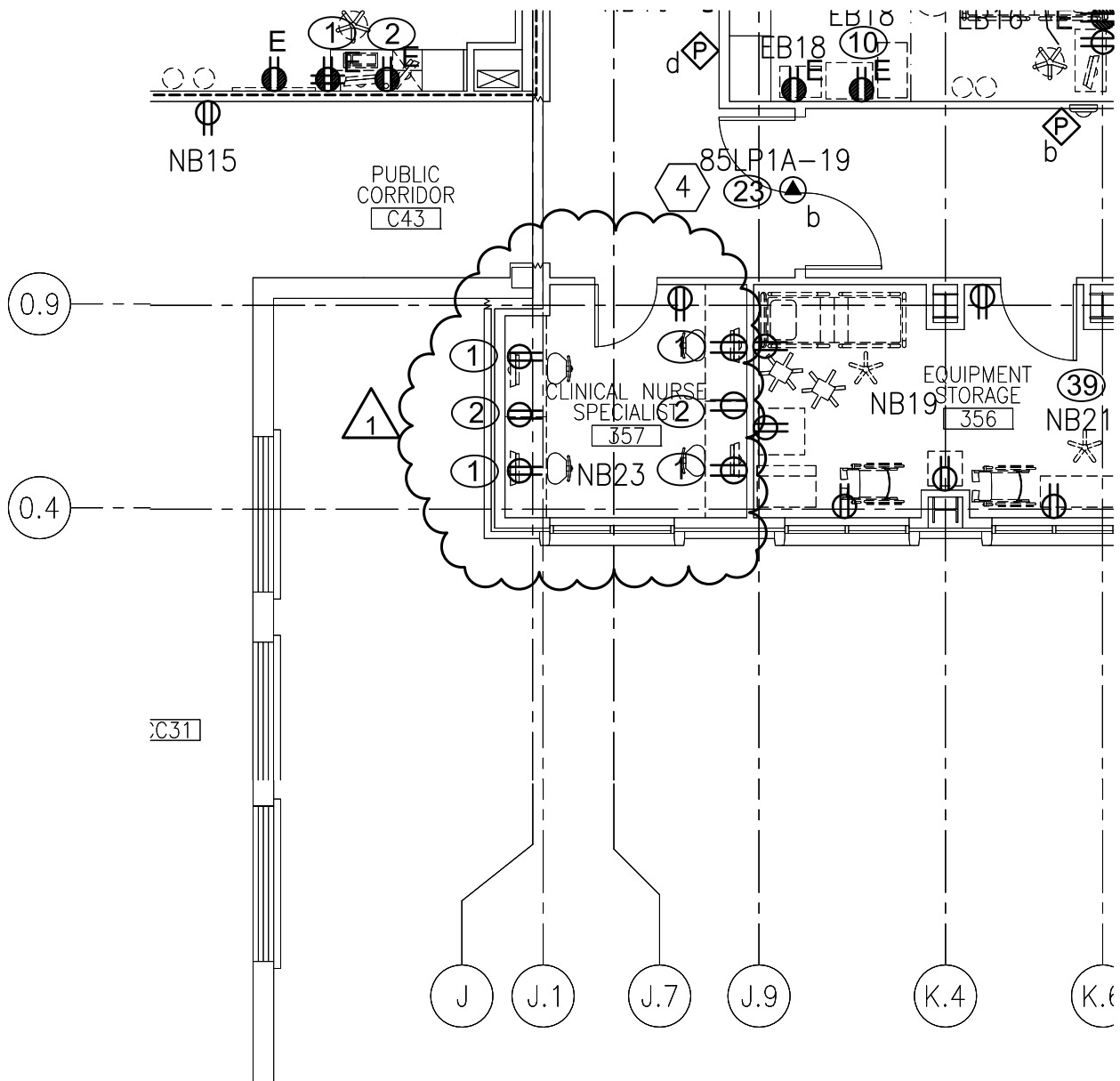
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DATE: 03/21/12

SKETCH  
NUMBER : AA-07





# THIRD FLOOR POWER PLAN 1/8"=1'-0"



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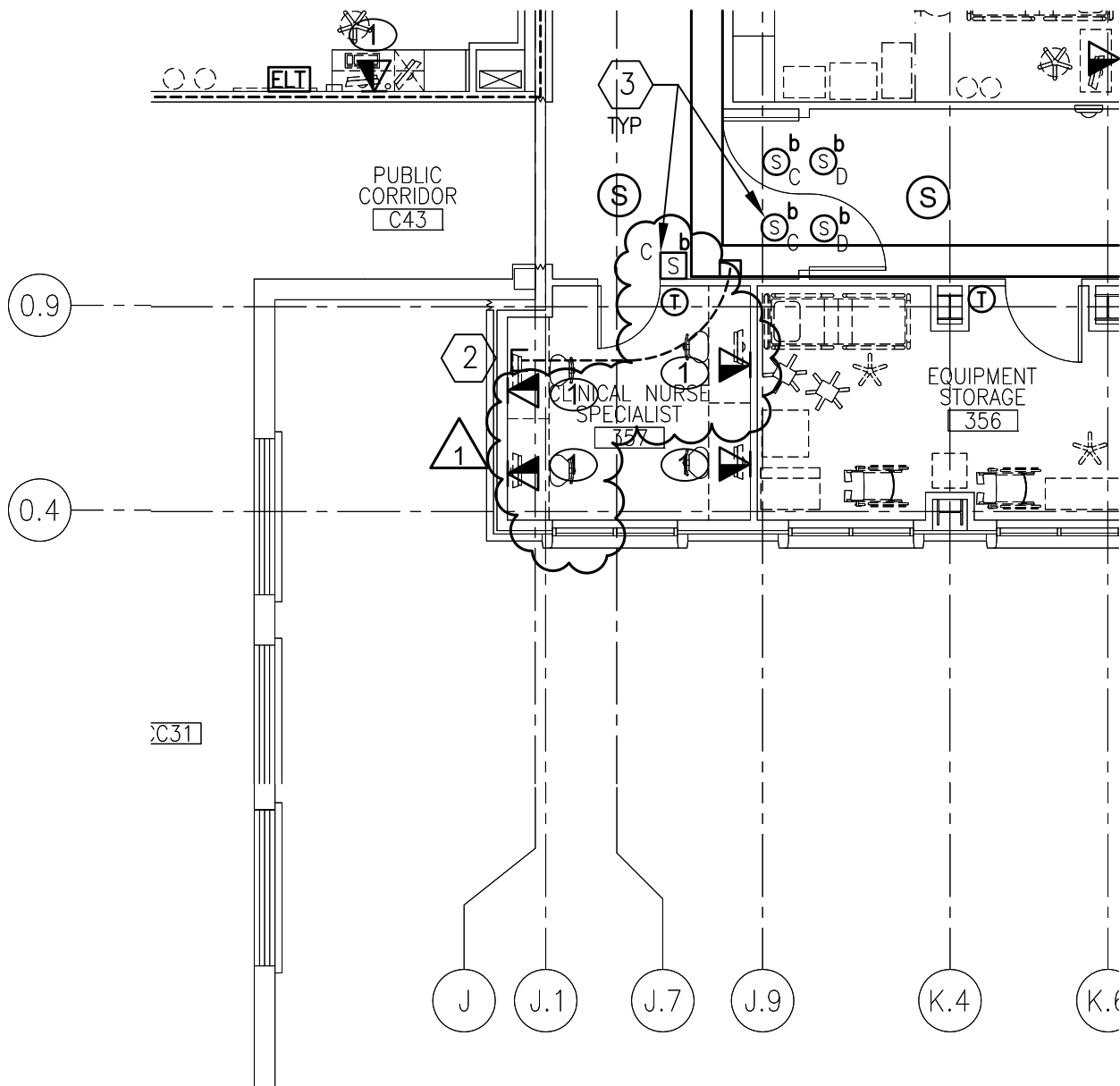
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REF. SHEET: EP2.3 ISSUED WITH: AD-01

VA PROJECT  
 NUMBER : 531-317

DATE: 03/21/12

SKETCH  
 NUMBER : EA-01



# THIRD FLOOR COMMUNICATIONS PLAN 1/8"=1'-0"



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DATE: 03/21/12

SKETCH  
 NUMBER : EA-02

SKETCH  
NUMBER : EA-03