# MEMO

To: All Contractors
From: Michelle Adams
Date: June 25, 2013
RE: PSC Women's Restroom Renovation
Project Number-BC00426705-B- Mechanical
Total Number of pages: 6

This memo and the attached documents represent Addendum 1 for the project named above. Included in this Addendum are the pre- bid sign in sheet and revised drawings. As stated at the Pre-bid Conference all questions must be submitted by 12:00pm EST on June 27, 2013. The final Addendum will be posted on Friday, June 28th. All Addenda should be acknowledged on the SE-331.

Thank you.

# University of South Carolina Pre Bid Sign In Sheet

**Columbia, South Carolina**

Project Name & Number: PSC Women's Restoom Renovation-Mechanical -BC00426705
Pre Bid Date & Time: 6/24/2013 @ 10:00 am

| Name | Company | Address | Phone # | Email |
|---|---|---|---|---|
| Ed Gibbs | Bear Mechanical | 3044 N Main St Columbia SC 29201 | 803-252-9226 | egibbs@bearmechanical.com |
| Haiyan Lin | Carolina Supply Services | P.O. Box 1011 Columbia 29202 | 803-404-7163 | haiyanlin55@gmail.com |
| Juaquana Brookins | USC - Facilities | 743 Greene St Columbia, SC | 803.777.3596 | jbrookne@fmc.sc.edu |
| Hatice Hikmet | USC. Facilities | 743 Greene St. Columbia SC | 803.777.9994 | hikmeth@mailbox.sc.edu |
| Morris Nussbaum | USC Facilities | 743 Greene St Columbia, SC 29208 | 803-777-1140 | morrisn@mailbox.sc.edu |
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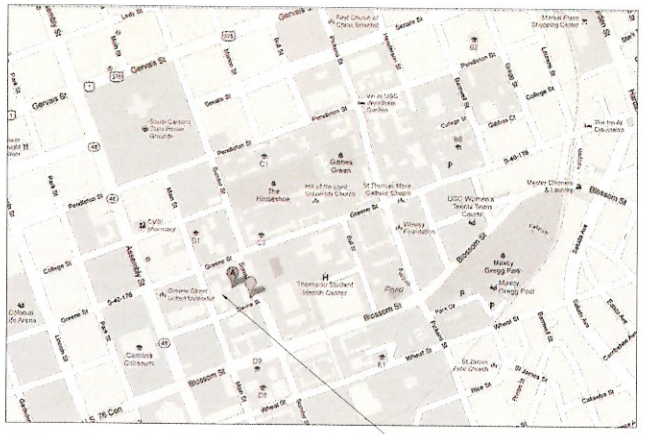
*Please make sure you list your company name as registered with LLR.
* By signing and providing your email address, you are authorizing the University of South Carolina to send you information electronically.

University of South Carolina

# Jones Building Women's Restroom Renovation
## CP003366440 Columbia, SC




LOCATION MAP

NO SCALE

### ARCHITECT

**Compass 5 Partners, LLC**

1329 State Street
Cayce, South Carolina
29033

803-765-0836 p
compass5partners.com

| SHEET No. | DESCRIPTION |
|---|---|
| G000 | COVER SHEET & INDEX |
| G001 | CODE SHEET, GENERAL NOTES, AND LEGEND |
| G100 | OVERALL LIFE SAFETY PLANS |
| AD100 | DEMOLITION PLAN |
| A100 | RENOVATION PLAN |
| A101 | REFLECTED CEILING PLAN |
| A102 | FINISH PLAN AND FINISH SCHEDULE |
| A200 | INTERIOR ELEVATIONS & MOUNTING HEIGHTS |
| A500 | DETAILS AND CASEWORK SECTIONS |
| | |

### MECHANICAL & PLUMBING

**GMK Associates, Inc.**

1201 Main Street, Suite 2100
Columbia, South Carolina
29201

803-256-0000 office
803-256-9610 fax

| SHEET No. | DESCRIPTION |
|---|---|
| M100 | HVAC SCHEDULES AND DETAILS |
| M101 | HVAC PLANS |
| M102 | HVAC SPECIFICATIONS |
| P100 | PLUMBING DEMOLITION PLAN, SPECIFICATIONS, SCHEDULES, AND LEGEND |
| P101 | PLUMBING RENOVATION PLANS |
| P102 | PLUMBING SPECIFICATIONS |
| | |
| | |

### ELECTRICAL

**GMK Associates, Inc.**

1201 Main Street, Suite 2100
Columbia, South Carolina
29201

803-256-0000 office
803-256-9610 fax

| SHEET No. | DESCRIPTION |
|---|---|
| E1.1 | ELECTRICAL DETAILS, SPECIFICATIONS, AND DEMOLITION PLAN |
| E2.1 | ELECTRICAL FIRST FLOOR RENOVATION PLAN |
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### FIRE PROTECTION

**Miles Engineering Associates**

200 Oakhurst Road
Blythewood, SC
29016

803-786-2596 office

| SHEET No. | DESCRIPTION |
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Compass 5 Partners, LLC
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803 765 0838 compass5partners.com

STATE OF SOUTH CAROLINA REGISTERED ARCHITECT — COMPASS 5 PARTNERS, LLC Columbia, SC C-100254

STATE OF SOUTH CAROLINA REGISTERED ARCHITECT — 6796

University of South Carolina

Jones PSC Restrooms Renovation
Columbia, SC

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Project Number: 1301.N/A

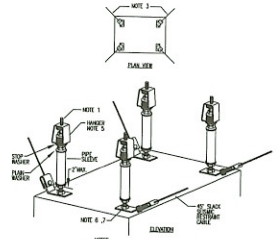
REVISIONS

| FOR CONSTRUCTION | 05/01/2013 |
|---|---|

COVER SHEET AND INDEX

Date: 05-01-13
Drawn: BRB
Checked: MEC

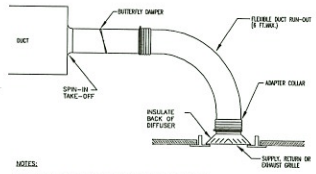
G000




NOTES

1. ATTACH ROD TO STRUCTURE. PROVIDE 1/4" CLEARANCE BETWEEN STRUCTURE AND TOP OF ISOLATOR OR NUT.
2. PROVIDE TWO NUTS WITH 1/8" CLEARANCE BETWEEN BOTTOM OF ISOLATOR AND WASHER.
3. CABLE SHALL BE AT 45 DEGREES FROM PIPE AND CYCLING ALTERNATE DIRECTIONS OVER EVERY OTHER SET OF CABLES.
4. CABLE, ROD, SLEEVE, HANGER AND SPACING SHALL BE CALCULATED BY VIBRATION ISOLATOR VENDOR, BUT IN NO CASE SHALL BE LESS THAN MIN. SIZE SPECIFIED.
5. PROVIDE VIBRATION ISOLATOR WHEN SPECIFIED.
6. PROVIDE TWO NUTS ON INTERIOR OF UNIT.
7. EQUIPMENT MAY BE TRAPEZE MOUNTED. TRAPEZE SHALL BE DESIGNED TO UNIT.

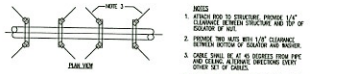
## 1 SUSPENDED EQUIPMENT SEISMIC DETAIL
NTS




NOTES:

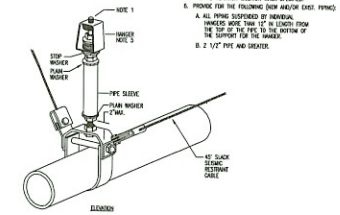
1. PROVIDE MIN OF 3 DUCT DIAMETERS BETWEEN TAPS OR AFTER ELBOWS.

## 2 FLEXIBLE DUCT CONNECTION TO GRILLE
NTS

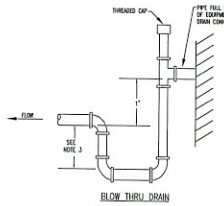



NOTES

1. ATTACH ROD TO STRUCTURE. PROVIDE 1/4" CLEARANCE BETWEEN STRUCTURE AND TOP OF ISOLATOR OR NUT.
2. PROVIDE TWO NUTS WITH 1/8" CLEARANCE BETWEEN BOTTOM OF ISOLATOR AND WASHER.
3. CABLE SHALL BE AT 45 DEGREES FROM PIPE AND CYCLING ALTERNATE DIRECTIONS OVER EVERY OTHER SET OF CABLES.
4. CABLE, ROD, SLEEVE, HANGER AND SPACING SHALL BE CALCULATED BY VIBRATION ISOLATOR VENDOR, BUT IN NO CASE SHALL BE LESS THAN MIN. SIZE SPECIFIED.
5. PROVIDE VIBRATION ISOLATOR WHEN SPECIFIED.
6. PROVIDE FOR THE FOLLOWING (NEW AND/OR EXIST. PIPING):
   A. ALL PIPING SUSPENDED BY INDIVIDUAL HANGERS MORE THAN 12" IN LENGTH FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.
   B. 2 1/2" PIPE AND GREATER.



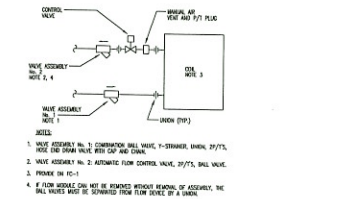

## 3 PIPE SEISMIC DETAIL
NTS




NOTE:

1. LOCATE TRAPS SO AS TO BE ACCESSIBLE FOR CLEANING.
2. TRAP SHALL NOT BLOCK ACCESS TO EQUIPMENT.
3. HEIGHT SHALL BE EQUAL TO 2 TIMES UNIT MAXIMUM POSITIVE STATIC PRESSURE.
4. HEIGHT SHALL BE EQUAL TO UNIT MAXIMUM NEGATIVE STATIC PRESSURE PLUS 1".
5. HEIGHT SHALL BE EQUAL TO UNIT MAXIMUM NEGATIVE STATIC PRESSURE.
6. PIPE TO NEAREST FLOOR DRAIN.

## 4 EQUIPMENT CONDENSATE DRAIN DETAIL
NTS




NOTES:

1. VALVE ASSEMBLY No. 1: COMBINATION BALL VALVE, Y-STRAINER, UNION, 3P/TS, HOSE END DRAIN VALVE WITH CAP AND CHAIN.
2. VALVE ASSEMBLY No. 2: AUTOMATIC FLOW CONTROL VALVE, 3P/TS, BALL VALVE.
3. PROVIDE ON FC-1
4. IF FLOW MODULE CAN NOT BE REMOVED WITHOUT REMOVAL OF ASSEMBLY, THE BALL VALVES MUST BE SEPARATED FROM FLOW DEVICE BY A UNION.

## 5 2-WAY COIL PIPING DETAIL
NTS

### AIR DISTRIBUTION SCHEDULE

| TAG | DESCRIPTION | NECK | MODULE SIZE | MOUNT | CONSTR. | MFGR | MODEL | NOTES |
|---|---|---|---|---|---|---|---|---|
| A | SLOT DIFFUSER | AS SHOWN | --- | SURFACE | ALUMINUM | PRICE | SERIES 300 | 3,5 |
| B | PERFORATED CEILING RETURN/EXHAUST | AS SHOWN | 16x16 | SURFACE | ALUMINUM | PRICE | SERIES APR3OR | 3 |
| | | | | | | | | |

1. FURNISH WITH OPPOSED BLADE DAMPER
2. 4-WAY DEFLECTION UNLESS NOTED OTHERWISE
3. SURFACE PRIMED TO RECEIVE PAINT
4. SEE PLAN FOR DIFFUSER CONFIGURATION
5. 1-2" SLOT

### FAN SCHEDULE

| TAG | TYPE | CAPACITY CFM | E.S.P. (IN. WG.) | MOTOR HP | MOTOR RPM | ELECTRICAL (VOLTS/HZ/PHASE) | EMERGENCY POWER | MANUFACTURER | MODEL NO. | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| EF-1 | INLINE | 400 | 0.5 | 0.167 | 1625 | 115/60/1 | NO | GREENHECK | SQ-90-VG | 1,3,6,9 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

1. MOTORIZED BACKDRAFT DAMPER
2. GRAVITY BACKDRAFT DAMPER
3. DISCONNECT SWITCH
4. SMOKEDETECTOR
5. SEISMIC ROOF CURB
6. VIBRATION ISOLATORS
7. FILTER
8. VARIDRIVE
9. ECM MOTOR WITH VFD

### FAN COIL UNIT SCHEDULE

| TAG | TYPE | CAPACITY CFM | ESP (IN. WG.) | COOLING COIL TYPE | WATER TEMP ENT. | WATER TEMP LVG. | CAPACITY (MBH) TOTAL | CAPACITY (MBH) SENS. | ENTERING DB °F | ENTERING WB °F | GPM | HEATING COIL TYPE | WATER TEMP ENT. | WATER TEMP LVG. | MBH | GPM | MOTOR #1 HP | MOTOR #1 RPM | ELECTRICAL (VOLTS/PHASE) | MANUFACTURER | MODEL | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FC-1 | HORIZONTAL | 420 | 0.44 | WATER | 48 | 60 | 20.0 | 15.0 | 80 | 67 | 2.5 | WATER | 180 | 160 | 31 | 1.1 | 1/15 | 1483 | 120/1 | ENVIRO-TEC | HLP 25 | 1,2,3,4 |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
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1. DISCONNECT SWITCH
2. RETURN PLENUM
3. FILTER
4. SINGLE POINT POWER CONNECTION

### MECHANICAL GENERAL NOTES

1. DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF DOORS, WINDOWS, CEILING DIFFUSERS, ETC.
2. EXTEND ALL DRAIN LINES AS INDICATED. ROUTE TO AVOID INTERFERENCE WITH PASSAGEWAYS. CONDENSATE DRAINS SHALL BE TRAPPED. SLOPE DRAIN LINES 1/8" PER FOOT.
3. ALL PIPING SHALL PITCH DOWN IN DIRECTION OF FLOW OR AS INDICATED ON DRAWINGS: 1" PER 40 FEET WITH MANUAL AIR VENTS AT ALL HIGH POINTS, AND 3/4" DRAIN VALVES AT ALL LOW POINTS.
4. ALL PIPING AND DUCTWORK INSULATION SHALL BE RUN CONTINUOUSLY THROUGH FLOORS, ROOFS AND PARTITIONS EXCEPT WHERE PROHIBITED BY FIRE CODES.
5. LOCATE ALL THERMOSTATS, HUMIDISTATS AND SWITCHES 4'-0" ABOVE FINISH FLOOR; ALIGN WITH LIGHT SWITCHES.
6. ALL PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH THE SPECIFICATIONS AND FURTHER SUPPORTS OR HANGERS SHALL BE ADJACENT TO ELBOWS, TO PREVENT WEIGHT OF PIPING BEING PLACED ON THE EQUIPMENT. SUPPORT DETAILS SHALL BE SUBMITTED TO THE MECHANICAL ENGINEER.
7. ALL PIPING AND DUCTWORK LOCATIONS SHALL BE COORDINATED WITH THE WORK UNDER OTHER DIVISIONS OF THE SPECIFICATIONS TO AVOID INTERFERENCE.
8. CORRECT SETTINGS ON ALL BALANCING FITTINGS SHALL BE PERMANENTLY MARKED.
9. RUNOUTS SHALL PITCH DOWN IN DIRECTION OF FLOW A MINIMUM OF 1" IN 30 FEET.
10. AIR DISTRIBUTION SYSTEMS WITH MORE THAN ONE BRANCH, OR MULTIPLE OUTLETS ON A BRANCH, SHALL HAVE VOLUME DAMPERS TO BALANCE AIR FLOWS. SPIN-IN FITTINGS ARE REQUIRED FOR CONNECTING FLEX DUCT TO BRANCH OR TRUNK DUCTS, WHERE FLEX DUCTS ARE INDICATED. IF FLEX DUCT CANNOT BE CONNECTED WITH A SPIN-IN, A HARD DUCTED TAKEOFF MUST BE PROVIDED.
11. HIGH EFFICIENCY TAKEOFFS SHALL BE USED ON ALL HARD DUCTED SUPPLY BRANCHES.
12. ALL PIPING, DUCTS, VENTS, ETC. EXTENDING THRU EXTERIOR WALLS AND ROOFS SHALL BE FLASHED AND COUNTERFLASHED.
13. PROVIDE ALL TRANSITIONS REQUIRED FOR INSTALLATION OF DUCT, AIR VOLUME CONTROLLERS, FAN COIL UNITS, EXHAUST FANS, SUPPLY FANS, AND ALL OTHER EQUIPMENT AND APPURTENANCES.
14. ALL DUCT IS GALVANIZED SHEET METAL EXCEPT AS NOTED.
15. DUCT SIZES ARE CLEAR INSIDE DIMENSIONS.
16. AIR DISTRIBUTION UNITS SHALL HAVE TRIM REQUIRED FOR FINISHED SERVICE.
17. COORDINATE ORIENTATION OF SUPPLY AND RETURN PIPING BEFORE FABRICATION.
18. PROVIDE DIELECTRIC FITTINGS AT ALL LOCATIONS WHERE DISSIMILAR METALS ARE JOINED IN PIPING AND DUCT SYSTEMS.

### HVAC LEGEND

| SYMBOL | DESCRIPTION | SYMBOL | DESCRIPTION |
|---|---|---|---|
| T | TEMPERATURE SENSOR OR THERMOSTAT | | DUCT TURNING UP |
| | CONNECT TO EXISTING | | SIDEWALL GRILLE , SEE "DIFFUSER & GRILLE SCHEDULE" |
| 18x12 | RECTANGULAR DUCT SIZE, FIRST FIGURE IS SIDE SHOWN | | UNION |
| 18"ø | ROUND DUCT SIZE | | STRAINER |
| R | CHANGE OF ELEVATION, RISER (R), DROP (D) | | STRAINER WITH BLOW OFF |
| | FLEXIBLE CONNECTION | P | PRESSURE INDICATOR |
| | FLEXIBLE DUCT | | BALANCING VALVE |
| HWS | HOT WATER SUPPLY | 1 | KEYNOTE |
| HWR | HOT WATER RETURN | 1 | DEMO KEYNOTE |
| CHWS | CHILLED WATER SUPPLY | 18x12 12x18 | TRANSITION, FLAT ON BOTTOM (FOB) FLAT ON TOP (FOT, IF APPLICABLE) |
| CHWR | CHILLED WATER RETURN | | TURNING VANES |
| | TEE OUTLET UP | SD | DUCT SMOKE DETECTORS |
| | TEE OUTLET DOWN | M | MOTOR OPERATED DAMPER |
| | ELBOW TURNED DOWN | | MANUAL VOLUME DAMPER |
| | ELBOW TURNED UP | QH | MANUAL VOLUME DAMPER WITH CONCEALED REGULATOR |
| | PIPE ANCHORS | FDX | FIRE DAMPER WITH ACCESS DOOR |
| | CEILING SUPPLY DIFFUSER, RETURN GRILLE W/ FLEX DUCT CONN. FOR RETURN OR EXHAUST AIR; SEE "DIFFUSER & GRILLE SCHEDULE" | A 8"ø 100 | A = DIFFUSER TAG 8"ø = NECK SIZE 100 = CFM |
| | CEILING DIFFUSER, GRILLE W/ HARD DUCT CONN. FOR RETURN OR EXHAUST AIR; SEE "DIFFUSER & GRILLE SCHEDULE" | | GATE VALVE |
| | EXISTING DUCT WORK TO REMAIN | | CHECK VALVE |
| | EXISTING DUCT WORK TO BE REMOVED | | END CAP |
| | DUCT TURNING DOWN | | BALL VALVE |


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University of South Carolina

# Jones PSC Restrooms Renovation
Columbia, SC

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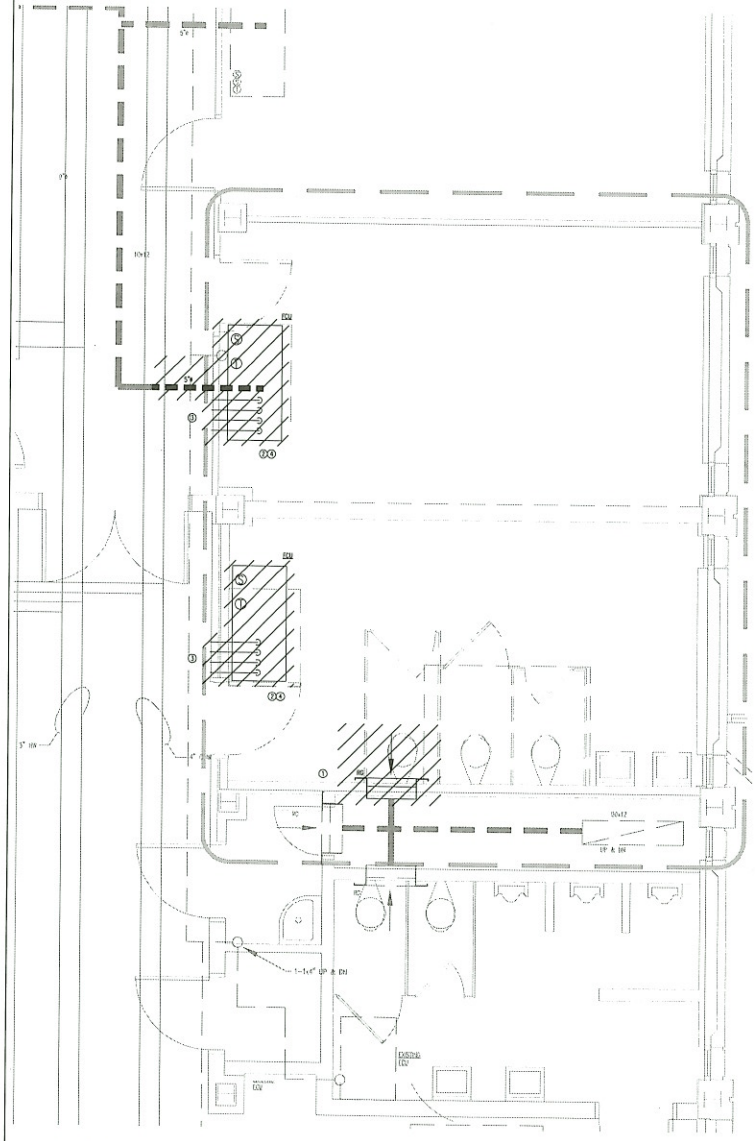
Project Number: 12060.01

REVISIONS
FOR CONSTRUCTION 05/22/2013

HVAC SCHEDULES AND DETAILS

Date: 04/24/2013
Drawn: JJR
Checked: JDR

M100



DEMOLITION NOTES:

1. BLANK OFF EXISTING 12"x10" EXHAUST GRILLE.
2. REFER TO ABATEMENT NOTES FOR PROCEDURE TO CONTAIN EXISTING FAN COIL UNIT. CONTRACTOR SHALL REMOVE EXISTING FAN COIL UNIT ONCE THE UNIT HAS BEEN CONTAINED.
3. REMOVE EXISTING CHILLED WATER, HOT WATER, AND CONDENSATE PIPING BACK TO MAINS AND CAP. REINSULATE EXISTING PIPING AS REQUIRED. COORDINATE SHUTDOWN OF CHILLED WATER WITH FACILITY MAINTENANCE. INSTALL NEW VALVES FOR FUTURE CONNECTION.
4. REMOVE EXISTING VENTILATION DUCT SERVING THE FAN COIL UNITS AND CAP TEMPORARY. REINSULATE DUCT AS REQUIRED.

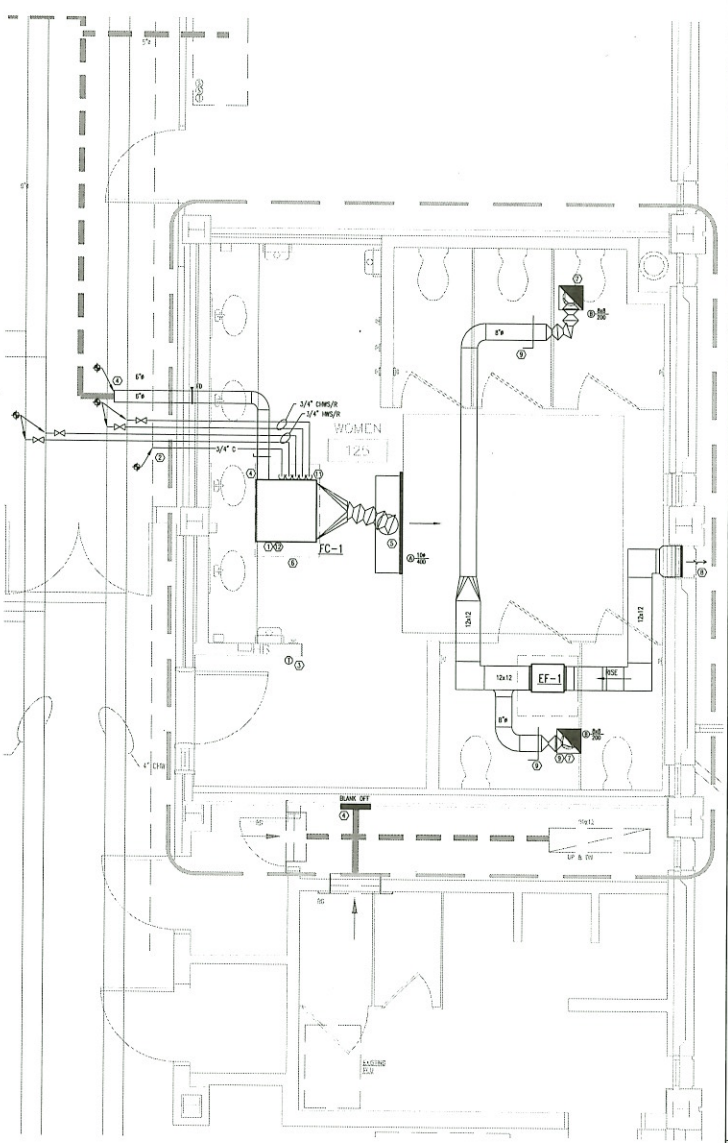
1 FIRST FLOOR DEMOLITION PLAN
1/2" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR HAS THE OPTION TO USE EQUIVALENT ROUND DUCT IN LIEU OF RECTANGULAR AS SPECIFIED.
2. ALL MITERED ELBOWS SHALL HAVE TURNING VANES UNLESS NOTED AS A TRANSFER DUCT.
3. ALL DUCT RUN-OUTS TO DIFFUSERS SHALL BE GRILLE SIZE UNLESS NOTED OTHERWISE.
4. COORDINATE ALL CEILING AIR DISTRIBUTION LOCATIONS WITH GENERAL CONTRACTOR AND ARCHITECTURAL REFLECTED CEILING PLANS AND LIGHTING LAY-OUT.

MECHANICAL KEYNOTES:

1. PROVIDE DEEP SEAL P-TRAP FULL SIZE OF UNIT CONNECTION AND CONNECT CONDENSATE TO EXISTING CONDENSATE DRAIN.
2. CONNECT NEW 1/2" CHWS/CHWR, 1/2" HWS/HWR AND 1" CONDENSATE TO EXISTING CAPPED TEMPORARY ABOVE CEILING IN CORRIDOR. FIELD VERIFY LOCATION. INSTALL NEW VALVES.
3. PROVIDE TEMPERATURE SENSOR AND CONNECT TO FC-1. ALIGN WITH ELECTRICAL OUTLET.
4. CONNECT NEW 6" DUCT TO EXISTING OUTSIDE AIR SUPPLY. PROVIDE 80 CFM TO FC-1.
5. SLOT DIFFUSER MOUNTED IN VERTICAL WITH FACTORY INSTALLED PLENUM. 10" ROUND CONNECTION.
6. INSTALL MANUFACTURER PROVIDED LOUVERED INLET PANEL ASSEMBLY. TYPICAL SIZE 48"x32". COORDINATE WITH TELESCOPING SKIRT AND COLLAR ASSEMBLY CONNECT TO FC-1. FACE OF PANEL TO BE PRIMED TO ACCEPT PAINT. COORDINATE WITH ARCHITECT FOR COLOR.
7. EXHAUST GRILLES SHALL BE PRIMED TO ACCEPT PAINT. COORDINATE WITH ARCHITECT FOR COLOR.
8. TERMINATE 12x12 EXHAUST AT EXTERIOR WINDOW. SEE ARCH. FOR CONTINUATION AND LOUVER.
9. PROVIDE CONCEALED REGULATOR VOLUME DAMPER CONTROLS.
10. PROVIDE CEILING MOUNTED OCCUPANCY SENSOR WITH 30 MINUTE SHUT-OFF DELAY.
11. INSTALL VALVES SO THEY ACCESSIBLE FOR ROUTING SERVICE AND REPAIR.
12. CONTRACTOR SHALL COORDINATE ACCESS PANEL LOCATION SO THAT FCU IS MAINTAINABLE AND FILTERS MAY BE CHANGED.




2 HVAC RENOVATION PLAN
1/2" = 1'-0"

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University of South Carolina

# Jones PSC Restrooms Renovation
Columbia, SC

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Project Number: 12060.01

REVISIONS

| FOR CONSTRUCTION | 05/22/2013 |
|---|---|

HVAC PLANS

Date: 04/24/2013
Drawn: JJR
Checked: JDR

M101

# HVAC SPECIFICATIONS

## GENERAL REQUIREMENTS:

A. THE CONTRACTOR SHALL FURNISH AND INSTALL ANY AND ALL MATERIALS AND LABOR TO PRODUCE A FULLY FUNCTIONAL HVAC SYSTEM THAT MEETS THE DESIGN INTENT, WHETHER SHOWN ON THE PLANS OR NOT. CONTRACTOR SHALL USE THESE DRAWINGS AS ESTABLISHING A LEVEL OF QUALITY AND A SCOPE OF MECHANICAL WORK. ANY REQUIRED MATERIALS AND LABOR TO MEET ALL CODES AND REGULATIONS SHALL BE FURNISHED AND INCLUDED IN THE CONTRACTORS PRICE. REQUEST FOR ADDITIONAL FUNDS TO INCLUDE MATERIALS AND LABOR TO MEET CODES AND COMPLY WITH REGULATIONS WILL NOT BE ALLOWED.

B. ALL ELECTRICAL EQUIPMENT SHALL BE UL LISTED.

C. ALL ITEMS TO BE PROPERLY LUBRICATED AND IN PERFECT OPERATION UPON COMPLETION OF THE PROJECT AND PRIOR TO FINAL ACCEPTANCE BY OWNER.

D. PROVIDE SEISMIC BRACING AND RESTRAINT AS REQUIRED BY THE INTERNATIONAL BUILDING CODE, 2006.

E. PROVIDE A COMPLETE HEATING, VENTILATING, AND AIR CONDITIONING SYSTEM AS SPECIFIED AND AS INDICATED ON THE MECHANICAL DRAWINGS FOR THE ENTIRE BUILDING.

F. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND FREE FROM FLAWS AND DEFECTS OF ANY NATURE. MATERIALS CALLED FOR ARE TO BE CONSIDERED AS STANDARD QUALITY, WHICH HOWEVER, IMPLIES NO PART OF CONTRACTOR TO SUBSTITUTE OTHER MATERIALS AND METHODS WITHOUT WRITTEN AUTHORITY FROM ENGINEER.

G. ALL WORK SHALL BE PERFORMED BY SKILLED MECHANICS, UNDER COMPETENT SUPERVISION, EMPLOYING LATEST AND BEST PRACTICES OF THE TRADE. WORK SHALL BE INSTALLED IN ACCORDANCE WITH RECOMMENDATIONS OF ASHRAE GUIDE, AND EQUIPMENT MANUFACTURER'S INSTALLATION INSTRUCTIONS. IN THE EVENT THERE IS ANY CONFLICT OR DOUBT, CONSULT ARCHITECT/ENGINEER FOR CLARIFICATION AND APPROVAL.

## SCOPE

A. PROVIDE MECHANICAL UNITS, DUCTWORK, REFRIGERANT AND CONDENSATE PIPING, AIR DISTRIBUTION, AND THERMOSTATIC CONTROLS AS SPECIFIED AND INDICATED IN THE DRAWINGS.

B. PROVIDE EXHAUST FANS WHERE INDICATED ON PLANS COMPLETE WITH DUCTWORK AND AIR DISTRIBUTION.

C. INSULATE ALL DUCTWORK, PIPING, AND EQUIPMENT AS HEREIN SPECIFIED AND AS INDICATED ON MECHANICAL DRAWINGS.

D. PROVIDE ALL CONTROL, INTERLOCK AND STARTING CIRCUIT WIRING. WIRING SHALL BE 120 VOLTS OR LESS. PROVIDE TRANSFORMERS AND RELAYS AS REQUIRED TO COMPLY WITH THIS REQUIREMENT. CONDUIT SHALL BE STEEL CONFORMING TO THE REQUIREMENTS OF THE ELECTRICAL SPECIFICATIONS, EXCEPT AS OTHERWISE SPECIFIED.

E. START, TEST, ADJUST, BALANCE AND PLACE INTO OPERATION ALL SYSTEMS. THE BUILDING AIR DISTRIBUTION SYSTEMS ARE TO BE BALANCED TO PROVIDE THE QUANTITY OF AIR AS SHOWN ON DRAWINGS. SYSTEM AIR BALANCE IS TO BE ACCOMPANIED WITH CERTIFIED TEST FIGURES AS TO OBTAINED AIR QUANTITIES. PROPER FAN PERFORMANCE AND COIL DISCHARGE AIR TEMPERATURE READING SHALL ALSO BE CERTIFIED ON TEST FORMS.

## GUARANTEES:

A. THE CONTRACTOR AGREES TO CORRECT DEFECTS IN WORKMANSHIP, NEW MATERIALS, NEW EQUIPMENT, AND THE OPERATION OF SYSTEM FOR A PERIOD OF ONE YEAR AFTER DATE OF ACCEPTANCE (CERTIFICATE OF OCCUPANCY). EQUIPMENT AND MATERIALS, REPAIRED OR REPLACED ARE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF CORRECTION.

B. THE CONTRACTOR AGREES TO REPAIR ANY DAMAGE TO BUILDING AND EQUIPMENT RESULTING FROM DEFECTS IN WORKMANSHIP, MATERIALS, EQUIPMENT, AND SYSTEM OPERATION.

C. THE CONTRACTOR AGREES TO REMOVE ANY ITEM NOT SPECIFIED OR GIVEN APPROVAL AND REPLACE IT WITH SPECIFIED OR APPROVED ITEM.

D. THE CONTRACTOR AGREES THAT ANY ITEM SUBMITTED FOR APPROVAL THAT DOES NOT CONFORM TO THESE SPECIFICATIONS SHALL HAVE ACCOMPANYING NOTE OF EXCEPTION.

E. THE CONTRACTOR AGREES THAT THE SYSTEM AS INSTALLED SHALL COMPLY WITH ALL CODE REQUIREMENTS.

F. CONTRACTOR SHALL COORDINATE DUCTWORK FABRICATION/LOCATIONS WITH ROOF TRUSS SHOP DRAWINGS.

## OPERATING AND MAINTENANCE INSTRUCTIONS:

A. THE CONTRACTOR SHALL ACQUAINT AND INSTRUCT THE OWNER'S REPRESENTATIVE WITH ALL DETAILS OF PERFORMANCE, OPERATION, AND MAINTENANCE OF THE SYSTEMS. IN ADDITION, THE CONTRACTOR SHALL FURNISH TWO COPIES OF A BROCHURE TO THE OWNER THROUGH THE ARCHITECT, WHICH SHALL CONTAIN PRINTED OPERATING AND MAINTENANCE INSTRUCTIONS, PARTS LIST, CONTROL DIAGRAM, ETC. INCLUDING A LIST OF SPARE PARTS AND ANY SPECIAL TOOLS RECOMMENDED BY THE EQUIPMENT MANUFACTURERS TO BE STOCKED BY THE OWNER. THE MANUALS SHALL INCLUDE A COMPLETE SET OF ALL APPROVED SHOP DRAWINGS FURNISHED UNDER THIS SECTION OF SPECIFICATIONS

B. THE BASIS OF OWNER'S INSTRUCTIONS SHALL BE WRITTEN FOR INCLUSION IN THE MAINTENANCE AND OPERATING INSTRUCTIONS DATA SPECIFIED ABOVE. OBTAIN CERTIFICATES, SIGNED BY THE OWNER'S REPRESENTATIVE, THAT THESE INSTRUCTIONS HAVE BEEN RECEIVED AND UNDERSTOOD.

## START-UP:

A. THE CONTRACTOR SHALL PLACE THE SYSTEMS IN FULL OPERATION BEFORE TESTING BEGINS. THE CONTRACTOR SHALL MAKE CORRECTIONS IN THE SYSTEM, INCLUDING FURNISHING AND INSTALLING DRIVES, MOTORS, DAMPERS, VALVES, ETC., IF REQUIRED TO BALANCE THE SYSTEMS. ALL SUCH CORRECTIONS SHALL BE INCLUDED IN THE CONTRACTOR'S BASIC BID AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL COST TO THE OWNER.

## SUBMITTALS

A. THE ENGINEER WILL REVIEW AND TAKE APPROPRIATE ACTION ON SHOP DRAWINGS, PRODUCT DATA, SAMPLES, AND OTHER SUBMITTALS REQUIRED BY THE CONTRACT DOCUMENTS. SUCH REVIEW SHALL BE FOR GENERAL COMPLIANCE WITH THE DESIGN AND WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. IT SHALL NOT INCLUDE THE REVIEW OF QUANTITIES, DIMENSIONS, WEIGHTS, FABRICATION PROCESSES, CONSTRUCTION METHODS, COORDINATION WITH THE WORK OF OTHER TRADES, OR CONSTRUCTION SAFETY PRECAUTIONS, ALL OF WHICH ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

B. CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AS SPECIFIED IN THE CONTRACT DOCUMENTS. ANY SUBSTITUTIONS SHALL BE APPROVED BY THE ENGINEER PRIOR TO SUBMITTAL. CONTRACTOR IS RESPONSIBLE FOR REVIEW OF ANY EQUIPMENT SUBSTITUTIONS BEFORE SUBMITTING TO THE ENGINEER TO VERIFY THAT SUBSTITUTED EQUIPMENT AT A MINIMUM IS EQUAL TO EQUIPMENT SPECIFIED IN THE CONSTRUCTION DOCUMENTS.

## PROJECT JOB DRAWINGS AND AS-BUILT DRAWINGS

A. THE CONTRACTOR SHALL KEEP A RECORD SET OF DRAWINGS ON THE JOB AND, AS CONSTRUCTION PROGRESSES, SHALL SHOW THE ACTUAL INSTALLED LOCATION OF ALL ITEMS, MATERIAL AND EQUIPMENT ON THE PROJECT JOB DRAWINGS.
B. AT THE TIME OF FINAL INSPECTION, TWO CORRECTED SETS OF PRINTS SHALL BE DELIVERED TO THE OWNER. ALL DRAWING COSTS TO BE BY THE CONTRACTOR.
C. AS BUILT DRAWINGS SHALL HAVE THE INFORMATION TRANSFERRED FROM THE PROJECT JOB DRAWINGS INCLUDING ALL ADDENDUM, SUPPLEMENTAL INSTRUCTIONS, CHANGE ORDERS, AND SIMILAR INFORMATION.
D. QUALIFIED DRAFTSMAN SHALL PERFORM THIS TASK.

## ALTERNATE

A. PROVIDE PRICING FOR A SERVICE CONTRACT ON THE ENTIRE MECHANICAL SYSTEM FOR A PERIOD OF ONE YEAR. SERVICE CONTRACT SHALL BECOME EFFECTIVE AFTER THE DATE OF ACCEPTANCE OF MECHANICAL SYSTEM BY OWNER.

## AIR DISTRIBUTION

A. PERFORATED FACE CEILING DIFFUSERS AND RETURN REGISTERS SHALL HAVE FULLY ADJUSTABLE PATTERN, REMOVABLE FACE, MIN. FRAME SIZE MATCHES T-BAR CEILING. PROVIDE FRAME FOR HARD TYPE CEILINGS WHERE REQUIRED. FABRICATION MAY BE STEEL OR ALUMINUM, WITH ALUMINUM FRAME, AND BAKED ENAMEL OFF-WHITE FINISH UNLESS NOTED OTHERWISE. PROVIDE INTEGRAL OPPOSED BLADE DAMPER WITH REMOVABLE KEY OPERATOR, OPERABLE FROM FACE. INSTALL ALL AIR DISTRIBUTION IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. UNITS SHALL BE PRICE, METAL-AIRE, OR APPROVED EQUAL.

C. REFER TO AIR DISTRIBUTION SCHEDULE FOR ADDITIONAL INFORMATION.

## FIRE DAMPERS/CONTROL DAMPERS/MANUAL DAMPERS/FIRE-SMOKE DAMPERS

A. INSTALL ALL DAMPERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. FIRE DAMPERS SHALL BE RUSKIN TYPE C FOR USE IN DYNAMIC SYSTEMS.

C. MANUAL DAMPERS SHALL BE RUSKIN MD-35 OR APPROVED EQUAL.

D. FIRE/SMOKE DAMPERS SHALL BE RUSKIN FSD60 OR APPROVED EQUAL.

E. DAMPERS SHALL BE RUSKIN MCA, OR APPROVED EQUAL.

## DUCTWORK

A. FURNISH ALL LABOR, MATERIALS, EQUIPMENT, AND SERVICES NECESSARY FOR THE INSTALLATION OF ALL SUPPLY, RETURN, VENTILATION, AND EXHAUST DUCTWORK AND RELATED EQUIPMENT AND ACCESSORIES AS INDICATED ON THE DRAWINGS, REQUIRED, AND AS SPECIFIED.

B. ALL DUCT SHALL BE IN ACCORDANCE WITH THE LATEST RECOMMENDATIONS OF THE ASHRAE GUIDE, WITH THE SMACNA DUCT CONSTRUCTION STANDARDS. SMACNA DUCT LINER APPLICATION STANDARD, AND WITH DETAILS ON THE DRAWINGS. CONSTRUCT TTS, BENDS, AND ELBOWS WITH RADIUS OF 1.5 TIMES WIDTH OF DUCT OR PROVIDE RECTANGULAR ELBOWS WITH AIRFOIL TURNING VANES. PROVIDE 45 DEGREE LATERAL TAKE-OFFS. PROVIDE MANUAL BALANCING DAMPER ON ALL TAKE-OFFS.

C. ALL METAL DUCTWORK SHALL BE DESIGNED FOR 3.0" WG PRESSURE.

D. ALL JOINTS SHALL BE MADE UTILIZING HARDCAST IRON GRIP WATER DUCT SEALANT 601 OR APPROVED EQUAL.

E. GALVANIZED STEEL DUCT SHALL BE ASTM A 653/A653M GALVANIZED STEEL SHEET, ZONANG STEEL (FY) DESIGNATION, WITH G90/Z275 ZINC COATING. SHEET STEEL FREE FROM BLISTERS OR OTHER MECHANICAL DEFECTS.

F. THE GENERAL LOCATION OF DUCTS SHALL BE AS SHOWN. EXACT LOCATION OF DUCTWORK MAY BE ALTERED SLIGHTLY TO INTEGRATE WITH FEATURES OF THE BUILDING. COORDINATE DUCT WITH PRE-FABRICATED WOOD TRUSSES.

D. WHERE CHANGES ARE MADE IN SHAPE OF DUCTS FULL AREAS SHALL BE MAINTAINED AND CHANGES SHALL BE GRADUAL TO MINIMIZE PRESSURE DROP.

H. OBSTRUCTIONS IN DUCTWORK SHALL BE STREAMLINED AND SHALL CONFORM TO SMACNA.

I. SHEET METAL GAUGES, CROSS JOINTS AND REINFORCING SHALL BE AS INDICATED BY SMACNA.

J. THE PITTSBURGH LOCK SHALL BE USED FOR LONGITUDINAL SEAMS AND SHALL CONFORM TO SMACNA.

K. ELBOWS SHALL BE 1.5R LONG RADIUS WHERE SPACE PERMITS OR INDICATED ON DRAWINGS. MITERED SQUARE ELBOWS WITH SINGLE THICKNESS TURNING VANES MAY BE PROVIDED IF INDICATED IN THE DRAWINGS.

L. TAPERS AND OFFSETS SHALL CONFORM TO SMACNA.

M. FLEXIBLE DUCT FOR LOW PRESSURE SERVICE SHALL BE A FACTORY FABRICATED ASSEMBLY CONSISTING OF AN INNER SLEEVE, INSULATION AND AN OUTER MOISTER BARRIER. THE INNER SLEEVE SHALL BE CONSTRUCTED OF A CONTINUOUS VINYL-COATED SPIRAL STEEL WIRE HELIX BONDED TO A CONTINUOUS LAYER OF VINYL COATED FIBERGLASS MESH. AN INSULATING BLANKET OF FIBER GLASS, PROVIDING A THERMAL CONDUCTANCE (C FACTOR) OF 0.23 BTU/HR/SQ.FT/DEGREES F. @ 75 DEGREES F., SHALL ENCASE THE INNER SLEEVE AND BE SHEATHED WITH AN OUTER MOISTURE BARRIER OF A REINFORCED METALIZED POLYAMIDE/POLYMIDE LAMINATE OF LOW PERMEABILITY WITH INTEGRAL ATTACHING DEVICES (GROMMETS) FOR A SUSPENSION SYSTEM AS LISTED BY UNDERWRITERS' LABORATORIES, INC. UNDER THEIR UL-181 STANDARDS AS A CLASS 1 AIR DUCT AND SHALL COMPLY WITH NFPA STANDARD NO. 90A. THE FLEXIBLE DUCT SHALL BE EQUAL TO THERMAFLEX M-KC, OR APPROVED EQUAL. FLEXIBLE DUCTWORK SHALL BE A MAXIMUM OF 6 FEET LONG.

N. FLEXIBLE DUCTWORK SHALL BE USED AS THE FINAL CONNECTION TO AIR SUPPLY TERMINALS. ALL FLEXIBLE DUCT RUNS ARE TO BE KEPT STRAIGHT AND AS SHORT AS POSSIBLE. NO BENDS OR ELBOWS FORMED WITH FLEXIBLE DUCT WILL BE ALLOWED. DO NOT USE FLEXIBLE DUCTWORK FOR ABOVE NON-ACCESSIBLE CEILINGS.

O. FLEXIBLE DUCT CONNECTIONS TO RIGID DUCTWORK SHALL BE MADE WITH "DRAWBIT" STRAPS.

P. ALL CONNECTIONS BETWEEN EQUIPMENT AND DUCTWORK SHALL BE MADE WITH A FLEXIBLE CONNECTION CONSISTING OF A HEAVY GLASS FABRIC, DOUBLE COATED WITH NEOPRENE, MATERIAL SHALL WITHSTAND THE AIR PRESSURE, 250 DEGREES F. TEMPERATURE CONTINUOUSLY, BE FIRE RESISTANT, WATERPROOF AND ANTIROT AND SHALL BE THE PRODUCT OF VENT FABRICS, INC. OR EQUAL.

Q. HANGERS AND SUPPORTS SHALL CONFORM TO THE LATEST EDITION OF SMACNA STANDARDS.

R. HANGERS AND SUPPORTS FOR DUCTWORK SHALL NOT SUPPORT ANY OTHER DEVICES.

S. ALL DUCTWORK SHALL BE PROPERLY SECURED DIRECTLY TO THE STRUCTURE OF THE BUILDING USING SUITABLE STRAP OR ANGLE HANGERS.

T. ALL CHANGES IN DIRECTION SHALL EITHER BE WITH A RADIUS NOT LESS THAN 1/2 WIDTH OF THE DUCT, OR SQUARE ELBOW WITH TURNING VANES.

U. SIZES SHOWN ON DRAWINGS ARE INSIDE DIMENSIONS. INCREASE SHEET METAL SIZES TO ALLOW FOR DUCTLINER ON TRANSFER DUCTS.

V. WIPE THE INSIDE OF ALL DUCTWORK TO REMOVE THE DEBRIS, OIL, GREASE, ETC. ONCE DUCTWORK IS CLEAN, COVER WITH PLASTIC OR METAL TEMPORARY CLOSURE MATERIAL. SEAL ALL DUCTWORK IN ACCORDANCE WITH SMACNA RECOMMENDATIONS. PROVIDE SEAL CLASS "A" ON ALL SUPPLY, RETURN, AND EXHAUST DUCTWORK. PROTECT DUCTWORK FROM ENTRY OF DUST AND DEBRIS DURING SHOP STORAGE, SHIPMENT AND TEMPORARY STORAGE AT THE JOB SITE.

## HVAC PIPE AND PIPE FITTINGS

A. PROVIDE PIPE HANGERS AND SUPPORTS IN ACCORDANCE WITH ASME B31.5 UNLESS INDICATED OTHERWISE.

## CONDENSATE DRAIN PIPING AND FITTINGS:

A. PIPE MATERIAL FOR ABOVE GROUND INSTALLATION SHALL BE ASTM D 1785, SCHEDULE 40 PVC. FITTING SHALL BE ASTM D 2466 OR D 2467 PVC. JOINTS SHALL BE SOLVENT WELDED.

B. SEE INSULATION SPECIFICATION SECTION FOR INSULATION THICKNESS.

## CHILLED WATER PIPING:

A. STEEL PIPE: ASTM A 53/A 53M, SCHEDULE 40, BLACK; USING ONE OF THE FOLLOWING JOINT TYPES:
   1. WELDED JOINTS: ASTM A 234/A 234M, WROUGHT STEEL WELDING TYPE FITTINGS; ANS B1.1 WELDED.
   2. THREADED JOINTS: ASTM B 16.3, MALLEABLE IRON FITTINGS.

## HEATING WATER PIPING

A. COPPER TUBE: ASTM B 88 (ASTM B 88M), TYPE K (A), DRAWN.
   1. FITTINGS: ASME B16.18, CAST BRASS, OR ASME B16.22, SOLDER WROUGHT COPPER.

## INSULATION:

A. ALL INSULATION SHALL HAVE A FLAME SPREAD RATING OF 25 AND A SMOKE DEVELOPED RATING OF 50.

B. ALL INSULATION SHALL BE INSTALLED IN A WORKMANLIKE MANNER BY QUALIFIED INSULATION MECHANICS. INSTALL ALL INSULATION IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, USING APPROVED TYPE LAGGINGS, ADHESIVES, MASTICS, AND OTHER MATERIALS APPLICABLE.

C. DUCT INSULATION – INSULATE ALL SUPPLY, RETURN, AND OUTSIDE AIR DUCTS INSIDE OF BUILDING. FINISH WITH VAPE AND VAPOR BARRIER JACKET. CONTINUE INSULATION THROUGH WALLS, SLEEVES, HANGERS, AND OTHER DUCT PENETRATIONS. INSULATION SHALL BE 2 INCHES THICK FLEXIBLE OR RIGID FIBERGLASS INSULATION WITH FOIL/SCRIM/KRAFT VAPOR BARRIER AND MIN R-VALUE OF R-6.

D. REFRIGERANT LINE INSULATION – PROVIDE 1" THICK ARMAFLEX INSULATION ON 1-1/2" NOMINAL DIAMETER AND SMALLER PIPE. PROVIDE 1-1/2" ARMAFLEX INSULATION FOR PIPE SIZES LARGER THAN 1-1/2" NOMINAL DIAMETER. PROVIDE 1" THICK INSULATION FOR FITTINGS AS RECOMMENDED BY MANUFACTURER. SEAL ALL SEAMS AND JOINTS WITH ADHESIVE EQUAL TO ARMSTRONG 520.

E. INSULATE ALL CONDENSATE LINES WITH 3/4" ARMAFLEX OR FOAMED RUBBER PIPE INSULATION OR EQUAL PRODUCT BY RUBATEX, MOSA, OR MARVELLE. SEAL ALL SEAMS AND JOINTS WITH ADHESIVE EQUAL TO ARMSTRONG 520.

F. PROVIDE MANUFACTURED 1 1/2" FIBERGLASS INSULATION ON ALL SUPPLY AIR DISTRIBUTION GRILLES.

G. INSULATION SHALL BE SECURED WITH BENJAMIN-FOSTER 85-20 ADHESIVE OR EQUAL. ALL JOINTS SHALL BE SEALED BY ADHERING A 2" SEALING LAP AT ALL JOINTS WITH 'B' 85-20 ADHESIVE OR EQUAL. INSULATION SHALL THEN BE FASTENED WITH 16 GAUGE COPPER WIRE ON 12" CENTERS. ON RECTANGULAR DUCT, CORNER ANGLES SHALL BE USED UNDER TIE WIRES TO PREVENT CUTTING OF VAPOR BARRIER.

## EXHAUST FANS

A. EACH EXHAUST FAN SHALL BE CONTROLLED AS SPECIFIED IN THE SEQUENCE OF OPERATION.

B. ALL FANS SHALL BE FURNISHED COMPLETE WITH MOTOR AND DRIVE ASSEMBLIES. ALL NON-ENCLOSED, EXPOSED DRIVES SHALL BE FURNISHED WITH FACTORY BELT GUARDS. FURNISH ALL ACCESSORIES AND HARDWARE NECESSARY TO PROPERLY INSTALL THE FAN. PROVIDE ALL OTHER ACCESSORIES OR OPTIONS AS INDICATED ON THE DRAWINGS OR SPECIFIED HEREIN. THESE MAY INCLUDE BUT ARE NOT LIMITED TO DISCONNECT SWITCHES, BACKDRAFT DAMPERS, BIRD OR INSECT SCREENS, SEISMIC CURBS, SPECIAL FINISH OR CONSTRUCTION, AND HARDWARE.

C. ALL FANS SHALL BEAR THE AMCA CERTIFIED RATINGS SEALS FOR BOTH SOUND AND AIR PERFORMANCE AND SHALL BE UL LISTED.

D. EXHAUST FANS SHALL INCLUDE MAGNETIC CONTACTOR AND SINGLE POINT POWER ENTRY.

E. PROVIDE ALL ACCESSORIES AS INDICATED IN DRAWINGS AND SPECIFICATIONS.

F. EXHAUST FANS SHALL BE GREENHECK, COOK, CARNES, OR APPROVED EQUAL.

INSTALLATION:

A. IN GENERAL THE EQUIPMENT INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR THE SPECIFIC WALL OR ROOF CONSTRUCTION BEING USED. MANUFACTURER'S RECOMMENDATIONS SHALL BE CONSIDERED A MINIMUM AND ALL EXTERIOR PENETRATIONS SHALL BE PROPERLY FLASHED AND SEALED SO AS TO BE COMPLETELY WEATHERPROOF AND AIRTIGHT.

B. ALL FANS SHALL BE BALANCED ABOUT THEIR SHAFTS AND SUBSTANTIALLY VIBRATION FREE.

C. ALL DUCTED CONNECTIONS TO FANS SHALL BE ACHIEVED WITH FLEXIBLE DUCT CONNECTORS.

D. ACCESS TO FAN AND FAN PARTS SHALL BE UNOBSTRUCTED. PROVIDE ACCESS DOORS IN DUCTS WHERE REQUIRED TO ACCESS DAMPERS FOR LUBRICATION.

E. AFTER INSTALLATION AND PRIOR TO STARTUP ALL FANS SHALL BE CHECKED FOR PROPER LUBRICATION, BELT TENSION, FAN ROTATION, POWER SUPPLY VOLTAGE AND PHASE, VIBRATION ISOLATION STATIC DEFLECTIONS AND CONTROLS CONNECTIONS.

F. ALL FANS SHALL REMAIN OFF DURING CONSTRUCTION EXCEPT AS NECESSARY FOR TESTING, ADJUSTMENT AND BALANCING OR AS DIRECTED BY THE ARCHITECT/ENGINEER. BEFORE AND AFTER INSTALLATION, AIR HOUSINGS SHALL BE PROTECTED FROM PAINT OVERSPRAY, ROOFING, AND OTHER DAMAGE TO THE FINISH BY WRAPPING THE FAN HOUSING WITH CLEAR PLASTIC AND TEMPORARILY TAPING IN PLACE.

G. PRIOR TO INSTALLATION OF THE FAN ALL REQUIRED ROOF OPENINGS SHALL BE COORDINATED FOR DIMENSIONS, LOCATIONS AND FRAMING TO MATCH THE SPECIFIC FAN MODEL AND INSTALLATION REQUIREMENTS. BEFORE PLACING FAN ON CURB, PROVIDE AN ADHESIVE BACKED NEOPRENE STRIP ALL THE WAY AROUND TOP OF CURB TO ENSURE AN AIR TIGHT FIT OF FAN ON CURB. INSTALL FAN PLUMB AND LEVEL. DO NOT INSTALL FAN ON CURB WHICH IS SUBSTANTIALLY UNLEVEL. ALL WIRING TO FAN SHALL BE THROUGH PIPE CONDUIT PROVIDED IN CURB BASE.

## TESTING, ADJUSTING AND BALANCING

A. EXTENT OF TESTING, ADJUSTING AND BALANCING WORK REQUIRED BY THIS SECTION IS INDICATED ON DRAWINGS AND SCHEDULES, AND BY REQUIREMENTS OF THIS SECTION, AND IS DEFINED TO INCLUDE, BUT IS NOT NECESSARILY LIMITED TO, AIR DISTRIBUTION SYSTEMS, HYDRONIC DISTRIBUTION SYSTEMS, AND ASSOCIATED EQUIPMENT AND APPARATUS OF MECHANICAL WORK. THE WORK CONSISTS OF SETTING SPEED AND VOLUME (FLOW) ADJUSTING FACILITIES PROVIDED FOR SYSTEMS, RECORDING DATA, CONDUCTING TESTS, PREPARING AND SUBMITTING REPORTS.

B. COMPONENT TYPES OF TESTING, ADJUSTING, AND BALANCING SPECIFIED IN THIS SECTION INCLUDES THE FOLLOWING AS APPLIED TO MECHANICAL EQUIPMENT:

1. FANS
2. AIR CONDITIONING UNITS
3. DUCTWORK SYSTEMS
4. COILS

C. TESTER'S QUALIFICATIONS: FIRM CERTIFIED BY NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) OR AABC IN THOSE TESTING AND BALANCING DISCIPLINES SIMILAR TO THOSE REQUIRED FOR THIS PROJECT, WHICH IS NOT INSTALLER OF SYSTEM TO BE TESTED AND IS OTHERWISE INDEPENDENT OF PROJECT.

D. TEST AND BALANCE ALL AFFECTED AIRFLOWS TO PLUS OR MINUS (±) 10 PERCENT, AND PROVIDE REPORT TO OWNER AND ARCHITECT/ENGINEER FOR APPROVAL.

E. INDUSTRY STANDARDS: COMPLY WITH ASHRAE RECOMMENDATIONS PERTAINING TO MEASUREMENTS, INSTRUMENTS, AND TESTING, ADJUSTING AND BALANCING, EXCEPT AS OTHERWISE INDICATED.

F. SUBMIT CERTIFIED TEST REPORTS, SIGNED BY TEST AND BALANCE SUPERVISOR WHO PERFORMED TAB WORK.

G. INCLUDE IDENTIFICATION AND TYPES OF INSTRUMENTS USED, AND THEIR MOST RECENT CALIBRATION DATE WITH SUBMISSION OF FINAL TEST REPORT.

H. MAINTENANCE DATA: INCLUDE IN MAINTENANCE MANUALS, COPIES OF CERTIFIED TEST REPORTS, AND IDENTIFICATION OF INSTRUMENTS.

I. DO NO PROCEED WITH TESTING, ADJUSTING, AND BALANCING WORK UNTIL WORK HAS BEEN COMPLETED AND IS OPERABLE. ENSURE THAT THERE IS NO LATENT RESIDUAL WORK STILL TO BE COMPLETED.

J. DO NOT PROCEED UNTIL WORK SCHEDULED FOR TESTING, ADJUSTING, AND BALANCING IS CLEAN AND FREE FROM DEBRIS, DIRT, AND DISCARDED BUILDING MATERIALS.

K. EXCEPT AS OTHERWISE INDICATED, USE SAME PRODUCTS AS USED BY ORIGINAL INSTALLER FOR PATCHING HOLES IN INSULATION, DUCTWORK AND HOUSING WHICH HAVE BEEN CUT OR DRILLED FOR TEST PURPOSES, INCLUDING ACCESS FOR TEST INSTRUMENTS, ATTACHING JIGS, AND SIMILAR PURPOSES.

L. AT TESTER'S OPTION, PLASTIC PLUGS WITH RETAINERS MAY BE USED TO PATCH DRILLED HOLES IN DUCTWORK AND HOUSINGS.

M. UTILIZE TEST INSTRUMENTS AND EQUIPMENT FOR TAB WORK REQUIRED, OF TYPE, PRECISION, AND CAPACITY AS RECOMMENDED IN NEBB'S PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS.

N. EXAMINE INSTALLED WORK AND CONDITIONS UNDER WHICH TESTING IS TO BE DONE TO ENSURE THAT WORK HAS BEEN COMPLETED, CLEANED, AND IS OPERABLE. DO NOT PROCEED WITH TAB WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN MANNER ACCEPTABLE TO TESTER.

O. TEST, ADJUST, AND BALANCE ENVIRONMENTAL SYSTEMS AND COMPONENTS, AS INDICATED, IN ACCORDANCE WITH PROCEDURES OUTLINED IN APPLICABLE STANDARDS.

P. TEST, ADJUST AND BALANCE SYSTEM DURING SUMMER SEASON FOR AIR CONDITIONING SYSTEMS AND DURING WINTER SEASON FOR HEATING SYSTEMS.

Q. PREPARE FIVE (5) REPORTS OF TEST RESULTS, INCLUDING INSTRUMENTATION CALIBRATION REPORTS, IN FORMAT RECOMMENDED BY APPLICABLE STANDARDS.

R. PATCH HOLES IN INSULATION, DUCTWORK, AND HOUSING, WHICH HAVE BEEN CUT OR DRILLED FOR TEST PURPOSES, IN MANNER RECOMMENDED BY ORIGINAL INSTALLER.

S. MARK EQUIPMENT SETTINGS, INCLUDING DAMPER CONTROL POSITIONS, VALVE INDICATORS, FAN SPEED CONTROL LEVERS, AND SIMILAR CONTROLS AND DEVICES, TO SHOW FINAL SETTINGS AT COMPLETION OF TAB WORK. PROVIDE MARKINGS WITH PAINT OR OTHER SUITABLE PERMANENT IDENTIFICATION MATERIALS.

T. RETEST, ADJUST AND BALANCE SYSTEMS SUBSEQUENT TO SIGNIFICANT SYSTEM MODIFICATIONS, AND RESUBMIT TEST RESULTS.


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University of South Carolina

**Jones PSC Restrooms Renovation**
**Columbia, SC**

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Project Number: xxxx.???

**REVISIONS**

| FOR CONSTRUCTION | 05/22/2013 |
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HVAC SPECIFICATIONS

Date: 04/24/2013
Drawn: JJR
Checked: JDR

**M102**