State of Utah

JON M. HUNTSMAN, JR.
*Governor*

GARY R. HERBERT
*Lieutenant Governor*

Department of Administrative Services
KIMBERLY K. HOOD
*Executive Director*

Division of Facilities Construction and Management
DAVID G. BUXTON
*Director*

# ADDENDUM NO. 1

Date: May 28, 2009

To: Contractors

From: Wayne Smith – Project Manager

Reference: Locker Room Remodel – West Jordan Armory
Utah National Guard – West Jordan, Utah
DFCM Project No. 09081480

Subject: **Addendum No. 1**

| | | | |
|---|---|---|---|
| Pages | Addendum Cover Sheet | 1 | page |
| | Architect's Addendum - Drawings | 14 | pages |
| | Total | 15 | pages |

***Note: This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to Disqualification.***

**While we contend that SB220 should only be potentially applicable to a contract issued after the effective date of said bill, this is to clarify that for purposes of this contract, regardless of the execution or effective dates of this contract, the status of Utah Law and remedies available to the State of Utah and DFCM, as it relates to any matter referred to or affected by said SB220, shall be the Utah law in effect at the time of the issuance of this Addendum.**

**1.1 SCHEDULE CHANGES:** No Project Schedule changes.

**1.2 GENERAL ITEMS:** See attached Architect's drawings.

# NATIONAL GUARD ARMORY REMODEL

## LOCKER ROOM CONVERSION

7602 AIRPORT ROAD
WEST JORDAN, UTAH 84084

DFCM #09081480

Client:
STATE OF UTAH
DIVISION OF FACILITIES AND CONSTRUCTION MANAGEMENT
4110 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114
TEL: (801) 538-3018
FAX: (801) 538-3267
CONTACT: WAYNE SMITH

DFCM PROJECT #: 09081480

Prime Consultant:
IBI GROUP
ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231


Seal


Consultants
MICHAEL BAKER JR. CORP. (ENGINEERING)
6955 UNION PARK CENTER, SUITE 370
MIDVALE, UTAH 84047
CONTACTS:
MECHANICAL:
TODD DORIOUS
TEL: (801) 352-5971
ELECTRICAL:
RAY THOM
TEL: (801) 352-5985


## SHEET INDEX

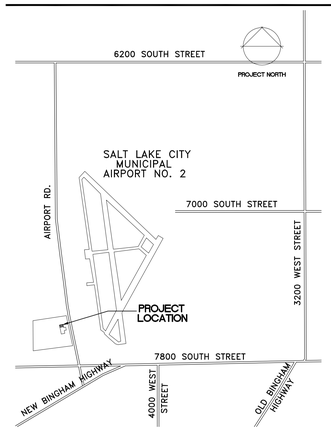

ARCHITECTURE

| | |
|---|---|
| G-001 | COVER SHEET |
| G-002 | SPECIFICATIONS |
| D-100 | DEMOLITION PLAN |
| A-101 | FLOOR PLAN |
| A-102 | REFLECTED CEILING PLAN |
| A-501 | DETAILS |

MECHANICAL AND ELECTRICAL

| | |
|---|---|
| EM-001 | SYMBOLS AND LEGENDS |
| M-101 | MECHANICAL REMODEL PLAN |
| M-601 | MECHANICAL SPECIFICATION |
| M-602 | MECHANICAL SPECIFICATION |
| E-101 | ELECTRICAL POWER PLAN |
| E-102 | ELECTRICAL LIGHTING PLAN |
| E-601 | ELECTRICAL PANEL SCHEDULES |
| E-602 | ELECTRICAL SPECIFICATION |


## VICINITY MAP (N.T.S.)




## CODE ANALYSIS

### APPLICABLE CODES

| | Year | | Year |
|---|---|---|---|
| International Building Code | 2006 | National Electrical Code | 2008 |
| International Mechanical Code | 2003 | Uniform Code for Building Conservation | – |
| International Plumbing Code | N/A | ADA Accessibility Guidelines | SEPT 2002 & ANSI 117 2003 |
| International Fire Code | 2003 | | |
| International Energy Conservation Code | – | | |

A. Occupancy and Group: A-2-1 ★ B-2 ★

Change in Use: Yes ____ No X Mixed Occupancy: Yes X No ____
Special Use and Occupancy (e.g. High Rise, Covered Mall): –

B. Seismic Design Category: ★ Design Wind Speed: ★ mph

C. Type of Construction (circle one):

| I | I | II | II | III | III | IV | V | V |
|---|---|---|---|---|---|---|---|---|
| A | B | A | B | A | B | HT | A | B |

D. Fire Resistance Rating Requirements for the Exterior Walls based on the fire separation distance (in hours):
North: ★ South: ★ East: ★ West: ★

E. Mixed Occupancies: ★ Nonseparated Uses: ____

F: Sprinklers:
Required: ____ Provided: X Type of Sprinkler System: ____

G: Number of Stories: 1 Building Height: 26'-0"

H: Actual Area per Floor (square feet): 76,675 ★

I: Tabular Area: ★

★ J: Area Modifications:

a) $A_a = A_t + \left[\frac{A_t\, I_f}{100}\right] + \left[\frac{A_t\, I_s}{100}\right]$ $\qquad I_f = 100\left[\frac{F}{P} - 0.25\right]\frac{W}{30}$

b) Sum of the Ratio Calculations for Mixed Occupancies:

$\frac{\text{Actual Area}}{\text{Allowable Area}} \leq 1$

c) Total Allowable Area for:
1) One Story: ____
2) Two Story: $A_a$ (2)____
3) Three Story: $A_a$ (3)____

d) Unlimited Area Building: Yes ____ No ____ Code Section: ____

K. Fire Resistance Rating Requirements for Building Elements (hours).

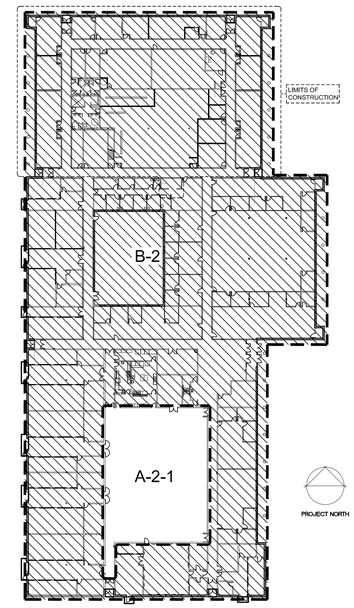
| Element | Hours | Assembly Listing | Element | Hours | Assembly Listing |
|---|---|---|---|---|---|
| Exterior Bearing Walls | ★ | | Floors - Ceiling Floors | ★ | |
| Interior Bearing Walls | ★ | | Roofs - Ceiling Roofs | ★ | |
| Exterior Non-Bearing Walls | ★ | | Exterior Doors and Windows | ★ | |
| Structural Frame | ★ | | Shaft Enclosures | ★ | |
| Partitions - Permanent | – | – | Fire Walls | ★ | |
| Fire Barriers | ★ | | Fire Partitions | 1 HR. | WP 1072 |
| | | | Smoke Partitions | ★ | |

L. Design Occupant Load: 416 For Remodel Area (refer to SHEET A101)
Exit Width Required: 31.05" Exit Width Provided: 80"

★ M. Minimum Number of Required Plumbing Facilities:
a) Water Closets - Required (m) ____ (f) ____ Provided (m) ____ (f) ____
b) Lavatories - Required (m) ____ (f) ____ Provided (m) ____ (f) ____
c) Bath Tubs or Showers: ____
d) Drinking Fountains: ____ Service Sinks: ____

FOOTNOTES:
1) In case of conflict with the U.S. Department of Justice Federal Registers Parts I through V - ADA Guidelines and specific reference to the International Building Code Accessibility Chapters, the more restrictive requirement shall govern.
2) Additional Code Information shall be provided at the discretion of the Building Official for Complex Buildings. Including, but not limited to:
a) High Rise Requirements.
b) Atriums.
c) Performance Based Criteria.
d) Means or Egress Analysis.
e) Fire Assembly Locator Sheet.
f) Exterior and Interior Accessibility Route.
g) Fire Stopping, Including Tested Design Number.
3) ★ Denotes code sections not affected by remodel

## OCCUPANCY LEGEND




## LEGENDS

### ABBREVIATIONS

| ABBREVIATIONS | TERM | ABBREVIATION | TERM | ABBREVIATION | TERM |
|---|---|---|---|---|---|
| AFF | ABOVE FINISHED FLOOR | FP | FIRE PLACE | POLY. | POLYETHYLENE |
| ABBREV. | ABBREVIATIONS | F.O.C. | FACE OF CONCRETE | PREFAB. | PREFABRICATED |
| ALUM. /AL. | ALUMINUM | F.O.S. | FACE OF STUD | PRE-FIN. | PREFINISHED |
| ANOD. | ANODIZED | FR | FROM/ FIRE RATING | PRELIM. | PRELIMINARY |
| APPROX. | APPROXIMATE | FRR | FIRE RESISTING RATING | PT | PAINT |
| AVE. | AVENUE | FT | FEET/FOOT | Q.BED. | QUEEN BED |
| BALC. | BALCONY | GALV. | GALVANIZED | R | RISER |
| BC | BROOM CLOSET | GAL. | GALLONS | R.D. | ROFF DRAIN |
| BET. | BETWEEN | G.I. | GALVANIZED IRON | REF. | REFERENCE |
| BLDG. | BUILDING | GIS | GOOD ONE SIDE | REV. | REVERSED/REVISED |
| BLK. | BLOCK | GL | GRID LINE | RM. | ROOM |
| BOTT. | BOTTOM | GWB | GYPSUM WALL BOARD | R.W.L. | RAIN WATER LEADER |
| BR | BEDROOM | H. | HIGH | R/W OR ROW | RIGHT OF WAY |
| BRD. | BOARD | H.C. | HANDICAPPED | S | SINK |
| B&P | BENCH & PEGS | H.M. | HOLLOW METAL | S.B. | SIDE BOARD |
| B.S. | BOTH SIDES | HOR. | HORIZONTAL | SCHED. | SCHEDULE |
| C | CABINET | HR. | HOUR | SECT. | SECTION |
| CB | CATCH BASIN | HT. | HEIGHT | S.F. | SQUARE FEET |
| CEM. | CEMENT | H.S.S. | HOLLOW STEEL SECTION (TUBULAR STEEL SECTION) | SH. | SHOWER |
| C.I.P. | CAST IN PLACE | ID | INTERIOR DESIGN | SHT. | SHEET |
| CLG. | CEILING | ID | INSIDE DIAMETER | SL. | SLOPE |
| CL | CENTER LINE | INC. | INCLUDING | ST | STAIN |
| CLOS. | CLOSET | INSUL | INSULATION/INSULATED | STL. | STEEL |
| CMU | CONCRETE MASONRY UNIT | INT | INTERIOR | SIM. | SIMILAR |
| CONC. | CCONCRETE | JET | JETTED TUB | SPECS | SPECIFICATIONS |
| CONT. | CONTINUOUS | KBED | KING BED | SPECD. | SPECIFIED |
| CONST. | CONSTRUCTION | LIN | LINEAR | SQ. | SQUARE |
| COL. | COLUMN | LT. WT. | LIGHTWEIGHT | ST. | STOVE, STAINLESS |
| CORR. | CORRIDOR | MAX. | MAXIMUM | STC | SOUND TRANSMISSION COEFFICENT |
| C/W | COMPLETE WITH | MECH. | MECHANICAL | STL. | STEEL |
| DBED | DOUBLE BED | MEZZ. | MEZZANINE | STOR. | STORAGE |
| DET. | DETAIL | MGR. | MANAGER | STRUCT. | STRUCTURAL |
| DIM. | DIMENSION | MDF | MEDIUM DENSITY FIBERBOARD | SUSP. | SUSPENDED |
| DN | DOWN | MIN. | MINIMUM | T | TREAD |
| DW | DISHWASHER | MISC. | MISCELLANEOUS | T&G | TONGUE AND GROOVE |
| DWG. | DRAWING | MTD. | MOUNTED | TBED | TWIN BED |
| EIFS | EXTERIOR INSULATION & FINISH SYSTEMS | MTL. | METAL | TEL. | TELEPHONE |
| ELEV. | ELEVATOR | NIC | NOT IN CONTRACT | TEMP. | TEMPERATURE |
| EL. | ELEVATION | NTS | NOT TO SCALE | T/O | TOP OF |
| ELECT. | ELECTRICAL | NO. OR # | NUMBER | T.O.S. | TOP OF SLAB |
| EQ. | EQUAL | O.C. | ON CENTER | T.S. | TUBE SECTION |
| EXIST. | EXISTING | O.D. | OUTSIDE DIAMETER | T.V. | TELEVISION |
| EXP. | EXPANDED/EXPANSION | O.S. | OWNER STORAGE | TYP. | TYPICAL |
| EXT. | EXTERIOR | O.S.F. | OUTSIDE FACE OF | ULC | UNDERWRITERS' LABORATORIES OF CANADA |
| F | FRIDGE | P | PANTRY | U/S | UNDERSIDE OF |
| FFE | FINISHED FLOOR ELEVATION | P.K. | PULLMAN KITCHEN | V.B. | VAPOUR BARRIER |
| FLR. | FLOOR | P.LAM. | PLASTIC LAMINATE | VEST. | VESTIBULE |
| FD | FLOOR DRAIN | PLUMB. | PLUMBING | W/ | WITH |
| FIN. | FINISH/FINISHED | PLYWD. | PLYWOOD | W.B. | WET BAR |
| F.O. | FACE OF | | | WR | WASHROOM |
| | | | | W.C. | WATER CLOSET |
| | | | | W.C. | WINE COOLER |
| | | | | WD. | WOOD |
| | | | | W/D | WASHER/DRYER |
| | | | | WP | WORK POINT |

### SYMBOLS

| | |
|---|---|
| EXISTING CONF. ROOM 100A E426 | ROOM NAME AND NUMBER |
| 5:12 | ROOF SLOPE |
| 8 | FINISHED FLOOR ELEVATION |
| 9'-10" | CEILING HEIGHT |
| MR | MILLWORK ITEM |
| E427A | DOOR NUMBER |
| FP | FIXTURE |
| W2 | WALL TYPE REFERENCE |
| W25 | WINDOW NUMBER |
| 2 | REFERENCE NOTES |
| 2 | DEMOLITION NOTES |
| D | GRID LINE |
| A3.02 / F — DETAIL NUMBER; SHEET NUMBER WHERE SHOWN | DETAIL |
| F / A3.02 — SECTION NUMBER; SHEET NUMBER WHERE SHOWN | BUILDING SECTION |
| F / A3.02 — SECTION NUMBER; SHEET NUMBER WHERE SHOWN | WALL/PARTIAL SECTION |
| F / A3.02 — ELEVATION NUMBER; SHEET NUMBER WHERE SHOWN | BUILDING ELEVATION |
| 82.00' | BUILDING LEVEL ELEVATION |
| A — ELEVATION VIEW; 1 / A5.02 — ROOM ELEVATION NUMBERS; SHEET NUMBER WHERE SHOWN | INTERIOR ELEVATION |
| | ACCESSIBLE UNIT |
| | HEARING IMPAIRED UNIT |
| | HEAT TRACE |
| 20.00' | FLOOR ELEVATION |

### IBC SECTION 3409 EXISTING CONSTRUCTION

PROVISIONS TO BE MADE TO MADE TO EXISTING BUILDING TO BRING INTO ACCESSIBILTY COMPLIANCE WITH CURRENT IBC BUILDING CODE & ANSI 117: UP TO 20% OF CONSTRUCTION BUDGET

CURRENT PARKING: 184 STALLS
5 ACCESSIBLE STALLES PROVIDED: 6 REQUIRED (ONE TO BE VAN ACCESSIBLE) AS PER SECTION 1106
1 VAN ACCESSIBLE STALL TO BE ADDED, RE; SITE PLAN AT COVER SHEET.

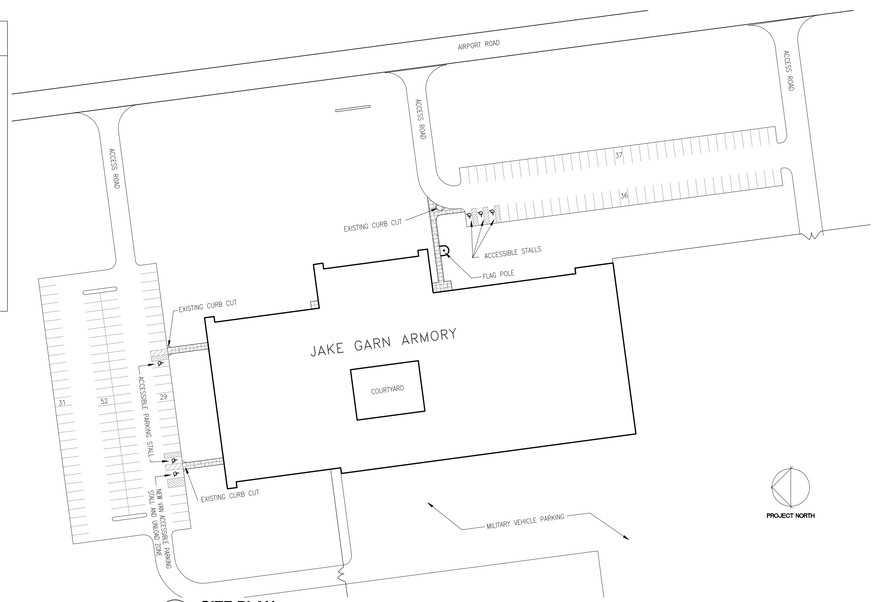
CURB ACCESS TO SIDEWALKS
CURB CUTS ARE LOCATED AT BUILIDNG ENTRANCES

CURRENT DOOR HARDWARE:
NO ACCESSIBLE DOOR HANDLES ARE LOCATED ON OFFICES AND CLASSROOM DOORS.
ACCESSIBLE LOCKSETS TO BE ADDED TO EXISTINGS DOORS.

30 LOCKSETS REQUIRED
APPROX. $400 FOR LOCKSET AND INSTALLATION
30 X $400.00 = $12,000

ESTIMATED CONSTRUCTUTION BUDGET = $52,000.00
$52,000.00 X 20% = $10,400.00

$12,000.00 > 20% OF ESTIMATED CONSTRUCTION BUDGET




1 / G-001 **SITE PLAN**
SCALE: N.T.S.

Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 28-May 2009 | | ADDENDUM 1-PLAN CHK. COMMENTS |

Revision

Notes


This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.


Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title
UTAH NATIONAL GUARD ARMORY INTERIOR REMODEL
7602 AIRPORT ROAD, WEST JORDAN, UTAH

Sheet Title
COVER SHEET
CODE ANALYSIS
SHEET SET INDEX

| | |
|---|---|
| Scale: N.T.S. | Date: 20 MAY, 2009 |
| Drawn: C.S. | Checked: J.G. |
| Cad File: G001-COVERSHEET.DWG | Sheet No. G-001 |
| Project No. IBI-25946 | |

PLOTTED DATE: Thursday, 28 May 2009 - 11:20am

ARCH E1 - ADT 2007

## ELECTRICAL SYMBOLS

LP2A–1,3 — HOME RUN TO PANELBOARD, ARROWS DENOTE NUMBER OF PHASE CONDUCTORS. LETTERS AND NUMBERS DESIGNATE PANEL AND CIRCUITS. CIRCUITS SHALL INCLUDE ALL CONDUCTORS (PHASE, NEUTRAL & GROUND).

CONDUIT RUN EXPOSED

CONDUIT RUN CONCEALED IN OR UNDER FLOOR SLAB

CONDUIT CONCEALED IN WALL OR CEILING SPACE

A / 2A–2b — LIGHTING FIXTURE, TYPE LETTER AND CIRCUIT NUMBER SHOWN. '2A' DENOTES PANELBOARD, '2' DENOTES CIRCUIT NUMBER, 'b' DENOTES SWITCH LETTER, 'A' DENOTES FIXTURE TYPE LETTER (NOTATIONS TYPICAL). SEE LIGHTING FIXTURE SCHEDULE FOR DETAILS.

A / 2A–2b — LIGHTING FIXTURE, TYPE LETTER AND CIRCUIT NUMBER SHOWN. '2A' DENOTES PANELBOARD, '2' DENOTES CIRCUIT NUMBER, 'b' DENOTES SWITCH LETTER, 'A' DENOTES FIXTURE TYPE LETTER (NOTATIONS TYPICAL). SEE LIGHTING FIXTURE SCHEDULE FOR DETAILS. SHADING DENOTES A FIXTURE WITH A BATTERY BACKUP SYSTEM.

A — STRIP LIGHTING FIXTURE, ENCLOSED, 'A' DENOTES FIXTURE TYPE LETTER (NOTATIONS TYPICAL) SEE LIGHTING FIXTURE SCHEDULE FOR DETAILS.

A — STRIP LIGHTING FIXTURE, ENCLOSED, 'A' DENOTES FIXTURE TYPE LETTER (NOTATIONS TYPICAL), WITH EMERGENCY BATTERY PACK, SEE LIGHTING FIXTURE SCHEDULE FOR DETAILS.

LIGHTING FIXTURE, 2X4', FLUORESCENT, EXISTING

STRIP LIGHTING FIXTURE, ENCLOSED, EXISTING

EXIT SIGN, WITH DIRECTIONAL ARROWS AS SHOWN ON THE DRAWINGS. SEE LIGHTING FIXTURE SCHEDULE FOR DETAILS.

$S_2$ — SINGLE POLE TOGGLE SWITCH, 15 AMPERE, 120/277 VOLT. MOUNTED 44 IN. ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.

- 2 DENOTES DOUBLE POLE TOGGLE SWITCH.
- 3 DENOTES THREE WAY TOGGLE SWITCH.
- 4 DENOTES FOUR WAY TOGGLE SWITCH.
- D DENOTES LOCAL WALL DIMMER.
- TS DENOTES TIME SWITCH.
- P DENOTES PILOT LIGHT.
- WP DENOTES WEATHERPROOF.

DUPLEX RECEPTACLE, 20 AMPERE, 125 VOLT, 2 POLE, 3 WIRE NEMA 5–20R, MOUNTED 18 IN. ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED.

GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLE, 20 AMPERE, 125 VOLT, 2 POLE, 3 WIRE NEMA 5–20R, MOUNTED 18 IN. ABOVE FINISHED FLOOR UNLESS OTHERWISE NOTED.

SINGLE RECEPTACLE, 20 AMPERE, 125 VOLT, 2 POLE, 3 WIRE NEMA 5–20R. COORDINATE MOUNTING HEIGHT WITH EQUIPMENT INSTALLER.

QUAD RECEPTACLE, 20 AMPERE, 125 VOLT, 2 POLE, 3 WIRE NEMA 5–20R. FLUSH FLOOR MOUNTED, UNLESS OTHERWISE NOTED.

DUPLEX TELECOMMUNICATIONS OUTLET, 8 PIN RJ45, ONE (1) VOICE, ONE (1) DATA. MOUNTED 18 IN. AFF(TYP)

20A 3P — SINGLE LINE DIAGRAM THERMAL–MAGNETIC CIRCUIT BREAKER.

100/3 3R (MC) — NON–FUSIBLE DISCONNECT SWITCH, SIZE AS SHOWN ON THE DRAWINGS. INDIVIDUALLY MOUNTED 54 IN. ABOVE FINISHED FLOOR. '100/3' DENOTES 100 AMPERE, 3 POLE. '3R' DENOTES NEMA 3R ENCLOSURE. (MC) INDICATES FURNISHED BY MECHANICAL CONTRACTOR & INSTALLED BY ELECTRICAL CONTRACTOR. WHERE SHOWN WITHOUT (MC) INDICATES FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. (NOTATION TYPICAL)

PANELBOARD, MOUNTED 78 IN. ABOVE FINISHED FLOOR TO TOP OF CABINET UNLESS OTHERWISE NOTED. SEE 'PANELBOARD SCHEDULE' FOR NUMBER AND SIZE OF OVERCURRENT DEVICES.

S — SMOKE DETECTOR, 120VAC, SURFACE MOUNTED, WITH BATTERY BACKUP

EMERGENCY LIGHT PACK WITH DUAL BEAM HEADS AND BATTERY BACKUP

2 — KEYNOTE NUMBER REFERENCE, DENOTES "SEE KEYNOTE 2 THIS DRAWING".

T — TRANSFORMER, EXISTING

## MECHANICAL SYMBOLS

| | | |
|---|---|---|
| | CTE | CONNECT TO EXISTING |
| | | DUCTWORK SUPPLY DOWN |
| | | DUCTWORK SUPPLY UP |
| | | DUCTWORK EXHAUST OR RETURN DOWN |
| | | DUCTWORK EXHAUST OR RETURN UP |
| | EAR | EXHAUST AIR REGISTER |
| | MOD | MOTOR OPERATED DAMPER |
| | RAR | RETURN AIR REGISTER |
| | SW | SWITCH |
| T | T'STAT | THERMOSTAT (MAY HAVE ARROW POINTING TO CONTROLLED DEVICE) |
| | | TURNING VANES |
| | VD | VOLUME DAMPER |

## GENERAL NOTES:

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED, TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODE.
2. CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK (HVAC, PLUMBING, FIRE PROTECTION) ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
3. INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS AND APPLICABLE CODES AND REGULATIONS.
4. COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, ELECTRICAL WORK, ETC., AS SHOWN ON/IN OTHER CONTRACT DOCUMENTS.
5. MAINTAIN A MINIMUM OF 6'–8" CLEARANCE TO UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.
6. ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSULATION IS APPLIED.
7. LOCATE ALL TEMPERATURE, PRESSURE AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH A STRAIGHT SECTION OF PIPE OR DUCT UPSTREAM AND DOWNSTREAM, AS RECOMMENDED BY THE DEVICE MANUFACTURER FOR ACCURACY.
8. WHERE TWO OR MORE PRODUCTS OF THE SAME TYPE OF EQUIPMENT ARE REQUIRED, THE PRODUCTS OF A SINGLE MANUFACTURER SHALL BE USED.
9. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITIVELY FIXED BY DRAWING DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATION NECESSARY TO ACHIEVE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE CONTRACTING OFFICER BEFORE BEING FIELD INSTALLED. DO NOT SCALE DRAWINGS.
10. ETC., SHALL BE FIRE STOPPED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM E 814 & UL 1479. SIMILARLY, SEAL/FIRESTOP AS REQUIRED AT SMOKE RATED SURFACES AS WELL.
11. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS (SUPPLY, RETURN AND EXHAUST) CONNECTED TO AIR HANDLING UNITS AND OTHER EQUIPMENT WHICH REQUIRES VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT UNLESS OTHERWISE INDICATED.
12. PROPERLY SECURE/PROTECT/BRACE MECHANICAL WORK AND EQUIPMENT TO MEET PROJECT SEISMIC REQUIREMENTS; DESIGN CATEGORY–C, IMPORTANCE FACTOR–1.0, SITE CLASS–D.

LICENSED PROFESSIONAL ENGINEER No. 256084–2202 RAY K. THOM 5/20/09 STATE of UTAH

Client

PROJECT NORTH

Prime Consultant

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231

Seal

Consultants

Baker

BAKER & ASSOCIATES
A unit of Michael Baker Corporation
Midvale Office
6955 Union Park Center, Suite 370
Midvale, Utah 84047
(801)–255–4400

Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| | | | |

| No. | Date | Apprd. | Description |
|---|---|---|---|
| | | | |

Revision

Notes

This drawing, as an instrument of service, is the property of the Architect an may not be reproduced without their permission and unless the reproductio carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and condition on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

UTAH NATIONAL GUARD
ARMORY INTERIOR REMODE

7600 AIRPORT RD. WEST JORDAN UT

Sheet Title

ELECTRICAL & MECHANICAL
SYMBOLS AND LEGENDS

| | |
|---|---|
| Scale: AS NOTED | Date: 05-20-09 |
| Drawn: RBM | Checked: RKT/TD |
| Cad File: EM001.DWG | Sheet No. |
| Project No. | EM001 |

PLOTTED DATE: Wednesday, 20 May 2009 - 3:46pm

## SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:
1. BUILDING WIRES AND CABLES RATED 600 V AND LESS.
2. CONNECTORS, SPLICES, AND TERMINATIONS RATED 600 V AND LESS.
3. SLEEVES AND SLEEVE SEALS FOR CABLES.

1.2 QUALITY ASSURANCE

A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE.
B. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS

2.1 CONDUCTORS AND CABLES

A. COPPER CONDUCTORS: COMPLY WITH NEMA WC 70.
B. CONDUCTOR INSULATION: COMPLY WITH NEMA WC 70 FOR TYPES THHN-THWN.

2.2 CONNECTORS AND SPLICES

A. DESCRIPTION: FACTORY-FABRICATED CONNECTORS AND SPLICES OF SIZE, AMPACITY RATING, MATERIAL, TYPE, AND CLASS FOR APPLICATION AND SERVICE INDICATED.

PART 3 – EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. FEEDERS: COPPER. STRANDED FOR NO. 12 AWG AND LARGER.
B. BRANCH CIRCUITS: COPPER. STRANDED FOR NO. 12 AWG AND LARGER.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. SERVICE ENTRANCE: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.
B. EXPOSED FEEDERS: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY, METAL-CLAD CABLE, TYPE MC.
C. FEEDERS CONCEALED IN CEILINGS, WALLS, PARTITIONS, AND CRAWLSPACES: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY, METAL-CLAD CABLE, TYPE MC.
D. EXPOSED BRANCH CIRCUITS, INCLUDING IN CRAWLSPACES: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY, METAL-CLAD CABLE, TYPE MC.
E. BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY, METAL-CLAD CABLE, TYPE MC.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. CONCEAL CABLES IN FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.
B. USE MANUFACTURER-APPROVED PULLING COMPOUND OR LUBRICANT WHERE NECESSARY; COMPOUND USED MUST NOT DETERIORATE CONDUCTOR OR INSULATION. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM PULLING TENSIONS AND SIDEWALL PRESSURE VALUES.
C. USE PULLING MEANS, INCLUDING FISH TAPE, CABLE, ROPE, AND BASKET-WEAVE WIRE/CABLE GRIPS, THAT WILL NOT DAMAGE CABLES OR RACEWAY.
D. INSTALL EXPOSED CABLES PARALLEL AND PERPENDICULAR TO SURFACES OF EXPOSED STRUCTURAL MEMBERS, AND FOLLOW SURFACE CONTOURS WHERE POSSIBLE.
E. SUPPORT CABLES ACCORDING TO DIVISION 26 SECTION "HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS."
F. IDENTIFY AND COLOR-CODE CONDUCTORS AND CABLES ACCORDING TO DIVISION 26 SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS."

3.4 CONNECTIONS

A. TIGHTEN ELECTRICAL CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A AND UL 486B.
B. MAKE SPLICES AND TAPS THAT ARE COMPATIBLE WITH CONDUCTOR MATERIAL AND THAT POSSESS EQUIVALENT OR BETTER MECHANICAL STRENGTH AND INSULATION RATINGS THAN UNSPLICED CONDUCTORS.
C. WIRING AT OUTLETS: INSTALL CONDUCTOR AT EACH OUTLET, WITH AT LEAST 6 INCHES (150 MM) OF SLACK.

## SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:
1. HANGERS AND SUPPORTS FOR ELECTRICAL EQUIPMENT AND SYSTEMS.

1.2 DEFINITIONS

A. EMT: ELECTRICAL METALLIC TUBING.

1.3 PERFORMANCE REQUIREMENTS

A. DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND COMPONENTS.

PART 2 – PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. STEEL SLOTTED SUPPORT SYSTEMS: COMPLY WITH MFMA-4, FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY.
1. PAINTED COATINGS: MANUFACTURER'S STANDARD PAINTED COATING APPLIED ACCORDING TO MFMA-4.
2. CHANNEL DIMENSIONS: SELECTED FOR APPLICABLE LOAD CRITERIA.

B. RACEWAY AND CABLE SUPPORTS: AS DESCRIBED IN NECA 1 AND NECA 101.
C. CONDUIT AND CABLE SUPPORT DEVICES: STEEL AND MALLEABLE-IRON HANGERS, CLAMPS, AND ASSOCIATED FITTINGS, DESIGNED FOR TYPES AND SIZES OF RACEWAY OR CABLE TO BE SUPPORTED.
D. SUPPORT FOR CONDUCTORS IN VERTICAL CONDUIT: FACTORY-FABRICATED ASSEMBLY CONSISTING OF THREADED BODY AND INSULATING WEDGING PLUG OR PLUGS FOR NON-ARMORED ELECTRICAL CONDUCTORS OR CABLES IN RISER CONDUITS. PLUGS SHALL HAVE NUMBER, SIZE, AND SHAPE OF CONDUCTOR GRIPPING PIECES AS REQUIRED TO SUIT INDIVIDUAL CONDUCTORS OR CABLES SUPPORTED. BODY SHALL BE MALLEABLE IRON.
E. STRUCTURAL STEEL FOR FABRICATED SUPPORTS AND RESTRAINTS: ASTM A 36/A 36M, STEEL PLATES, SHAPES, AND BARS; BLACK AND GALVANIZED.
F. MOUNTING, ANCHORING, AND ATTACHMENT COMPONENTS: ITEMS FOR FASTENING ELECTRICAL ITEMS OR THEIR SUPPORTS TO BUILDING SURFACES INCLUDE THE FOLLOWING:
1. CONCRETE INSERTS: STEEL OR MALLEABLE-IRON, SLOTTED SUPPORT SYSTEM UNITS SIMILAR TO MSS TYPE 18; COMPLYING WITH MFMA-4 OR MSS SP-58.
2. CLAMPS FOR ATTACHMENT TO STEEL STRUCTURAL ELEMENTS: MSS SP-58, TYPE SUITABLE FOR ATTACHED STRUCTURAL ELEMENT.
3. THROUGH BOLTS: STRUCTURAL TYPE, HEX HEAD, AND HIGH STRENGTH. COMPLY WITH ASTM A 325.
4. TOGGLE BOLTS: ALL-STEEL SPRINGHEAD TYPE.
5. HANGER RODS: THREADED STEEL.

PART 3 – EXECUTION

3.1 APPLICATION

A. COMPLY WITH NECA 1 AND NECA 101 FOR APPLICATION OF HANGERS AND SUPPORTS FOR ELECTRICAL EQUIPMENT AND SYSTEMS EXCEPT IF REQUIREMENTS IN THIS SECTION ARE STRICTER.
B. MAXIMUM SUPPORT SPACING AND MINIMUM HANGER ROD SIZE FOR RACEWAY: SPACE SUPPORTS FOR EMT, IMC, AND RMC AS REQUIRED BY NFPA 70. MINIMUM ROD SIZE SHALL BE 1/4 INCH (6 MM) IN DIAMETER.
C. MULTIPLE RACEWAYS OR CABLES: INSTALL TRAPEZE-TYPE SUPPORTS FABRICATED WITH STEEL SLOTTED OR OTHER SUPPORT SYSTEM, SIZED SO CAPACITY CAN BE INCREASED BY AT LEAST 25 PERCENT IN FUTURE WITHOUT EXCEEDING SPECIFIED DESIGN LOAD LIMITS.
1. SECURE RACEWAYS AND CABLES TO THESE SUPPORTS WITH SINGLE-BOLT CONDUIT CLAMPS OR SINGLE-BOLT CONDUIT CLAMPS USING SPRING FRICTION ACTION FOR RETENTION IN SUPPORT CHANNEL.

3.2 SUPPORT INSTALLATION

A. COMPLY WITH NECA 1 AND NECA 101 FOR INSTALLATION REQUIREMENTS EXCEPT AS SPECIFIED IN THIS ARTICLE.
B. RACEWAY SUPPORT METHODS: IN ADDITION TO METHODS DESCRIBED IN NECA 1, EMT MAY BE SUPPORTED BY OPENINGS THROUGH STRUCTURE MEMBERS, AS PERMITTED IN NFPA 70.
C. STRENGTH OF SUPPORT ASSEMBLIES: WHERE NOT INDICATED, SELECT SIZES OF COMPONENTS SO STRENGTH WILL BE ADEQUATE TO CARRY PRESENT AND FUTURE STATIC LOADS WITHIN SPECIFIED LOADING LIMITS. MINIMUM STATIC DESIGN LOAD USED FOR STRENGTH DETERMINATION SHALL BE WEIGHT OF SUPPORTED COMPONENTS PLUS 200 LB (90 KG).
D. MOUNTING AND ANCHORAGE OF SURFACE-MOUNTED EQUIPMENT AND COMPONENTS: ANCHOR AND FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTS TO BUILDING STRUCTURAL ELEMENTS BY THE FOLLOWING METHODS UNLESS OTHERWISE INDICATED BY CODE:
1. TO WOOD: FASTEN WITH LAG SCREWS OR THROUGH BOLTS.
2. TO NEW CONCRETE: BOLT TO CONCRETE INSERTS.
3. TO MASONRY: APPROVED TOGGLE-TYPE BOLTS ON HOLLOW MASONRY UNITS AND EXPANSION ANCHOR FASTENERS ON SOLID MASONRY UNITS.
4. TO EXISTING CONCRETE: EXPANSION ANCHOR FASTENERS.
5. INSTEAD OF EXPANSION ANCHORS, POWDER-ACTUATED DRIVEN THREADED STUDS PROVIDED WITH LOCK WASHERS AND NUTS MAY BE USED IN EXISTING STANDARD-WEIGHT CONCRETE 4 INCHES (100 MM) THICK OR GREATER. DO NOT USE FOR ANCHORAGE TO LIGHTWEIGHT-AGGREGATE CONCRETE OR FOR SLABS LESS THAN 4 INCHES (100 MM) THICK.
6. TO LIGHT STEEL: SHEET METAL SCREWS.

E. DRILL HOLES FOR EXPANSION ANCHORS IN CONCRETE AT LOCATIONS AND TO DEPTHS THAT AVOID REINFORCING BARS.

## SECTION 260533 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. THIS SECTION INCLUDES RACEWAYS, FITTINGS, BOXES, ENCLOSURES, AND CABINETS FOR ELECTRICAL WIRING.

1.2 DEFINITIONS

A. EMT: ELECTRICAL METALLIC TUBING.
B. FMC: FLEXIBLE METAL CONDUIT.
C. LFMC: LIQUIDTIGHT FLEXIBLE METAL CONDUIT.

1.3 QUALITY ASSURANCE

A. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. EMT: ANSI C80.3.
B. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.
C. FITTINGS FOR CONDUIT (INCLUDING ALL TYPES AND FLEXIBLE AND LIQUIDTIGHT), EMT, AND CABLE: NEMA FB 1; LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.
1. FITTINGS FOR EMT: STEEL OR DIE-CAST, COMPRESSION TYPE.

2.2 METAL WIREWAYS

A. DESCRIPTION: SHEET METAL SIZED AND SHAPED AS INDICATED, NEMA 250, TYPE 1, UNLESS OTHERWISE INDICATED.
B. FITTINGS AND ACCESSORIES: INCLUDE COUPLINGS, OFFSETS, ELBOWS, EXPANSION JOINTS, ADAPTERS, HOLD-DOWN STRAPS, END CAPS, AND OTHER FITTINGS TO MATCH AND MATE WITH WIREWAYS AS REQUIRED FOR COMPLETE SYSTEM.
C. WIREWAY COVERS: HINGED TYPE OR SCREW-COVER TYPE.
D. FINISH: MANUFACTURER'S STANDARD ENAMEL FINISH.

2.3 SURFACE RACEWAYS

A. SURFACE METAL RACEWAYS: GALVANIZED STEEL WITH SNAP-ON COVERS. MANUFACTURER'S STANDARD ENAMEL FINISH IN COLOR SELECTED BY ARCHITECT.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. SHEET METAL OUTLET AND DEVICE BOXES: NEMA OS 1.
B. SMALL SHEET METAL PULL AND JUNCTION BOXES: NEMA OS 1.

PART 3 – EXECUTION

3.1 RACEWAY APPLICATION

A. COMPLY WITH THE FOLLOWING INDOOR APPLICATIONS, UNLESS OTHERWISE INDICATED:
1. EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: EMT.
2. EXPOSED, NOT SUBJECT TO SEVERE PHYSICAL DAMAGE: EMT.
3. CONCEALED IN CEILINGS AND INTERIOR WALLS AND PARTITIONS: EMT.

B. MINIMUM RACEWAY SIZE: 3/4-INCH (21-MM) TRADE SIZE.
C. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE AND LOCATION.

3.2 INSTALLATION

A. KEEP RACEWAYS AT LEAST 6 INCHES (150 MM) AWAY FROM PARALLEL RUNS OF FLUES AND STEAM OR HOT-WATER PIPES. INSTALL HORIZONTAL RACEWAY RUNS ABOVE WATER AND STEAM PIPING.
B. COMPLETE RACEWAY INSTALLATION BEFORE STARTING CONDUCTOR INSTALLATION.
C. SUPPORT RACEWAYS AS SPECIFIED IN DIVISION 26 SECTION "HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS."
D. INSTALL NO MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS IN ANY CONDUIT RUN EXCEPT FOR COMMUNICATIONS CONDUITS, FOR WHICH FEWER BENDS ARE ALLOWED.
E. CONCEAL CONDUIT AND EMT WITHIN FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.
F. INSTALL PULL WIRES IN EMPTY RACEWAYS. USE POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB (90-KG) TENSILE STRENGTH. LEAVE AT LEAST 12 INCHES (300 MM) OF SLACK AT EACH END OF PULL WIRE.
G. FLEXIBLE CONDUIT CONNECTIONS: USE MAXIMUM OF 72 INCHES (1830 MM) OF FLEXIBLE CONDUIT FOR EQUIPMENT SUBJECT TO VIBRATION, NOISE TRANSMISSION, OR MOVEMENT; AND FOR TRANSFORMERS AND MOTORS.

3.3 PROTECTION

A. PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS THAT ENSURE COATINGS, FINISHES, AND CABINETS ARE WITHOUT DAMAGE OR DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION.
1. REPAIR DAMAGE TO GALVANIZED FINISHES WITH ZINC-RICH PAINT RECOMMENDED BY MANUFACTURER.
2. REPAIR DAMAGE TO PVC OR PAINT FINISHES WITH MATCHING TOUCHUP COATING RECOMMENDED BY MANUFACTURER.

## SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. IDENTIFICATION FOR RACEWAYS.
2. IDENTIFICATION OF POWER AND CONTROL CABLES.
3. IDENTIFICATION FOR CONDUCTORS.

1.2 QUALITY ASSURANCE

A. COMPLY WITH ANSI A13.1.
B. COMPLY WITH NFPA 70.
C. COMPLY WITH 29 CFR 1910.144 AND 29 CFR 1910.145.
D. ADHESIVE-ATTACHED LABELING MATERIALS, INCLUDING LABEL STOCKS, LAMINATING ADHESIVES, AND INKS USED BY LABEL PRINTERS, SHALL COMPLY WITH UL 969.

1.3 COORDINATION

A. COORDINATE IDENTIFICATION NAMES, ABBREVIATIONS, COLORS, AND OTHER FEATURES WITH REQUIREMENTS IN OTHER SECTIONS REQUIRING IDENTIFICATION APPLICATIONS, DRAWINGS, SHOP DRAWINGS, MANUFACTURER'S WIRING DIAGRAMS, AND THE OPERATION AND MAINTENANCE MANUAL; AND WITH THOSE REQUIRED BY CODES, STANDARDS, AND 29 CFR 1910.145. USE CONSISTENT DESIGNATIONS THROUGHOUT PROJECT.
B. COORDINATE INSTALLATION OF IDENTIFYING DEVICES WITH COMPLETION OF COVERING AND PAINTING OF SURFACES WHERE DEVICES ARE TO BE APPLIED.
C. COORDINATE INSTALLATION OF IDENTIFYING DEVICES WITH LOCATION OF ACCESS PANELS AND DOORS.
D. INSTALL IDENTIFYING DEVICES BEFORE INSTALLING ACOUSTICAL CEILINGS AND SIMILAR CONCEALMENT.

PART 2 – PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. COMPLY WITH ANSI A13.1 FOR MINIMUM SIZE OF LETTERS FOR LEGEND AND FOR MINIMUM LENGTH OF COLOR FIELD FOR EACH RACEWAY SIZE.
B. COLORS FOR RACEWAYS CARRYING CIRCUITS AT 600 V OR LESS:
1. BLACK LETTERS ON AN ORANGE FIELD.
2. LEGEND: INDICATE VOLTAGE.

C. SELF-ADHESIVE VINYL LABELS FOR RACEWAYS CARRYING CIRCUITS AT 600 V OR LESS: PREPRINTED, FLEXIBLE LABEL LAMINATED WITH A CLEAR, WEATHER- AND CHEMICAL-RESISTANT COATING AND MATCHING WRAPAROUND ADHESIVE TAPE FOR SECURING ENDS OF LEGEND LABEL.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. COMPLY WITH ANSI A13.1 FOR MINIMUM SIZE OF LETTERS FOR LEGEND AND FOR MINIMUM LENGTH OF COLOR FIELD FOR EACH RACEWAY AND CABLE SIZE.
B. SELF-ADHESIVE VINYL LABELS: PREPRINTED, FLEXIBLE LABEL LAMINATED WITH A CLEAR, WEATHER- AND CHEMICAL-RESISTANT COATING AND MATCHING WRAPAROUND ADHESIVE TAPE FOR SECURING ENDS OF LEGEND LABEL.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

A. COLOR-CODING CONDUCTOR TAPE: COLORED, SELF-ADHESIVE VINYL TAPE NOT LESS THAN 3 MILS (0.08 MM) THICK BY 1 TO 2 INCHES (25 TO 50 MM) WIDE.
B. SELF-ADHESIVE VINYL LABELS: PREPRINTED, FLEXIBLE LABEL LAMINATED WITH A CLEAR, WEATHER- AND CHEMICAL-RESISTANT COATING AND MATCHING WRAPAROUND ADHESIVE TAPE FOR SECURING ENDS OF LEGEND LABEL.

PART 3 – EXECUTION

3.1 INSTALLATION

A. VERIFY IDENTITY OF EACH ITEM BEFORE INSTALLING IDENTIFICATION PRODUCTS.
B. LOCATION: INSTALL IDENTIFICATION MATERIALS AND DEVICES AT LOCATIONS FOR MOST CONVENIENT VIEWING WITHOUT INTERFERENCE WITH OPERATION AND MAINTENANCE OF EQUIPMENT.
C. APPLY IDENTIFICATION DEVICES TO SURFACES THAT REQUIRE FINISH AFTER COMPLETING FINISH WORK.
D. SELF-ADHESIVE IDENTIFICATION PRODUCTS: CLEAN SURFACES BEFORE APPLICATION, USING MATERIALS AND METHODS RECOMMENDED BY MANUFACTURER OF IDENTIFICATION DEVICE.
E. SYSTEM IDENTIFICATION COLOR-CODING BANDS FOR RACEWAYS AND CABLES: EACH COLOR-CODING BAND SHALL COMPLETELY ENCIRCLE CABLE OR CONDUIT. PLACE ADJACENT BANDS OF TWO-COLOR MARKINGS IN CONTACT, SIDE BY SIDE. LOCATE BANDS AT CHANGES IN DIRECTION, AT PENETRATIONS OF WALLS AND FLOORS, AT 50-FOOT (15-M) MAXIMUM INTERVALS IN STRAIGHT RUNS, AND AT 25-FOOT (7.6-M) MAXIMUM INTERVALS IN CONGESTED AREAS.

3.2 IDENTIFICATION SCHEDULE

A. ACCESSIBLE RACEWAYS AND METAL-CLAD CABLES, 600 V OR LESS, FOR SERVICE, FEEDER, AND BRANCH CIRCUITS MORE THAN 30 A, AND 120 V TO GROUND: IDENTIFY WITH SELF-ADHESIVE VINYL LABEL. INSTALL LABELS AT 10-FOOT (3-M) MAXIMUM INTERVALS.
B. ACCESSIBLE RACEWAYS AND CABLES WITHIN BUILDINGS: IDENTIFY THE COVERS OF EACH JUNCTION AND PULL BOX OF THE FOLLOWING SYSTEMS WITH SELF-ADHESIVE VINYL LABELS WITH THE WIRING SYSTEM LEGEND AND SYSTEM VOLTAGE. SYSTEM LEGENDS SHALL BE AS FOLLOWS:
1. EMERGENCY POWER.
2. POWER.
3. UPS.

C. POWER-CIRCUIT CONDUCTOR IDENTIFICATION, 600 V OR LESS: FOR CONDUCTORS IN VAULTS, PULL AND JUNCTION BOXES, MANHOLES, AND HANDHOLES, USE COLOR-CODING CONDUCTOR TAPE TO IDENTIFY THE PHASE.
1. COLOR-CODING FOR PHASE AND VOLTAGE LEVEL IDENTIFICATION, 600 V OR LESS: USE COLORS LISTED BELOW FOR UNGROUNDED FEEDER AND BRANCH-CIRCUIT CONDUCTORS.
a. COLOR SHALL BE FACTORY APPLIED.
b. COLORS FOR 208/120-V CIRCUITS:
1) PHASE A: BLACK.
2) PHASE B: RED.
3) PHASE C: BLUE.
c. COLORS FOR 480/277-V CIRCUITS:
1) PHASE A: BROWN.
2) PHASE B: ORANGE.
3) PHASE C: YELLOW.
d. FIELD-APPLIED, COLOR-CODING CONDUCTOR TAPE: APPLY IN HALF-LAPPED TURNS FOR A MINIMUM DISTANCE OF 6 INCHES (150 MM) FROM TERMINAL POINTS AND IN BOXES WHERE SPLICES OR TAPS ARE MADE. APPLY LAST TWO TURNS OF TAPE WITH NO TENSION TO PREVENT POSSIBLE UNWINDING. LOCATE BANDS TO AVOID OBSCURING FACTORY CABLE MARKINGS.

## SECTION 262726 – WIRING DEVICES

PART 1 – GENERAL

1.1 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:
1. RECEPTACLES, RECEPTACLES WITH INTEGRAL GFCI, AND ASSOCIATED DEVICE PLATES.
2. WALL-SWITCH AND EXTERIOR OCCUPANCY SENSORS.
3. COMMUNICATIONS OUTLETS.

1.2 DEFINITIONS

A. EMI: ELECTROMAGNETIC INTERFERENCE.
B. GFCI: GROUND-FAULT CIRCUIT INTERRUPTER.

1.3 QUALITY ASSURANCE

A. COMPLY WITH NFPA 70.

1.4 COORDINATION

A. RECEPTACLES FOR OWNER-FURNISHED EQUIPMENT: MATCH PLUG CONFIGURATIONS.
1. CORD AND PLUG SETS: MATCH EQUIPMENT REQUIREMENTS.

PART 2 – PRODUCTS

2.1 STRAIGHT BLADE RECEPTACLES

A. CONVENIENCE RECEPTACLES, 125 V, 20 A: COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, AND UL 498.

2.2 GFCI RECEPTACLES

A. GENERAL DESCRIPTION: STRAIGHT BLADE, FEED-THROUGH TYPE. COMPLY WITH NEMA WD 1, NEMA WD 6, UL 498, AND UL 943, CLASS A, AND INCLUDE INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED.
B. DUPLEX GFCI CONVENIENCE RECEPTACLES, 125 V, 20 A:

2.3 COMMUNICATIONS OUTLETS

A. TELEPHONE OUTLET:
1. DESCRIPTION: SINGLE RJ-45 JACK FOR TERMINATING 100-OHM, BALANCED, FOUR-PAIR UTP; TIA/EIA-568-B.1; COMPLYING WITH CATEGORY 5E. COMPLY WITH UL 1863.

B. COMBINATION TV AND TELEPHONE OUTLET:
1. DESCRIPTION: SINGLE RJ-45 JACK FOR 100-OHM, BALANCED, FOUR-PAIR UTP; TIA/EIA-568-B.1; COMPLYING WITH CATEGORY 5E; AND ONE TYPE F COAXIAL CABLE CONNECTOR.

2.4 WALL PLATES

A. SINGLE AND COMBINATION TYPES TO MATCH CORRESPONDING WIRING DEVICES.
1. PLATE-SECURING SCREWS: METAL WITH HEAD COLOR TO MATCH PLATE FINISH.
2. MATERIAL FOR FINISHED SPACES: SMOOTH, HIGH-IMPACT THERMOPLASTIC.
3. MATERIAL FOR UNFINISHED SPACES: GALVANIZED STEEL.

2.5 MULTIOUTLET ASSEMBLIES

A. COMPONENTS OF ASSEMBLIES: PRODUCTS FROM A SINGLE MANUFACTURER DESIGNED FOR USE AS A COMPLETE, MATCHING ASSEMBLY OF RACEWAYS AND RECEPTACLES.
B. RACEWAY MATERIAL: METAL, WITH MANUFACTURER'S STANDARD FINISH.
C. WIRE: NO. 12 AWG.

PART 3 – EXECUTION

3.1 INSTALLATION

A. COMPLY WITH NECA 1, INCLUDING THE MOUNTING HEIGHTS LISTED IN THAT STANDARD, UNLESS OTHERWISE NOTED.
B. COORDINATION WITH OTHER TRADES:
1. TAKE STEPS TO INSURE THAT DEVICES AND THEIR BOXES ARE PROTECTED. DO NOT PLACE WALL FINISH MATERIALS OVER DEVICE BOXES AND DO NOT CUT HOLES FOR BOXES WITH ROUTERS THAT ARE GUIDED BY RIDING AGAINST OUTSIDE OF THE BOXES.
2. KEEP OUTLET BOXES FREE OF PLASTER, DRYWALL JOINT COMPOUND, MORTAR, CEMENT, CONCRETE, DUST, PAINT, AND OTHER MATERIAL THAT MAY CONTAMINATE THE RACEWAY SYSTEM, CONDUCTORS, AND CABLES.
3. INSTALL DEVICE BOXES IN BRICK OR BLOCK WALLS SO THAT THE COVER PLATE DOES NOT CROSS A JOINT UNLESS THE JOINT IS TROWELED FLUSH WITH THE FACE OF THE WALL.
4. INSTALL WIRING DEVICES AFTER ALL WALL PREPARATION, INCLUDING PAINTING, IS COMPLETE.

C. CONDUCTORS:
1. DO NOT STRIP INSULATION FROM CONDUCTORS UNTIL JUST BEFORE THEY ARE SPLICED OR TERMINATED ON DEVICES.
2. STRIP INSULATION EVENLY AROUND THE CONDUCTOR USING TOOLS DESIGNED FOR THE PURPOSE. AVOID SCORING OR NICKING OF SOLID WIRE OR CUTTING STRANDS FROM STRANDED WIRE.
3. THE LENGTH OF FREE CONDUCTORS AT OUTLETS FOR DEVICES SHALL MEET PROVISIONS OF NFPA 70, ARTICLE 300, WITHOUT PIGTAILS.
4. EXISTING CONDUCTORS:
a. CUT BACK AND PIGTAIL, OR REPLACE ALL DAMAGED CONDUCTORS.
b. STRAIGHTEN CONDUCTORS THAT REMAIN AND REMOVE CORROSION AND FOREIGN MATTER.
c. PIGTAILING EXISTING CONDUCTORS IS PERMITTED PROVIDED THE OUTLET BOX IS LARGE ENOUGH.

D. DEVICE INSTALLATION:
1. REPLACE ALL DEVICES THAT HAVE BEEN IN TEMPORARY USE DURING CONSTRUCTION OR THAT SHOW SIGNS THAT THEY WERE INSTALLED BEFORE BUILDING FINISHING OPERATIONS WERE COMPLETE.
2. KEEP EACH WIRING DEVICE IN ITS PACKAGE OR OTHERWISE PROTECTED UNTIL IT IS TIME TO CONNECT CONDUCTORS.
3. DO NOT REMOVE SURFACE PROTECTION, SUCH AS PLASTIC FILM AND SMUDGE COVERS, UNTIL THE LAST POSSIBLE MOMENT.
4. CONNECT DEVICES TO BRANCH CIRCUITS USING PIGTAILS THAT ARE NOT LESS THAN 6 INCHES (152 MM) IN LENGTH.
5. WHEN THERE IS A CHOICE, USE SIDE WIRING WITH BINDING-HEAD SCREW TERMINALS. WRAP SOLID CONDUCTOR TIGHTLY CLOCKWISE, 2/3 TO 3/4 OF THE WAY AROUND TERMINAL SCREW.
6. USE A TORQUE SCREWDRIVER WHEN A TORQUE IS RECOMMENDED OR REQUIRED BY THE MANUFACTURER.
7. WHEN CONDUCTORS LARGER THAN NO. 12 AWG ARE INSTALLED ON 15- OR 20-A CIRCUITS, SPLICE NO. 12 AWG PIGTAILS FOR DEVICE CONNECTIONS.
8. TIGHTEN UNUSED TERMINAL SCREWS ON THE DEVICE.
9. WHEN MOUNTING INTO METAL BOXES, REMOVE THE FIBER OR PLASTIC WASHERS USED TO HOLD DEVICE MOUNTING SCREWS IN YOKES, ALLOWING METAL-TO-METAL CONTACT.

E. RECEPTACLE ORIENTATION:
1. INSTALL GROUND PIN OF VERTICALLY MOUNTED RECEPTACLES DOWN, AND ON HORIZONTALLY MOUNTED RECEPTACLES TO THE LEFT.

F. DEVICE PLATES: DO NOT USE OVERSIZED OR EXTRA-DEEP PLATES. REPAIR WALL FINISHES AND REMOUNT OUTLET BOXES WHEN STANDARD DEVICE PLATES DO NOT FIT FLUSH OR DO NOT COVER ROUGH WALL OPENING.
G. ARRANGEMENT OF DEVICES: UNLESS OTHERWISE INDICATED, MOUNT FLUSH, WITH LONG DIMENSION VERTICAL AND WITH GROUNDING TERMINAL OF RECEPTACLES ON TOP. GROUP ADJACENT SWITCHES UNDER SINGLE, MULTIGANG WALL PLATES.

3.2 IDENTIFICATION

A. COMPLY WITH DIVISION 26 SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS."
1. RECEPTACLES: IDENTIFY PANELBOARD AND CIRCUIT NUMBER FROM WHICH SERVED.

## SECTION 262816 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. MOLDED-CASE CIRCUIT BREAKERS (MCCBS).

1.2 COORDINATION

A. COORDINATE LAYOUT AND INSTALLATION OF SWITCHES, CIRCUIT BREAKERS, AND COMPONENTS WITH EQUIPMENT SERVED AND ADJACENT SURFACES. MAINTAIN REQUIRED WORKSPACE CLEARANCES AND REQUIRED CLEARANCES FOR EQUIPMENT ACCESS DOORS AND PANELS.

PART 2 – PRODUCTS

2.1 MOLDED-CASE CIRCUIT BREAKERS

A. GENERAL REQUIREMENTS: COMPLY WITH UL 489, NEMA AB 1, AND NEMA AB 3, WITH INTERRUPTING CAPACITY TO COMPLY WITH AVAILABLE FAULT CURRENTS.
B. CURRENT-LIMITING CIRCUIT BREAKERS: FRAME SIZES 400 A AND SMALLER, AND LET-THROUGH RATINGS LESS THAN NEMA FU 1, RK-5.
C. FEATURES AND ACCESSORIES:
1. STANDARD FRAME SIZES, TRIP RATINGS, AND NUMBER OF POLES.
2. LUGS: MECHANICAL OR COMPRESSION TYPE, SUITABLE FOR NUMBER, SIZE, TRIP RATINGS, AND CONDUCTOR MATERIAL.
3. APPLICATION LISTING: APPROPRIATE FOR APPLICATION; TYPE SWD FOR SWITCHING FLUORESCENT LIGHTING LOADS; TYPE HID FOR FEEDING FLUORESCENT AND HIGH-INTENSITY DISCHARGE LIGHTING CIRCUITS.

PART 3 – EXECUTION

3.1 EXAMINATION

A. EXAMINE ELEMENTS AND SURFACES TO RECEIVE ENCLOSED SWITCHES AND CIRCUIT BREAKERS FOR COMPLIANCE WITH INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK.
B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION

A. INSTALL INDIVIDUAL WALL-MOUNTED SWITCHES AND CIRCUIT BREAKERS WITH TOPS AT UNIFORM HEIGHT UNLESS OTHERWISE INDICATED.
B. COMPLY WITH NECA 1.

## SECTION 265100 – INTERIOR LIGHTING

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS.
2. EMERGENCY LIGHTING UNITS.
3. EXIT SIGNS.
4. LIGHTING FIXTURE SUPPORTS.

1.2 DEFINITIONS

A. BF: BALLAST FACTOR.
B. CCT: CORRELATED COLOR TEMPERATURE.
C. CRI: COLOR-RENDERING INDEX.
D. LER: LUMINAIRE EFFICACY RATING.
E. LUMEN: MEASURED OUTPUT OF LAMP AND LUMINAIRE, OR BOTH.
F. LUMINAIRE: COMPLETE LIGHTING FIXTURE, INCLUDING BALLAST HOUSING IF PROVIDED.

1.3 COORDINATION

A. COORDINATE LAYOUT AND INSTALLATION OF LIGHTING FIXTURES AND SUSPENSION SYSTEM WITH OTHER CONSTRUCTION THAT PENETRATES CEILINGS OR IS SUPPORTED BY THEM, INCLUDING HVAC EQUIPMENT, FIRE-SUPPRESSION SYSTEM, AND PARTITION ASSEMBLIES.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, PRODUCT(S) INDICATED ON DRAWINGS.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. RECESSED FIXTURES: COMPLY WITH NEMA LE 4 FOR CEILING COMPATIBILITY FOR RECESSED FIXTURES.
B. FLUORESCENT FIXTURES: COMPLY WITH UL 1598. WHERE LER IS SPECIFIED, TEST ACCORDING TO NEMA LE 5 AND NEMA LE 5A AS APPLICABLE.
C. METAL PARTS: FREE OF BURRS AND SHARP CORNERS AND EDGES.
D. SHEET METAL COMPONENTS: STEEL UNLESS OTHERWISE INDICATED. FORM AND SUPPORT TO PREVENT WARPING AND SAGGING.
E. DOORS, FRAMES, AND OTHER INTERNAL ACCESS: SMOOTH OPERATING, FREE OF LIGHT LEAKAGE UNDER OPERATING CONDITIONS, AND DESIGNED TO PERMIT RELAMPING WITHOUT USE OF TOOLS. DESIGNED TO PREVENT DOORS, FRAMES, LENSES, DIFFUSERS, AND OTHER COMPONENTS FROM FALLING ACCIDENTALLY DURING RELAMPING AND WHEN SECURED IN OPERATING POSITION.
F. DIFFUSERS AND GLOBES:
1. ACRYLIC LIGHTING DIFFUSERS: 100 PERCENT VIRGIN ACRYLIC PLASTIC. HIGH RESISTANCE TO YELLOWING AND OTHER CHANGES DUE TO AGING, EXPOSURE TO HEAT, AND UV RADIATION.
a. LENS THICKNESS: AT LEAST 0.125 INCH (3.175 MM) MINIMUM UNLESS OTHERWISE INDICATED.
b. UV STABILIZED.
2. GLASS: ANNEALED CRYSTAL GLASS UNLESS OTHERWISE INDICATED.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

A. GENERAL REQUIREMENTS FOR ELECTRONIC BALLASTS:
1. COMPLY WITH UL 935 AND WITH ANSI C82.11.
2. DESIGNED FOR TYPE AND QUANTITY OF LAMPS SERVED.
3. BALLASTS SHALL BE DESIGNED FOR FULL LIGHT OUTPUT UNLESS ANOTHER BF, DIMMER, OR BI-LEVEL CONTROL IS INDICATED.

B. ELECTRONIC PROGRAMMED-START BALLASTS FOR T5 AND T8 AND T5HO LAMPS: COMPLY WITH ANSI C82.11 AND THE FOLLOWING:
1. LAMP END-OF-LIFE DETECTION AND SHUTDOWN CIRCUIT FOR T5 DIAMETER LAMPS.
2. AUTOMATIC LAMP STARTING AFTER LAMP REPLACEMENT.

C. SINGLE BALLASTS FOR MULTIPLE LIGHTING FIXTURES: FACTORY WIRED WITH BALLAST ARRANGEMENTS AND BUNDLED EXTENSION WIRING TO SUIT FINAL INSTALLATION CONDITIONS WITHOUT MODIFICATION OR REWIRING IN THE FIELD.

2.4 EMERGENCY FLUORESCENT POWER UNIT

A. INTERNAL TYPE: SELF-CONTAINED, MODULAR, BATTERY-INVERTER UNIT, FACTORY MOUNTED WITHIN LIGHTING FIXTURE BODY AND COMPATIBLE WITH BALLAST. COMPLY WITH UL 924.
1. EMERGENCY CONNECTION: OPERATE ONE FLUORESCENT LAMP(S) CONTINUOUSLY AT AN OUTPUT OF 1100 LUMENS EACH. CONNECT UNSWITCHED CIRCUIT TO BATTERY-INVERTER UNIT AND SWITCHED CIRCUIT TO FIXTURE BALLAST.
2. NIGHTLIGHT CONNECTION: OPERATE ONE FLUORESCENT LAMP CONTINUOUSLY.
3. TEST PUSH BUTTON AND INDICATOR LIGHT: VISIBLE AND ACCESSIBLE WITHOUT OPENING FIXTURE OR ENTERING CEILING SPACE.
a. PUSH BUTTON: PUSH-TO-TEST TYPE, IN UNIT HOUSING, SIMULATES LOSS OF NORMAL POWER AND DEMONSTRATES UNIT OPERABILITY.
b. INDICATOR LIGHT: LED INDICATES NORMAL POWER ON. NORMAL GLOW INDICATES TRICKLE CHARGE; BRIGHT GLOW INDICATES CHARGING AT END OF DISCHARGE CYCLE.
4. BATTERY: SEALED, MAINTENANCE-FREE, NICKEL-CADMIUM TYPE.
5. CHARGER: FULLY AUTOMATIC, SOLID-STATE, CONSTANT-CURRENT TYPE WITH SEALED POWER TRANSFER RELAY.
6. REMOTE TEST: SWITCH IN HAND-HELD REMOTE DEVICE AIMED IN DIRECTION OF TESTED UNIT INITIATES CODED INFRARED SIGNAL. SIGNAL RECEPTION BY FACTORY-INSTALLED INFRARED RECEIVER IN TESTED UNIT TRIGGERS SIMULATION OF LOSS OF ITS NORMAL POWER SUPPLY, PROVIDING VISUAL CONFIRMATION OF EITHER PROPER OR FAILED EMERGENCY RESPONSE.
7. INTEGRAL SELF-TEST: FACTORY-INSTALLED ELECTRONIC DEVICE AUTOMATICALLY INITIATES CODE-REQUIRED TEST OF UNIT EMERGENCY OPERATION AT REQUIRED INTERVALS. TEST FAILURE IS ANNUNCIATED BY AN INTEGRAL AUDIBLE ALARM AND A FLASHING RED LED.

B. EXTERNAL TYPE: SELF-CONTAINED, MODULAR, BATTERY-INVERTER UNIT, SUITABLE FOR POWERING ONE OR MORE FLUORESCENT LAMPS, REMOTE MOUNTED FROM LIGHTING FIXTURE. COMPLY WITH UL 924.
1. EMERGENCY CONNECTION: OPERATE ONE FLUORESCENT LAMP CONTINUOUSLY. CONNECT UNSWITCHED CIRCUIT TO BATTERY-INVERTER UNIT AND SWITCHED CIRCUIT TO FIXTURE BALLAST.
2. BATTERY: SEALED, MAINTENANCE-FREE, NICKEL-CADMIUM TYPE.
3. CHARGER: FULLY AUTOMATIC, SOLID-STATE, CONSTANT-CURRENT TYPE.
4. HOUSING: NEMA 250, TYPE 1 ENCLOSURE.
5. TEST PUSH BUTTON: PUSH-TO-TEST TYPE, IN UNIT HOUSING, SIMULATES LOSS OF NORMAL POWER AND DEMONSTRATES UNIT OPERABILITY.
6. LED INDICATOR LIGHT: INDICATES NORMAL POWER ON. NORMAL GLOW INDICATES TRICKLE CHARGE; BRIGHT GLOW INDICATES CHARGING AT END OF DISCHARGE CYCLE.
7. INTEGRAL SELF-TEST: FACTORY-INSTALLED ELECTRONIC DEVICE AUTOMATICALLY INITIATES CODE-REQUIRED TEST OF UNIT EMERGENCY OPERATION AT REQUIRED INTERVALS. TEST FAILURE IS ANNUNCIATED BY AN INTEGRAL AUDIBLE ALARM AND A FLASHING RED LED.

2.5 EXIT SIGNS

A. GENERAL REQUIREMENTS FOR EXIT SIGNS: COMPLY WITH UL 924; FOR SIGN COLORS, VISIBILITY, LUMINANCE, AND LETTERING SIZE, COMPLY WITH AUTHORITIES HAVING JURISDICTION.
B. INTERNALLY LIGHTED SIGNS:
1. LAMPS FOR AC OPERATION: LEDS, 50,000 HOURS MINIMUM RATED LAMP LIFE.
2. SELF-POWERED EXIT SIGNS (BATTERY TYPE): INTEGRAL AUTOMATIC CHARGER IN A SELF-CONTAINED POWER PACK.
a. BATTERY: SEALED, MAINTENANCE-FREE, NICKEL-CADMIUM TYPE.
b. CHARGER: FULLY AUTOMATIC, SOLID-STATE TYPE WITH SEALED TRANSFER RELAY.
c. OPERATION: RELAY AUTOMATICALLY ENERGIZES LAMP FROM BATTERY WHEN CIRCUIT VOLTAGE DROPS TO 80 PERCENT OF NOMINAL VOLTAGE OR BELOW. WHEN NORMAL VOLTAGE IS RESTORED, RELAY DISCONNECTS LAMPS FROM BATTERY, AND BATTERY IS AUTOMATICALLY RECHARGED AND FLOATED ON CHARGER.
d. TEST PUSH BUTTON: PUSH-TO-TEST TYPE, IN UNIT HOUSING, SIMULATES LOSS OF NORMAL POWER AND DEMONSTRATES UNIT OPERABILITY.
e. LED INDICATOR LIGHT: INDICATES NORMAL POWER ON. NORMAL GLOW INDICATES TRICKLE CHARGE; BRIGHT GLOW INDICATES CHARGING AT END OF DISCHARGE CYCLE.
f. INTEGRAL SELF-TEST: FACTORY-INSTALLED ELECTRONIC DEVICE AUTOMATICALLY INITIATES CODE-REQUIRED TEST OF UNIT EMERGENCY OPERATION AT REQUIRED INTERVALS. TEST FAILURE IS ANNUNCIATED BY AN INTEGRAL AUDIBLE ALARM AND A FLASHING RED LED.

2.6 FLUORESCENT LAMPS

A. T8 RAPID-START LAMPS, RATED 25 W MAXIMUM, NOMINAL LENGTH OF 48 INCHES (1220 MM), 2800 INITIAL LUMENS (MINIMUM), CRI 75 (MINIMUM), COLOR TEMPERATURE 3500 K, AND AVERAGE RATED LIFE 20,000 HOURS UNLESS OTHERWISE INDICATED.
B. T8 RAPID-START LAMPS, RATED 17 W MAXIMUM, NOMINAL LENGTH OF 24 INCHES (610 MM), 1300 INITIAL LUMENS (MINIMUM), CRI 75 (MINIMUM), COLOR TEMPERATURE 3500 K, AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED.
C. T5 RAPID-START LAMPS, RATED 28 W MAXIMUM, NOMINAL LENGTH OF 45.2 INCHES (1150 MM), 2900 INITIAL LUMENS (MINIMUM), CRI 85 (MINIMUM), COLOR TEMPERATURE 3000 K, AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED.

2.7 LIGHTING FIXTURE SUPPORT COMPONENTS

A. COMPLY WITH DIVISION 26 SECTION "HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS" FOR CHANNEL- AND ANGLE-IRON SUPPORTS AND NONMETALLIC CHANNEL AND ANGLE SUPPORTS.
B. SINGLE-STEM HANGERS: 1/2-INCH (13-MM) STEEL TUBING WITH SWIVEL BALL FITTINGS AND CEILING CANOPY. FINISH SAME AS FIXTURE.
C. TWIN-STEM HANGERS: TWO, 1/2-INCH (13-MM) STEEL TUBES WITH SINGLE CANOPY DESIGNED TO MOUNT A SINGLE FIXTURE. FINISH SAME AS FIXTURE.
D. WIRES: ASTM A 641/A 641M, CLASS 3, SOFT TEMPER, ZINC-COATED STEEL, 12 GAGE (2.68 MM).
E. ROD HANGERS: 3/16-INCH (5-MM) MINIMUM DIAMETER, CADMIUM-PLATED, THREADED STEEL ROD.

PART 3 – EXECUTION

3.1 INSTALLATION

A. LIGHTING FIXTURES:
1. SET LEVEL, PLUMB, AND SQUARE WITH CEILINGS AND WALLS UNLESS OTHERWISE INDICATED.
2. INSTALL LAMPS IN EACH LUMINAIRE.

B. LAY-IN CEILING LIGHTING FIXTURES SUPPORTS: USE GRID AS A SUPPORT ELEMENT.
1. INSTALL CEILING SUPPORT SYSTEM RODS OR WIRES, INDEPENDENT OF THE CEILING SUSPENSION DEVICES, FOR EACH FIXTURE. LOCATE NOT MORE THAN 6 INCHES (150 MM) FROM LIGHTING FIXTURE CORNERS.
2. SUPPORT CLIPS: FASTEN TO LIGHTING FIXTURES AND TO CEILING GRID MEMBERS AT OR NEAR EACH FIXTURE CORNER WITH CLIPS THAT ARE UL LISTED FOR THE APPLICATION.
3. FIXTURES OF SIZES LESS THAN CEILING GRID: INSTALL AS INDICATED ON REFLECTED CEILING PLANS OR CENTER IN ACOUSTICAL PANEL, AND SUPPORT FIXTURES INDEPENDENTLY WITH AT LEAST TWO 3/4-INCH (20-MM) METAL CHANNELS SPANNING AND SECURED TO CEILING TEES.
4. INSTALL AT LEAST ONE INDEPENDENT SUPPORT ROD OR WIRE FROM STRUCTURE TO A TAB ON LIGHTING FIXTURE. WIRE OR ROD SHALL HAVE BREAKING STRENGTH OF THE WEIGHT OF FIXTURE AT A SAFETY FACTOR OF 3.

C. SUSPENDED LIGHTING FIXTURE SUPPORT:
1. PENDANTS AND RODS: WHERE LONGER THAN 48 INCHES (1200 MM), BRACE TO LIMIT SWINGING.
2. STEM-MOUNTED, SINGLE-UNIT FIXTURES: SUSPEND WITH TWIN-STEM HANGERS.
3. CONTINUOUS ROWS: USE TUBING OR STEM FOR WIRING AT ONE POINT AND TUBING OR ROD FOR SUSPENSION FOR EACH UNIT LENGTH OF FIXTURE CHASSIS, INCLUDING ONE AT EACH END.
4. DO NOT USE GRID AS SUPPORT FOR PENDANT LUMINAIRES. CONNECT SUPPORT WIRES OR RODS TO BUILDING STRUCTURE.

D. CONNECT WIRING ACCORDING TO DIVISION 26 SECTION "LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES."

3.2 IDENTIFICATION

A. INSTALL LABELS WITH PANEL AND CIRCUIT NUMBERS ON CONCEALED JUNCTION AND OUTLET BOXES. COMPLY WITH REQUIREMENTS FOR IDENTIFICATION SPECIFIED IN DIVISION 26 SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS."
5.

3.3 IDENTIFICATION

A. COMPLY WITH REQUIREMENTS IN DIVISION 26 SECTION "IDENTIFICATION FOR ELECTRICAL SYSTEMS."

---

Client

PROJECT NORTH

Prime Consultant

IBI GROUP
ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231

Seal

LICENSED PROFESSIONAL ENGINEER
No.7256084-2202
RAY K. THOM
STATE of UTAH

Consultants

Baker
BAKER & ASSOCIATES
A unit of Michael Baker Corporation
Midvale Office
6955 Union Park Center, Suite 370
Midvale, Utah 84047
(801)-255-4400

Issues

| No. | Date | Appd. | Description |
|---|---|---|---|
| 1 | 5-28-09 | RKT | ADDENDUM 1 |

Revision

| No. | Date | Appd. | Description |
|---|---|---|---|

Notes

This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

UTAH NATIONAL GUARD ARMORY INTERIOR REMODEL

7600 AIRPORT RD. WEST JORDAN UT

Sheet Title

ELECTRICAL SPECIFICATIONS

| | |
|---|---|
| Scale: AS NOTED | Date: 05-28-09 |
| Drawn: RBM | Checked: RKT |
| Cad File: E602.DWG | Sheet No. |
| Project No. | E602 |

VOLTAGE: 277 /480 PHASE: 3 WIRE: 4 → PANELBOARD : → HA

BUS AMPERES: 225 → MAIN LUGS (ONLY) ON: → TYPE MOUNTING: → SURFACE

K.A.I.C. RATING: 65 → LOCATION: → ELECTRICAL ROOM

MAIN BKR. AMPS: NA → MAIN BREAKER MOUNTED ON: NA → FED FROM: → TRANSFORMER

| CKT. NO. | POLE | BKR AMPS | WIRE SIZE | CIRCUIT DESCRIPTION | TYPE OF LOAD | KVA PHASE A | KVA PHASE B | KVA PHASE C | CKT. NO. | POLE | BKR AMPS | WIRE SIZE | CIRCUIT DESCRIPTION | TYPE OF LOAD | KVA PHASE A | KVA PHASE B | KVA PHASE C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 20 | 12 | LIGHTING | 1 | 1.4 | | | 2 | 1 | 20 | 12 | LIGHTING | 1 | 3.2 | | |
| 3 | 1 | 20 | 12 | LIGHTING | 1 | | 4.0 | | 4 | 1 | 20 | 12 | LIGHTING | 1 | | 1.9 | |
| 5 | 1 | 20 | 12 | LIGHTING | 1 | | | 3.3 | 6 | 1 | 20 | 12 | LIGHTING | 1 | | | 3.2 |
| 7 | 1 | 20 | 12 | LIGHTING | 1 | 2.7 | | | 8 | 1 | 20 | 12 | LIGHTING | 1 | 2.5 | | |
| 9 | 1 | 20 | 12 | LIGHTING | 1 | | 3.2 | | 10 | 1 | 20 | 12 | LIGHTING | 1 | | 3.8 | |
| 11 | 1 | 20 | 12 | LIGHTING | 1 | | | 2.6 | 12 | | | --- | SPARE | 1 | | | 0.0 |
| 13 | 1 | 20 | 12 | LIGHTING | 1 | 3.8 | | | 14 | | | --- | SPARE | 1 | 0.0 | | |
| 15 | 1 | 20 | 12 | LIGHTING | 1 | | 2.7 | | 16 | | | --- | SPARE | 1 | | 0.0 | |
| 17 | 1 | 20 | 12 | VAV | 1 | | | 1.4 | 18 | 1 | 20 | 12 | LIGHT STORAGE BLDG | 1 | | | 2.8 |
| 19 | 1 | 20 | 12 | VAV | 1 | 1.4 | | | 20 | 1 | 20 | 12 | VAV | 1 | 1.4 | | |
| 21 | | | --- | SPARE | 1 | | 0.0 | | 22 | 1 | 20 | 12 | VAV | 1 | | 1.4 | |
| 23 | | | --- | SPARE | 1 | | | 0.0 | 24 | 1 | 20 | 12 | VAV | 1 | | | 1.4 |
| 25 | | | --- | SPARE | 1 | 0.0 | | | 26 | 1 | 20 | 12 | LIGHT POLES | 1 | UNK | | |
| 27 | | | --- | SPARE | 1 | | 0.0 | | 28 | 1 | 20 | 12 | OUTSIDE LIGHTS | 1 | | UNK | |
| 29 | 3 | 20 | 12 | BOILER | 1 | | | UNK | 30 | 1 | 20 | 12 | OUTSIDE LIGHTS STOR | 1 | | | UNK |
| 31 | | | --- | BOILER | 1 | UNK | | | 32 | 1 | 20 | 12 | LIGHTING (RM 428,429) | 1 | 0.4 | | |
| 33 | | | --- | BOILER | 1 | | UNK | | 34 | 1 | 20 | 12 | LIGHING (RM 427) | 1 | | 0.4 | |
| 35 | 1 | 20 | 12 | SURGE PROTECTION | 1 | | | UNK | 36 | 1 | 20 | 12 | LIGHTING (414A, 414, 411, | 1 | | | 0.9 |
| 37 | 1 | 20 | 12 | LIGHTING (RM 430) | 1 | 0.8 | | | 38 | | | --- | | 1 | | | |
| 39 | 1 | 20 | 12 | LIGHTING (RM 431) | 1 | | 0.8 | | 40 | | | --- | | 1 | | | |
| 41 | | | --- | | 1 | | | | 42 | | | --- | | 1 | | | |

| PANELBOARD LOAD SUMMARY: | PHASE A | PHASE B | PHASE C | TOTAL |
|---|---|---|---|---|
| TOTALS ( KVA ) : | 17.6 | 18.2 | 15.6 | 51.5 |
| TOTALS ( AMPS ) : | 146.8 | 151.9 | 130.3 | 143.0 |

VOLTAGE: 120 /208 PHASE: 3 WIRE: 4 → PANELBOARD : → LAIII

BUS AMPERES: 225 → MAIN LUGS (ONLY) ON: → TYPE MOUNTING: → SURFACE

K.A.I.C. RATING: 65 → LOCATION: → ELECTRICAL ROOM

MAIN BKR. AMPS: NA → MAIN BREAKER MOUNTED ON: NA → FED FROM: → TRANSFORMER

| CKT. NO. | POLE | BKR AMPS | WIRE SIZE | CIRCUIT DESCRIPTION | TYPE OF LOAD | KVA PHASE A | KVA PHASE B | KVA PHASE C | CKT. NO. | POLE | BKR AMPS | WIRE SIZE | CIRCUIT DESCRIPTION | TYPE OF LOAD | KVA PHASE A | KVA PHASE B | KVA PHASE C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | --- | SPACE | 1 | UNK | | | 2 | 1 | 20 | 12 | UNKNOWN | 1 | UNK | | |
| 3 | | | --- | SPACE | 1 | | UNK | | 4 | 1 | 20 | 12 | UNKNOWN | 1 | | UNK | |
| 5 | 1 | 20 | 12 | UNKNOWN | 1 | | | UNK | 6 | 1 | 20 | 12 | UNKNOWN | 1 | | | UNK |
| 7 | 1 | 20 | 12 | UNKNOWN | 1 | UNK | | | 8 | 1 | 20 | 12 | UNKNOWN | 1 | UNK | | |
| 9 | 1 | 20 | 12 | UNKNOWN | 1 | | UNK | | 10 | 1 | 20 | 12 | UNKNOWN | 1 | | UNK | |
| 11 | 1 | 20 | 12 | ROOMS 431, 430 | 1 | | | 1.3 | 12 | 1 | 20 | 12 | ROOM 427 | 1 | | | 0.7 |
| 13 | 1 | 20 | 12 | ROOMS 431, 430 | 1 | 1.1 | | | 14 | | | --- | | 1 | | | |
| 15 | 1 | 20 | 12 | ROOM 429 | 1 | | 0.7 | | 16 | | | --- | | 1 | | | |
| 17 | 1 | 20 | 12 | ROOM 428 | 1 | | | 0.7 | 18 | | | --- | | 1 | | | |
| 19 | 1 | 20 | 12 | ROOMS 418A, 418 | 1 | 0.4 | | | 20 | | | --- | | 1 | | | |
| 21 | 1 | 20 | 12 | ROOMS 414A, 414 | 1 | | 0.9 | | 22 | | | --- | | 1 | | | |
| 23 | 1 | 20 | 12 | ROOMS 411A, 414 | 1 | | | 0.7 | 24 | | | --- | | 1 | | | |
| 25 | 1 | 20 | 12 | ROOM 412 | 1 | 0.5 | | | 26 | | | --- | | 1 | | | |
| 27 | 1 | 20 | 12 | ROOM 412 | 1 | | 0.5 | | 28 | | | --- | | 1 | | | |
| 29 | 1 | 20 | 12 | ROOM 407A, 407 | 1 | | | 0.4 | 30 | | | --- | | 1 | | | |
| 31 | | | --- | | 1 | | | | 32 | | | --- | | 1 | | | |
| 33 | | | --- | | 1 | | | | 34 | | | --- | | 1 | | | |
| 35 | | | --- | | 1 | | | | 36 | | | --- | | 1 | | | |
| 37 | | | --- | | 1 | | | | 38 | | | --- | | 1 | | | |
| 39 | | | --- | | 1 | | | | 40 | | | --- | | 3 | | | |
| 41 | | | --- | | 1 | | | | 42 | | | --- | | 2 | | | |

| PANELBOARD LOAD SUMMARY: | PHASE A | PHASE B | PHASE C | TOTAL |
|---|---|---|---|---|
| TOTALS ( KVA ) : | 2.0 | 2.1 | 3.8 | 8.0 |
| TOTALS ( AMPS ) : | 17.0 | 17.8 | 31.7 | 22.2 |

## LIGHTING FIXTURE SCHEDULE

| LTR | LOCATION | STYLE | MOUNTING | MANUFACTURER/CATALOG NO. | LAMP | VOLTS | NOTES |
|---|---|---|---|---|---|---|---|
| A | OFFICE AREAS CLASSROOMS | 2' X 4' | RECESSED | LITHONIA CAT.NO. 2PMO G B 3 32 27LS MVOLT GEB10IS OR ENG. APPROVED EQUAL | FLUORESCENT 3-25W T8(48") | 277VAC | EMERGENCY BALLASTS TO BE INSTALLED WHERE INDICATED |
| B | EXERCISE ROOM | 2' X 4' | SUFACE | LITHONIA CAT.NO. 2VRS 4 32 AR12 MVOLT GEB10IS OR ENG. APPROVED EQUAL | FLUORESCENT 4-25W T8(48") | 277VAC | EMERGENCY BALLASTS TO BE INSTALLED WHERE INDICATED |
| C | EXIT LOCATIONS | 13"X10" | SURFACE | LITHONIA CAT.NO LE S W 1 G 120/277 ELNSD OR ENG. APPROVED EQUAL | LED | 277VAC | |

Client

PROJECT NORTH

Prime Consultant

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231

Seal

LICENSED PROFESSIONAL ENGINEER No.7256084-2202 RAY K. THOM STATE of UTAH

Consultants

Baker
BAKER & ASSOCIATES
A unit of Michael Baker Corporation
Midvale Office
6955 Union Park Center, Suite 370
Midvale, Utah 84047
(801)-255-4400

Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 05-28-09 | RKT | ADDENDUM 1 |

| No. | Date | Apprd. | Description |
|---|---|---|---|

Revision

Notes

This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

UTAH NATIONAL GUARD
ARMORY INTERIOR REMODEL

7600 AIRPORT RD. WEST JORDAN UT

Sheet Title

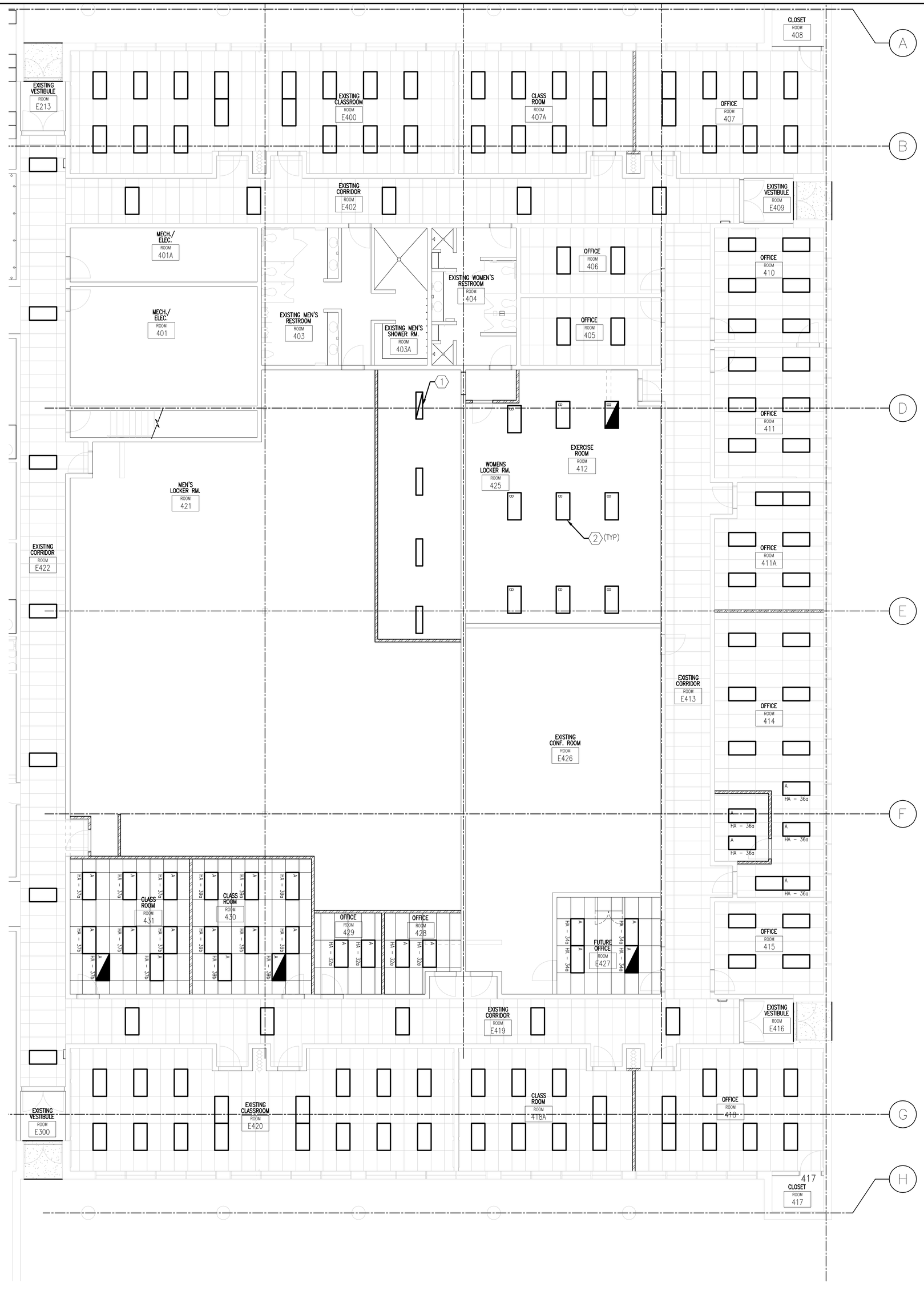
ELECTRICAL PANEL SCHEDULES

| Scale | Date |
|---|---|
| AS NOTED | 05-28-09 |
| Drawn: RBM | Checked: RKT |
| Cad File: E601.DWG | Sheet No. E601 |
| Project No. | |

ARCH E1 - ADT 2002

P:\proj\Lake Gam Army National Guard Armory\Drawings\Electrical\E601.dwg, 5/28/2009 11:54:23 AM, PDF995.pc3

PLOTTED DATE:




## 1 E102 ELEC. LIGHTING PLAN

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

## GENERAL NOTES:

1) PANEL AND CIRCUIT NUMBER DESIGNATIONS ARE FOR GENERAL REFERENCE ONLY AND WERE NOT FIELD VERIFIED. ANY EXISTING CIRCUIT MODIFICATIONS SHOULD BE FIELD VERIFIED BEFORE BEGINNING WORK.

2) ALL POWER CONDUIT TO BE A MINIMUM 3/4" EMT WITH TYPE THHN, STRANDED COPPER CONDUCTORS

3) THE WIRE SIZE FROM A 20 AMPERE, SINGLE POLE, 277 VOLT CIRCUIT BREAKER MOUNTED IN A PANELBOARD TO THE LOAD SHALL BE AS FOLLOWS:

NO. 12 AWG WIRE – UP TO 100 FEET RUN
NO. 10 AWG WIRE – 101 FEET RUN TO 200 FEET RUN
NO. 8 AWG WIRE – 201 FEET RUN TO 300 FEET RUN

## KEYNOTES:

1. EXISTING LIGHT FIXTURE TO HAVE AN EMERGENCY BATTERY PACK INSTALLED IN IT
2. NEW LIGHT FIXTURE TO BE MOUNTED IN THE PLACE OF THE EXISTING LIGHT FIXTURES. UTILIZE THE EXISTING CIRCUIT FEED.

Client

PROJECT NORTH

Prime Consultant

IBI GROUP
ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231

Seal

LICENSED PROFESSIONAL ENGINEER
No.7256084-2202
RAY K. THOM
STATE of UTAH

Consultants

Baker
BAKER & ASSOCIATES
A unit of Michael Baker Corporation
Midvale Office
6955 Union Park Center, Suite 370
Midvale, Utah 84047
(801)-255-4400

Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 05-28-09 | RKT | ADDENDUM 1 |

| No. | Date | Apprd. | Description |
|---|---|---|---|

Revision

Notes

This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

UTAH NATIONAL GUARD
ARMORY INTERIOR REMODEL

7600 AIRPORT RD. WEST JORDAN UT

Sheet Title

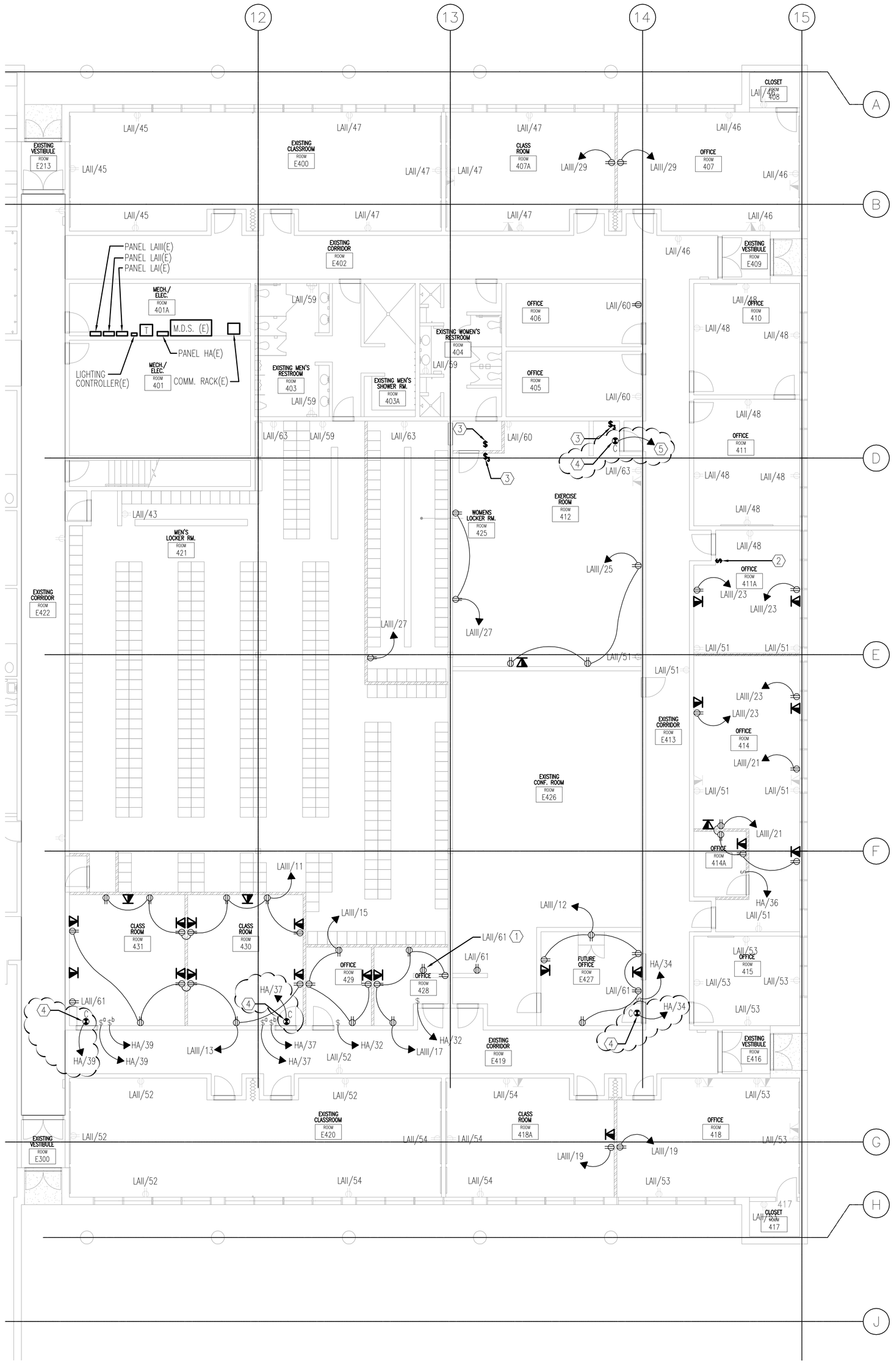
ELECTRICAL LIGHTING PLAN

| | |
|---|---|
| Scale: AS NOTED | Date: 05-28-09 |
| Drawn: RBM | Checked: RKT |
| Cad File: E102.DWG | Sheet No. E102 |
| Project No. | |

ARCH E 3 - ACT 2007

P:\proj\Jake Garn Army National Guard Armory\Drawings\Electrical\E102.dwg, 5/28/2009 11:54:44 AM, PDF995.pc3

PLOTTED DATE:




## 1 E101 ELEC. POWER PLAN

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

## GENERAL NOTES:

1) PANEL AND CIRCUIT NUMBER DESIGNATIONS ARE FOR GENERAL REFERENCE ONLY AND WERE NOT FIELD VERIFIED. ANY EXISTING CIRCUIT MODIFICATIONS SHOULD BE FIELD VERIFIED BEFORE BEGINNING WORK.

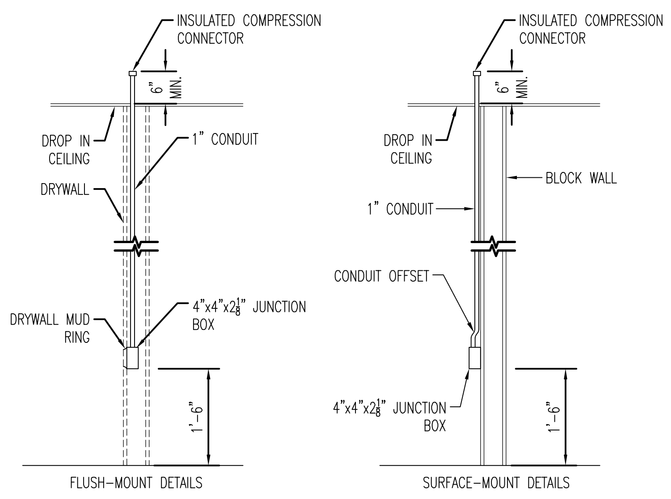
2) ALL POWER CONDUIT TO BE A MINIMUM 3/4" EMT WITH TYPE THHN, STRANDED COPPER CONDUCTORS

3) THE WIRE SIZE FROM A 20 AMPERE, SINGLE POLE, 120 VOLT CIRCUIT BREAKER MOUNTED IN A PANELBOARD TO THE LOAD SHALL BE AS FOLLOWS:

NO. 12 AWG WIRE – UP TO 100 FEET RUN
NO. 10 AWG WIRE – 101 FEET RUN TO 200 FEET RUN
NO. 8 AWG WIRE – 201 FEET RUN TO 300 FEET RUN

## KEYNOTES:

1. EXISTING OUTLET TO BE DISCONNECTED AND REMOVED. A JUNCTION IS TO BE INSTALLED IN THE ATTIC TO ACCOMMODATE THE CONTINUATION OF THE CIRCUIT TO OTHER EXISTING OUTLETS
2. REPLACE EXISTING 3-WAY TOGGLE SWITCH WITH A SINGLE-POLE TOGGLE SWITCH. UTILIZE THE EXISTING LIGHTING CIRCUIT IN THE ROOM TO CONTROL EXISTING LIGHT FIXTURES.
3. NEW TOGGLE SWITCH TO CONTROL NEW AND EXISTING LIGHT FIXTURES IN EACH AREA. UTILIZE THE EXISTING LIGHT CIRCUIT IN EACH ROOM LOCATION.
4. NEW EXIT SIGN TO BE SURFACE MOUNTED ABOVE EACH DOOR FRAME. SEE LIGHT FIXTURE SCHEDULE ON DRAWING E-601 FOR ADDITIONAL DETAILS.
5. CONNECT THE NEW EXIT SIGN INTO THE EXISTING POWER FEED FOR THE LIGHTS IN THE ROOM.




## 2 E101 COMM. DROP DETAIL - TYPICAL

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

Client

PROJECT NORTH

Prime Consultant

IBI GROUP
ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231

Seal

LICENSED PROFESSIONAL ENGINEER No.7256084-2202 RAY K. THOM STATE of UTAH

Consultants

Baker
BAKER & ASSOCIATES
A unit of Michael Baker Corporation
Midvale Office
6955 Union Park Center, Suite 370
Midvale, Utah 84047
(801)-255-4400

Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 27 MAY, 09 | RKT | ADDENDUM 1 |

Revision

| No. | Date | Apprd. | Description |
|---|---|---|---|

Notes

This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

UTAH NATIONAL GUARD ARMORY INTERIOR REMODEL

7600 AIRPORT RD. WEST JORDAN UT

Sheet Title

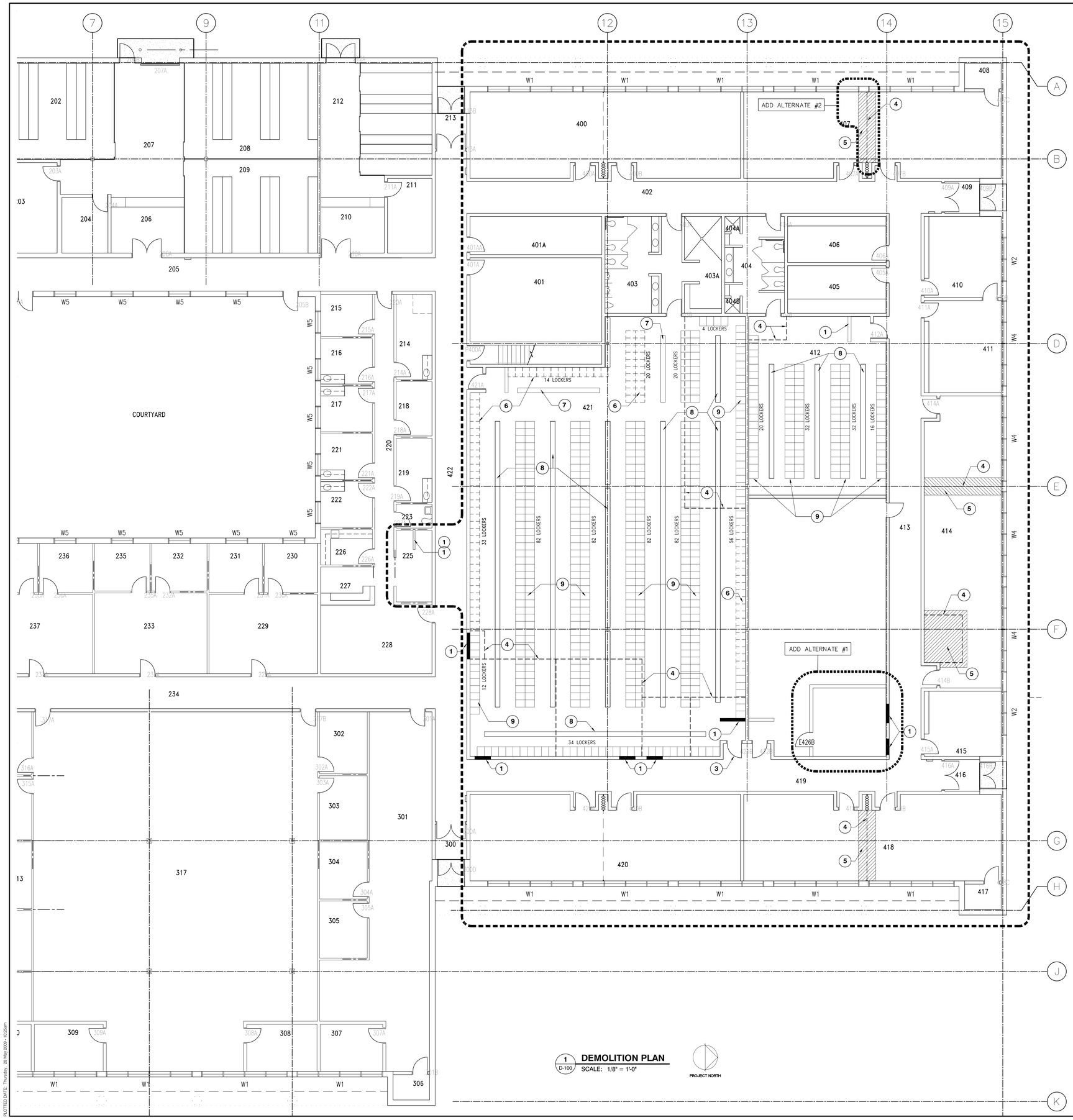
ELECTRICAL POWER PLAN

| | |
|---|---|
| Scale: AS NOTED | Date: 05-28-09 |
| Drawn: RBM | Checked: RKT |
| Cad File: E101.DWG | Sheet No. |
| Project No. | E101 |

P:\proj\Jake Garn Army National Guard Armory\Drawings\Electrical\E101.dwg, 5/28/2009 11:55:11 AM, PDF995.pc3

PLOTTED DATE:

ARCH E.3 - AUG 2001




## 1 D-100 DEMOLITION PLAN

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

PROJECT NORTH

## GENERAL NOTES

1. EXISTING FIRE SPRINKLER SYSTEM HEAD LOCATIONS TO BE MODIFIED TO MEET THE CITY OF WEST JORDAN'S REQUIRED FIRE SPRINKLER HEAD LOCATIONS.
2. UNLESS OTHERWISE NOTED , ALL WALLS ARE EXISTING & SHALL REMAIN UNDISTURBED.
3. UNLESS OTHERWISE NOTED ALL DOORS & FRAMES TO REMAIN UNDISTURBED.
4. CONTRACTOR TO REPAIR AND/OR REPLACE ANY ITEMS IN OR ON THE BUILDING THAT ARE DAMAGED BY CONSTRUCTION ACTIVITIES DURING THE CONSTRUCTION PROCESS

## DEMOLITION NOTES

1. EXISTING CMU WALL TO BE REMOVED; PATCH FLOOR & ADJACENT WALL AS REQUIRED AFTER REMOVAL. RE: PLAN FOR LOCATIONS
2. SAWCUT EXISTING CMU BLOCK WALL TO ACCEPT HOLLOW METAL FRAME: REFER TO DOOR AND WINDOW TYPES
3. EXISTING DOOR TO BE REMOVED FOR RELOCATION TO NEW LOCKER ENTRANCE
4. LINE OF NEW WALL CONSTRUCTION
5. CEILING GRID & TILE SYSTEM REMOVED & STORED FOR RE-USE AFTER NEW WALL IS CONSTRUCTED
6. EXISTING LOCKERS TO REMAIN UNDISTURBED RE: NEW PLAN FOR LAYOUT
7. EXISTING BENCH TO REMAIN UNDISTURBED
8. EXISTING BENCH TO BE REMOVED & RETAINED BY OWNER (AT THEIR DISCRETION)
9. EXISTING LOCKERS TO BE REPLACED BY CONTRACTOR TO NEW POSITIONS AS SHOWN ON NEW PLAN. (UNUSED LOCKERS TO BE RETAINED BY OWNER). VERIFY ATTACHMENT TO CONCRETE FLOOR.


Client:

STATE OF UTAH
DIVISION OF FACILITIES AND CONSTRUCTION MANAGEMENT
4110 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114
TEL: (801) 538-3018
FAX: (801) 538-3267

CONTACT: WAYNE SMITH


DFCM PROJECT #: 09081480


Prime Consultant:

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231


Seal


Consultants

MICHAEL BAKER JR. CORP. (ENGINEERING)
6955 UNION PARK CENTER, SUITE 370
MIDVALE, UTAH 84047

CONTACTS:
MECHANICAL:
TODD DORIOUS
TEL: (801) 352-5971
ELECTRICAL:
RAY THOM
TEL: (801) 352-5985


Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 28-May 2009 | | PLAN CHECK COMMENT RESPONSES |

Revision


Notes

This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.


Project Title

# UTAH NATIONAL GUARD ARMORY INTERIOR REMODEL

7602 AIRPORT ROAD, WEST JORDAN, UTAH

Sheet Title

# DEMOLITION PLAN

| | |
|---|---|
| Scale: 1/8" = 1'-0" | Date: 20 MAY, 2009 |
| Drawn: C.S. | Checked: J.G. |
| Cad File: D100.DWG | Sheet No. D-100 |
| Project No. IBI-25946 | |

PLOTTED DATE: Thursday, 28 May 2009 - 10:25am

ARCH E1 - ADT 2007

## FINISH SCHEDULE

| ROOM NO. | ROOM NAME | FLOOR | BASE | WALLS NORTH | WALLS EAST | WALLS SOUTH | WALLS WEST | CEILING | MILLWORK | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| E213 | EXST. VESTIBULE | SPACE TO REMAIN UNCHANGED | | | | | | | | |
| E225 | EXST. FILE RM. | – | – | – | – | – | W2 | – | – | |
| E300 | EXST. VESTIBULE | SPACES TO REMAIN UNCHANGED | | | | | | | | |
| E400 | EXST. CLASSROOM | | | | | | | | | |
| E401 | EXST. MECH/ELEC. | | | | | | | | | |
| E401A | EXST. MECH/ELEC. | | | | | | | | | |
| E402 | EXST. HALLWAY | | | | | | | | | |
| 403 | EXST. MENS RM. | | | | | | | | | |
| 403A | EXST. MENS SHW. | | | | | | | | | |
| 404 | EXST. WOM. SHW. | | | | | | | | | |
| 405 | OFFICE | F2 | – | W3 | W3 | W3 | W3 | C2 | – | |
| 406 | OFFICE | F2 | – | W3 | W3 | W3 | W3 | C2 | – | |
| 407 | OFFICE | F3 | B1 | – | – | W1 | – | C3 | – | |
| 407A | CLASS ROOM | F3 | B1 | W1 | – | – | – | C3 | – | |
| E409 | EXST. VESTIBULE | SPACES TO REMAIN UNCHANGED | | | | | | | | |
| 410 | OFFICE | | | | | | | | | |
| 411 | OFFICE | | | | | | | | | |
| 411A | OFFICE | F3 | B1 | – | W1 | – | – | C3 | – | |
| 412 | EXERCISE ROOM | F5/F4 | B1 | – | – | – | W1 | C4 | – | |
| 413 | EXST. HALLWAY | – | – | – | – | W2 | – | C2 | – | |
| 414 | OFFICE | F2 | B1 | W1 | – | W1 | – | C3 | – | |
| 414A | OFFICE | F2 | B1 | W1 | W1 | W1 | W1 | C1 | – | |
| 415 | OFFICE | SPACES TO REMAIN UNCHANGED | | | | | | | | |
| E416 | EXST. VESTIBULE | | | | | | | | | |
| 418 | OFFICE | F3 | B1 | – | – | W1 | – | C3 | – | |
| 418A | CLASS ROOM | F3 | B1 | W1 | – | – | – | C3 | – | |
| E419 | EXST. HALLWAY | F3 | – | – | – | – | W2 | C2 | – | |
| E420 | EXST. CLASSROOM | SPACE TO REMAIN UNCHANGED | | | | | | | – | |
| 421 | MEN'S LOCKER | F5 | B1 | W1 | W1 | – | – | C4 | – | |
| E422 | EXST. HALLWAY | F3 | B1 | W2 | – | – | – | C2 | – | ADD ALTERNATE #1 |
| 425 | WOMEN'S LOCKER | F5 | B1 | W2 | W1 | W1 | – | C4 | – | |
| E426 | CONF. ROOM | F3 | – | – | – | – | – | C5 | – | |
| 427 | OFFICE | F2 | – | W2 | – | – | – | C1 | M1 | |
| 428 | OFFICE | F2 | B1 | W1 | – | W1 | W1 | C1 | – | |
| 429 | OFFICE | F2 | B1 | W1 | – | W1 | W1 | C1 | – | |
| 430 | CLASS ROOM | F2 | B1 | W1 | – | W1 | W1 | C1 | – | |
| 431 | CLASS ROOM | F2 | B1 | W1 | – | W1 | W1 | C1 | – | |

NOTE: REPAIR AND REPLACE EXISTING BUILDING COMPONENTS DAMAGED BY CONSTRUCTINO ACTIVITIES

FLOOR

F1 PATCH DAMAGED FLOOR FROM DEMOLITION

F2 NEW CARPET TILES TO MATCH EXISTING

F3 EXISTING FLOOR TILES TO REMAIN

F4 RUBBER SPORTS MAT (TILES) INSTALLED ON CONCRETE FLOOR – ALLOW FOR 300 S.F. OF TILES

F5 NEW CARPET TILES TO MATCH EXISTING

BASE

B1 4" RUBBER BASE (ROPPE OR EQ.)

CEILING

C1 NEW CEILING TILES TO MATCH EXISTING

C2 EXISTING CEILING TO REMAIN

C3 EXISTING CEILING TO REMAIN; REPAIR AND REPLACE CEILING SYSTEM AND TILES AS REQUIRED FOR NEW WALL.

C4 OPEN TO STRUCTURE

C5 EXISTING CEILING TO BE MODIFIED AS REQUIRED TO MEET MECHANICAL DIFFUSER REQUIREMENTS

WALL

W1 NEW WALL TO BE PAINTED

W2 PATCH, REPAIR AND PAINT AREA OF DEMOLITINO AS REQUIRED FOR FINISHED APPEARANCE

W3 PATCH EXISTING WALL AS REQUIRED AND PAINT

MILLWORK

M1 PRE-MANUFACTERED SOLID WOOD CABINET 36"W X 16"D X 72"H TO HOUSE EXISTING A/V EQUIPMENT

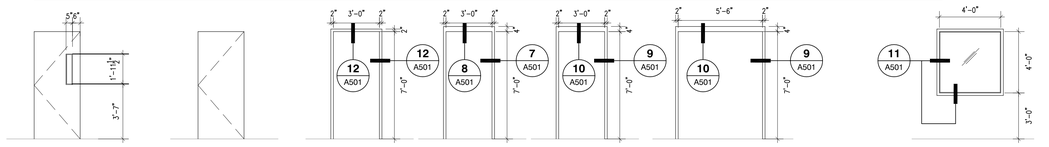
## DOOR SCHEDULE

| DOOR NO. | INT EXT | DOOR TYPE | DOOR SIZE WIDTH | HEIGHT | THICK | FIRE RATING | GL | DOOR FINISH MAT | INT | EXT | DETAILS HEAD | JAMB | THRESH | FRAME MAT | INT | EXT | FIRE R. | TYP. | HARDWARE GROUP | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 414A-A | INT | B | 3-0 | 7-0 | 1 3/4" | NR | – | HM | PT | PT | 12/A501 | 12/A501 | – | H.M. | PT. | PT. | NR | F1 | II | |
| 427A | INT | A | 3-0 | 7-0 | 1 3/4" | NR | – | WD | ST | ST | 8/A501 | 7/A501 | – | H.M. | PT. | PT. | NR | F2 | II | ADD ALTERNATE #1 |
| 428A | INT | A | 3-0 | 7-0 | 1 3/4" | NR | – | WD | PT | PT | EXISTING DOOR FRAME TO REMAIN | | | | | | | | USE EXISTING | VERIFY SMOKE SEAL IS INSTALLED |
| 429A | INT | A | 3-0 | 7-0 | 1 3/4" | NR | – | WD | PT | PT | 8/A501 | 7/A501 | – | H.M. | PT. | PT. | NR | F2 | I | |
| 430A | INT | A | 3-0 | 7-0 | 1 3/4" | NR | – | WD | PT | PT | 8/A501 | 7/A501 | – | H.M. | PT. | PT. | NR | F2 | I | |
| 431A | INT | A | 3-0 | 7-0 | 1 3/4" | NR | – | WD | PT | PT | 8/A501 | 7/A501 | – | H.M. | PT. | PT. | NR | F2 | I | |
| 421B | EXISTING DOOR TO BE RELOCATED TO NEW LOCATION IN LOCKER ROOM | | | | | | | | | | 8/A501 | 7/A501 | – | H.M. | PT. | PT. | NR | F2 | IV | |
| 425A | INT | B | 3-0 | 7-0 | 1 3/4" | NR | – | HM | PT | PT | 12/A501 | 12/A501 | – | H.M. | PT. | PT. | NR | F1 | IV | |

## HARDWARE UPGRADE

1) REFER TO SHEET G-002 FOR NEW HARDWARE GROUPS.
2) HARDWARE UPGRADE WAS COMPLETED TO MEET 2006 IBC SECTION 3409 ACCESABILITY STANDARD.

| DOOR NO. | HARDWARE GROUP | DOOR NO. | HARDWARE GROUP | DOOR NO. | HARDWARE GROUP | DOOR NO. | HARDWARE GROUP | DOORS TO KEEP EXISITNG HARDWARE |
|---|---|---|---|---|---|---|---|---|
| 400A | I | 405A | II | 418B | II | 431A | I | 407C |
| 400B | I | 406A | II | 403A | III | | | 409A |
| 407A | I | 407B | II | 403B | III | | | 409B |
| 412A | I | 410A | II | 404A | III | | | 410B |
| 412B | I | 411A | II | 404B | III | | | 416A |
| 418A | I | 414A | II | 421A | IV | | | 416B |
| 420A | I | 414A-A | II | 428A | II | | | 418C |
| 420B | I | 414B | II | 429A | II | | | 426B |
| 426A | I | 415A | II | 430A | I | | | |




DOOR TYPE: A
20 MIN. FIRE RATING
SOLID CORE WOOD
FIRE RATED GLAZING

DOOR TYPE: B
H.M.

FRAME TYPE: F1
H.M.
SOLID GROUT FRAME

FRAME TYPE: F2
H.M.
SOLID GROUT FRAME

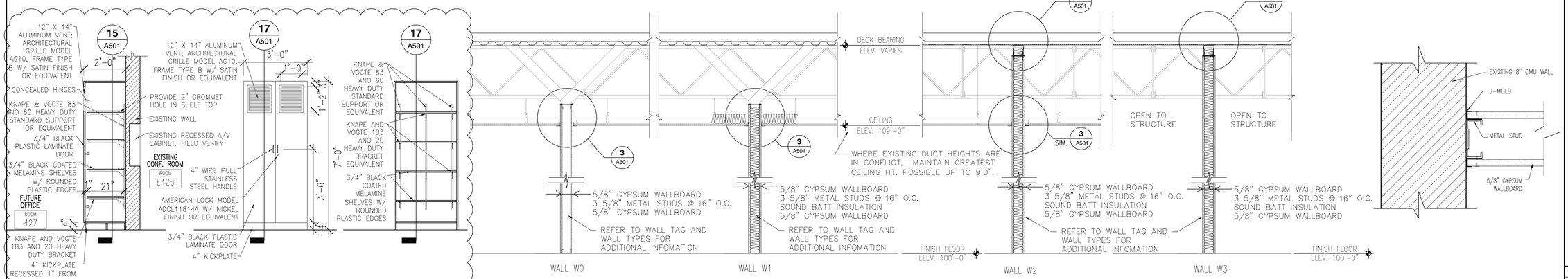
FRAME TYPE: F3
H.M.
SOLID GROUT FRAME

FRAME TYPE: F4
H.M.
SOLID GROUT FRAME

WINDOW TYPE: W1
H.M.
FIRE RESISTIVE GLAZING
SOLID GROUT FRAME

19 A501 **DOOR & FRAME TYPES**
SCALE: 1/4" = 1'-0"

18 A501 **WINDOW TYPE**
SCALE: 1/4" = 1'-0"



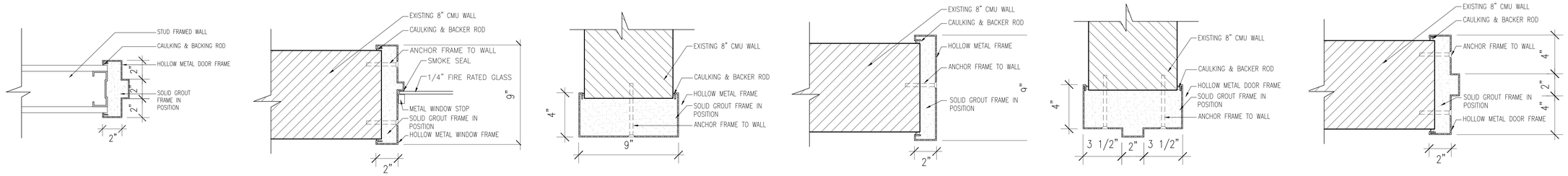

17 A501 **CABINET SECTION**
SCALE: 1/2" = 1'-0"

16 A501 **CABINET ELEVATION**
SCALE: 1/2" = 1'-0"

15 A501 **CABINET SECTION**
SCALE: 1/2" = 1'-0"

14 A501 **WALL SECTIONS/TYPES**
SCALE: 3/4" = 1'-0"

13 A501 **NEW WALL TO EXISTING WALL DETAIL**
SCALE: 3" = 1'-0"




12 A501 **DOOR JAMB/HEAD DETAIL**
SCALE: 3" = 1'-0"

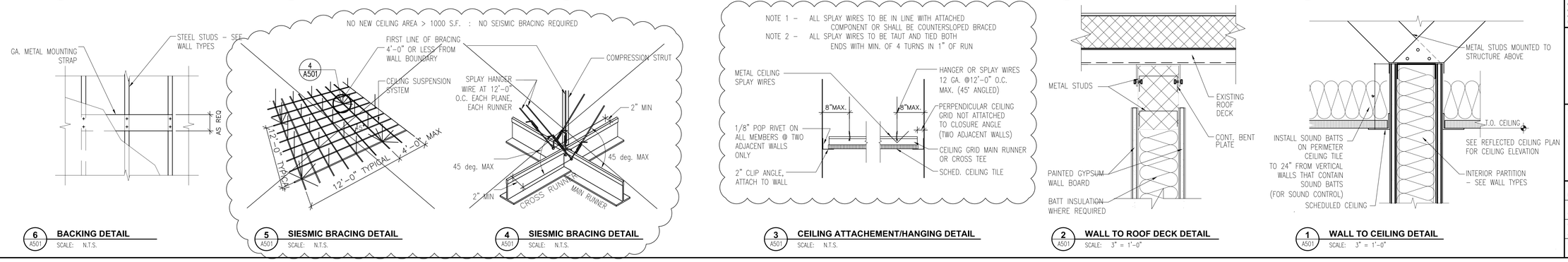
11 A501 **WINDOW HEAD/JAMB DETAIL**
SCALE: 3" = 1'-0"

10 A501 **METAL FRAME HEAD DETAIL**
SCALE: 3" = 1'-0"

9 A501 **METAL FRAME JAMB DETAIL**
SCALE: 3" = 1'-0"

8 A501 **DOOR FRAME HEAD DETAIL**
SCALE: 3" = 1'-0"

7 A501 **DOOR FRAME JAMB DETAIL**
SCALE: 3" = 1'-0"




6 A501 **BACKING DETAIL**
SCALE: N.T.S.

5 A501 **SIESMIC BRACING DETAIL**
SCALE: N.T.S.

4 A501 **SIESMIC BRACING DETAIL**
SCALE: N.T.S.

3 A501 **CEILING ATTACHEMENT/HANGING DETAIL**
SCALE: N.T.S.

2 A501 **WALL TO ROOF DECK DETAIL**
SCALE: 3" = 1'-0"

1 A501 **WALL TO CEILING DETAIL**
SCALE: 3" = 1'-0"


Client:
STATE OF UTAH
DIVISION OF FACILITIES AND CONSTRUCTION MANAGEMENT
4110 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114
TEL: (801) 538-3018
FAX: (801) 538-3267
CONTACT: WAYNE SMITH


1
DFCM PROJECT #: 09081480


Prime Consultant:
IBI GROUP
ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231


Seal


Consultants
MICHAEL BAKER JR. CORP. (ENGINEERING)
6955 UNION PARK CENTER, SUITE 370
MIDVALE, UTAH 84047
CONTACTS:
MECHANICAL:
TODD DORIOUS
TEL: (801) 352-5971
ELECTRICAL:
RAY THOM
TEL: (801) 352-5985


Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 28-May 2009 | | ADDENDUM 1-PLAN CHK COMMENTS |

Revision


Notes
This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

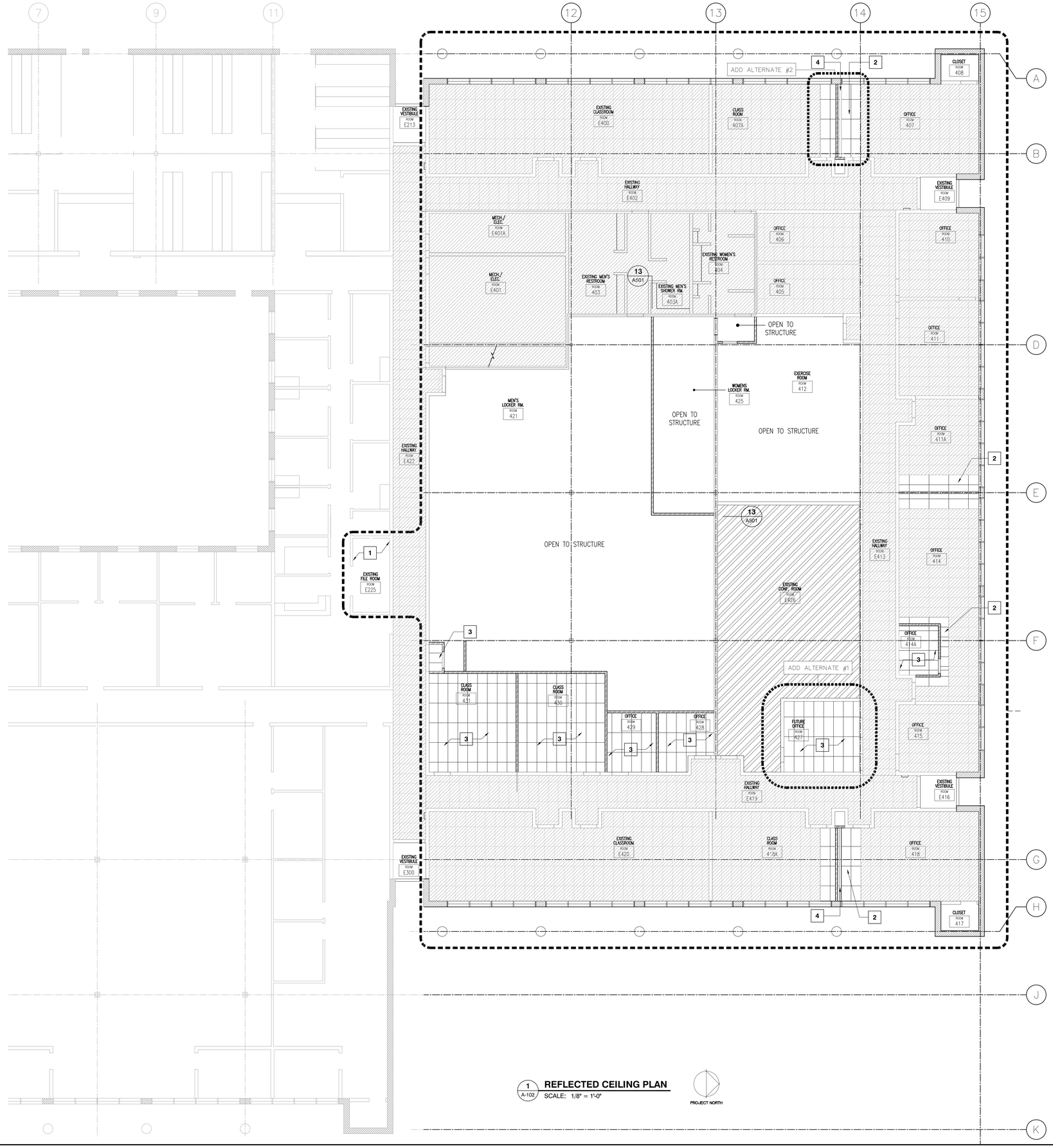

Project Title
UTAH NATIONAL GUARD ARMORY INTERIOR REMODEL
7602 AIRPORT ROAD, WEST JORDAN, UTAH

Sheet Title
SCHEDULES
WALL TYPES
WALL SECTIONS
DETAILS

| Scale | Date |
|---|---|
| N.T.S. | 20 MAY, 2009 |
| Drawn: C.S. | Checked: J.G. |
| Cad File: A501.DWG | Sheet No. A-501 |
| Project No. IBI-25946 | |

PLOTTED DATE: Thursday, 28 May 2009 - 10:39am

ARCH E1 - AOT 2007




1 A-102 **REFLECTED CEILING PLAN**
SCALE: 1/8" = 1'-0"

PROJECT NORTH

## GENERAL NOTES

1. EXISTING FIRE SPRINKLER SYSTEM HEAD LOCATIONS TO BE MODIFIED TO MEET THE CITY OF WEST JORDAN'S REQUIRED FIRE SPRINKLER HEAD LOCATIONS.
2. REFER TO SHEET A101 FOR ADD ALTERNATE INFORMATION
3. REFER TO 14/A501 FOR CEILING HEIGHT INFORMATION

## REFERENCE NOTES

1. CEILING TO REMAIN UNDISTURBED IN THIS AREA
2. MODIFIED CEILING GRID TO ACCOMMODATE NEW WALL RE: FLOOR PLAN & DETAILS FOR WALL INFO
3. NEW CEILING TILE & SUSPENDED SYSTEM
4. EXISTING MOVABLE PARTITION DOOR RAIL TO REMAIN. FRAME NEW WALL TO THE SIDE OF THE RAIL AS SHOWN TO AVOID WALL INTERFERENCE WITH RAIL

## LEGEND

NEW CEILING GRID SYSTEM AND TILE REFER TO DETAILS ON SHEET A501 (AT NEW WALL LOCATIONS IN SPACES WITH EXISTING CEILING GRID SYSTEM, THE GRID AND TILE MAY BE REUSED IF IN GOOD CONDITION)

EXISTING CEILING TILE AND GRID SYSTEM, OR AREA OF "OPEN TO STRUCTURE" TO REMAIN UNCHANGED

EXISTING CEILING TILE AND GRID SYSTEM TO REMAIN. EXISTING MECHANICAL DUCT, DIFFUSERS & RETURN AIR GRILLES, CURRENTLY LOCATED ABOVE CEILING SYSTEM, TO BE BROUGHT DOWN FLUSH AND INCORPORATED INTO EXISTING CEILING


Client:

STATE OF UTAH
DIVISION OF FACILITIES AND CONSTRUCTION MANAGEMENT
4110 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114
TEL: (801) 538-3018
FAX: (801) 538-3267

CONTACT: WAYNE SMITH


1

DFCM PROJECT #: 09081480


Prime Consultant

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231


Seal


Consultants

MICHAEL BAKER JR. CORP. (ENGINEERING)
6955 UNION PARK CENTER, SUITE 370
MIDVALE, UTAH 84047

CONTACTS:
MECHANICAL:
TODD DORIOUS
TEL: (801) 352-5971
ELECTRICAL:
RAY THOM
TEL: (801) 352-5985


Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 28-May 2009 | | ADDENDUM 1-PLAN CHK. COMMENTS |

Revision

Notes


This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.


Project Title

# UTAH NATIONAL GUARD ARMORY INTERIOR REMODEL

7602 AIRPORT ROAD, WEST JORDAN, UTAH

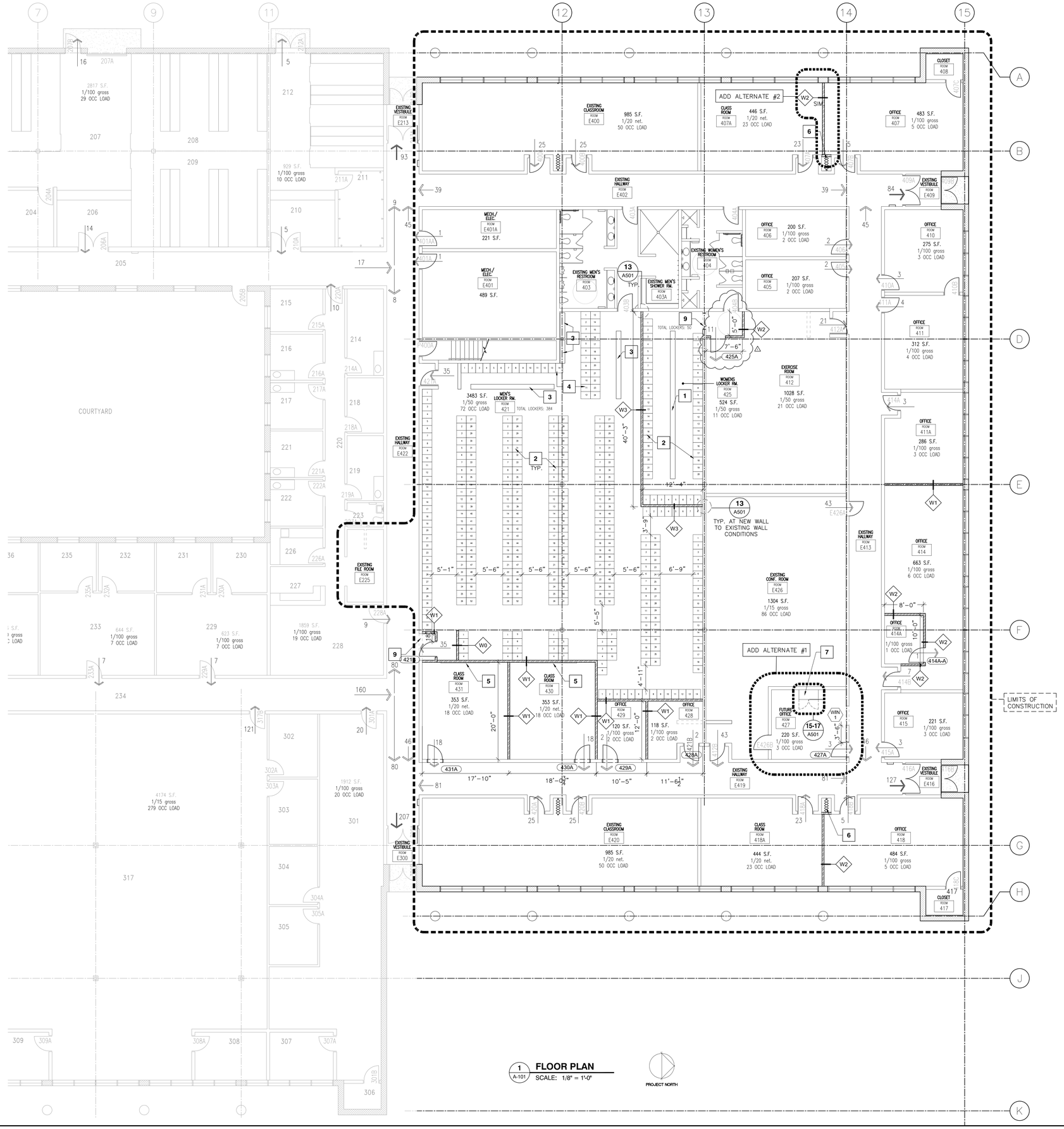
Sheet Title

# REFLECTED CEILING PLAN

| | |
|---|---|
| Scale: 1/8" = 1'-0" | Date: 20 MAY, 2009 |
| Drawn: C.S. | Checked: J.G. |
| Cad File: A102.DWG | Sheet No. A-102 |
| Project No.: IBI-25946 | |

PLOTTED DATE: Thursday, 28 May 2009 - 10:19am

ARCH E1 - ADT 2007




1 A-101 **FLOOR PLAN**
SCALE: 1/8" = 1'-0"

## GENERAL NOTES

1. EXISTING FIRE SPRINKLER SYSTEM HEAD LOCATIONS TO BE MODIFIED TO MEET THE CITY OF WEST JORDAN'S REQUIRED FIRE SPRINKLER HEAD LOCATIONS.
2. UNLESS OTHERWISE NOTED , ALL WALLS ARE EXISTING & SHALL REMAIN UNDISTURBED.
3. UNLESS OTHERWISE NOTED ALL DOORS & FRAMES TO REMAIN UNDISTURBED.
4. CONTRACTOR TO REPAIR AND/OR REPLACE ANY ITEMS IN OR ON THE BUILDING THAT ARE DAMAGED BY CONSTRUCTION ACTIVITIES DURING THE CONSTRUCTION PROCESS
5. EXISTING DOOR HARDWARE TO BE CHANGED OUT ON SELECTED DOORS. REFER TO SPECIFICATION AND DOOR SCHEDULE FOR ADDITIONAL INFORMATION

## ADD ALTERNATE NOTES

#1. PROVIDE COST TO UPDATE THIS ROOM TO AN OFFICE AS SHOWN INCLUDING THE ADDITION OF A WINDOW, DOOR & A CABINET.

#2. ADD WALL PARTITIONS IN LOCATION SHOWN, AS SHOWN. INCLUDE COST TO ADD ELECTRICAL OUTLET IN WALL & REPLACEMENT OF CEILING TILES AFFECTED BY NEW WALL.

## REFRENCE NOTES

1. RELOCATED & INSTALLED WOOD BENCH FROM MENS LOCKER ROOM
2. EXISTING 18" W X 24" D X 6' TALL LOCKERS RELOCATED BY CONTRACTOR TO LOCATIONS SHOWN.
3. EXISTING WOOD BENCH TO REMAIN UNDISTURBED
4. EXISTING BANK OF LOCKERS TO REMAIN UNDISTURBED
5. NEW 4' X 10' WHITE BD. (TO BE INSTALLED AT LOCATION DETERMINED BY CLIENT) PROVIDE BACKING IN NEW WALL FOR WHITE BD. INSTALLATION
6. EXISTING ACCORDION DOOR TO BE ENCAPSULATED IN WALL CAVITY
7. PRE-BUILT CABINET INSTALLED AT LOCATION SHOWN TO ACCOMMODATE EXISTING A/V EQUIPMENT. RE: DETAIL
8. INSTALL HOLLOW METAL DOOR FRAME TYPE 3 AT SAWCUT OPENING; SOLID GROUT FRAME IN PLACE
9. INSTALL HOLLOW METAL DOOR FRAME TYPE 4 AT SAWCUT OPENING; SOLID GROUT FRAME IN PLACE

## LEGEND

24 / 35 — OCCUPANT LOAD– OUT SPECIFIC DOOR

1304 S.F. ← ROOM GROSS SQUARE FOOTAGE
1/15 gross ← No. SQUARE FEET PER OCCUPANT
86 OCC LOAD ← OCCUPANT LOAD

## WALL LEGEND

EXISTING EXTERIOR WALL TO REMAIN

NEW GYP. BD. WALL ON 3 5/8" METAL STUDS. REFER TO SHEET A501 FOR DETAILS

Client:

STATE OF UTAH
DIVISION OF FACILITIES AND CONSTRUCTION MANAGEMENT

4110 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114
TEL: (801) 538-3018
FAX: (801) 538-3267

CONTACT: WAYNE SMITH

1

DFCM PROJECT #: 09081480

Prime Consultant:

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS

Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231

Seal

Consultants:

MICHAEL BAKER JR. CORP. (ENGINEERING)

6955 UNION PARK CENTER, SUITE 370
MIDVALE, UTAH 84047

CONTACTS:

MECHANICAL:
TODD DORIOUS
TEL: (801) 352-5971

ELECTRICAL:
RAY THOM
TEL: (801) 352-5985

Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| | | | |

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 28-May 2009 | | ADDENDUM 1-PLAN CHK. COMMENTS |

Revision

Notes

This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

# UTAH NATIONAL GUARD ARMORY INTERIOR REMODEL

7602 AIRPORT ROAD, WEST JORDAN, UTAH

Sheet Title

# FLOOR PLAN

| | |
|---|---|
| Scale: 1/8" = 1'-0" | Date: 20 MAY, 2009 |
| Drawn: C.S. | Checked: J.G. |
| Cad File: A101.DWG | Sheet No. A-101 |
| Project No. IBI-25946 | |

PLOTTED DATE: Thursday, 28 May 2009 - 10:37am

ARCH E1 - ADT 2007

HARDWARE SCHEDULE

Manufacturer Legend:

(BES) Best Access Systems
(SCH) Schlage
(GLY) Glynn Johnson
(PEM) Pemko
(MAR) Markar
(VON) Von Duprin
(IVE) Ives
(BYO) By Others
(LCN) LCN
(ADA) Adams Rite
(DON) Don Jo

Schedule Notes:

1. It is the intention that the hardware specified shall be of sufficient quantities necessary to complete the Work. Notify the Architect of omissions or discrepancies prior to bid date for clarifications or instructions. Adjustments to the Contract Sum will not be allowed for omissions not clarified prior to bid opening.
2. Furnish all items in US26D, Satin Chrome unless otherwise specified, Thresholds and Weatherstrip shall be Mill Finish Aluminum. Closers shall be Powder Coated Aluminum. Trim and Flat Goods may be furnished in US32D, Satin Stainless Steel.
3. Hardware supplier shall verify all lock functions with Owner prior to ordering material.
4. Hardware supplier shall provide point-to-point wiring diagrams for automatic operator to general and electrical contractor prior to electrical rough in. Electrical contractor shall provide 120VAC to operator and provide and install wiring and low voltage wiring from operator to actuators.

HW SET: 01

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | CLASSROOM LOCK | 93K-7-D-14D-S3 LM "A" KEYWAY | 626 | BES |
| 1 | EA | CLOSER W/STOP ARM | 4111 SCUSH - ST-1586 | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW | 630 | IVE |
| 1 | EA | DOOR SWEEP | 345ANB | AL | PEM |

HW SET: 02

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 630 | IVE |
| 1 | EA | MORTISE CYLINDER | 1E74 X REQUIRED CAM "A" KEYWAY | | BES |
| 1 | EA | PRIVACY LOCK | L9496L 17B | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW | 630 | IVE |
| 1 | EA | WALL STOP | WS402CVX | 626 | IVE |
| 1 | SET | SEALS | 290AS HEAD AND JAMBS | AL | PEM |

HW SET: 03

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PUSH/PULL PLATE | | 626 | BES |
| 1 | EA | SURFACE CLOSER | 4031 RW/PA (INSTALL REGULAR ARM) | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW | 630 | IVE |
| 1 | EA | WALL STOP | WS406CVX | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

HW SET: 04

EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PANIC HARDWARE | | 626 | BES |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW | 630 | IVE |
| 1 | EA | WALL STOP | WS406CVX | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

SECTION 05400

COLD FORMED STEEL FRAMING

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

Design, construct and install non-structural cold formed framing in conformance with applicable building codes and with AISA Standards for Cold-Formed Steel Framing. The design is to provide for movement of components without damage, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.2 SUBMITTALS (Submittals shall be for informational purposes only.)

Provide manufacturer's standard catalog data for specified products demonstrating compliance with referenced standards. Describe method for securing studs and other members to tracks and for bolted, welded and clipped framing connections. Provide manufacturer's printed installation instructions.

1.3 QUALIFICATIONS

Installer shall be experienced in performing work of this section with a minimum of three years documented experience in the installation of work similar to that required for this project.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS (Provide all steel framing from a single manufacturer)

Nuconsteel, Dietrich Metal Framing, Allied Studco, AllSteel Products, Inc., United Metal Products, Inc.

2.2 FRAMING MATERIALS

Non-load bearing (non-structural) cold-formed steel members shall be 25 gauge and shall have a minimum protective coating equal to G-40 galvanized finish and shall conform to ASTM C-645. Provide wall framing materials, such as studs, tracks, bracing, clip angles, straps, headers and other related accessories. Fastening shall be accomplished by screws, power actuated fasteners, clinching, or a combination of those. The type, size, number, and spacing of fasteners shall be as required by the approved connection detail. Screws shall penetrate the last ply in the connection, including gussets as applicable and with at least three threads visible beyond the last ply.

PART 3 EXECUTION

3.1 INSTALLATION

Prepare attachment surfaces so that they are plum, level, and in proper alignment for accepting cold-formed structural framing system. Set framing system plumb, square, aligned, without twist at correct elevation. Members shall be level, and true to line of 1/8 inch in 10 feet. Fabricate walls to a maximum out-of-square tolerance of 1/8 inch.

END OF SECTION

SECTION 08110

STEEL DOORS AND FRAMES TITLE

PART 1 GENERAL

1.1 SUBMITTALS (Submittals shall be for informational purposes only.)

Submit manufacturer's data sheets on each product to be used, including installation methods and manufacturer's certification that products comply with referenced standards.

1.2 QUALITY ASSURANCE

Doors and frames shall conform to the requirements of ANSI A250.8-1998 (SDI-100) and other specifications herein named. Fire Rated Doors and Frames shall be labeled by UL, WH, or other agency acceptable to the authorities having jurisdiction.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
1. Amweld Building Products, LLC.
2. Ceco Door Products.
3. Steelcraft.

2.2 MATERIALS

Doors, frames, frame anchors, and hardware reinforcing material shall comply with ANSI/SDI A250.8. Hardware reinforcing on doors and frames shall comply with ANSI/SDI A250.6. The physical performance levels shall be in accordance with ANSI/SDI A250.4. All steels used to manufacturer frames, anchors, and accessories shall meet the requirements of cold rolled steel and conform to ASTM A1008 and A568.

2.3 FRAMES

Provide Levels and Models in accordance with ANSI/SDI A250. The minimum steel frame thickness for Level 1 Standard duty interior door frames shall be 0.042 inch. Provide frames, other than slip-on drywall type with a minimum of three anchors per jamb suitable for the adjoining wall construction. Provide anchors of not less than 0.042 inch (1.0 mm) in thickness or 0.167 inch (4.2 mm) diameter wire. Slip-on drywall frame anchors shall be as provided by the manufacturer to assure performance specified. For existing masonry wall conditions that do not allow for the use of a floor anchor, an additional jamb anchor shall be provided. Prepare all frames for all mortise template hardware and reinforced only for surface mounted hardware. Drilling and/or tapping shall be completed by others. Minimum hardware reinforcing gages shall comply with Table 4 of ANSI/SDI A250.8.

2.4 DOORS

Solid core wood doors are to match existing doors and shall be a minimum of 1-3/4 inches. Provide vision lites in accordance with ANSI/SDI A250.8.

2.5 FABRICATION

Fabricate frames in accordance with ANSI/SDI A250.8. All surfaces of the frame exposed to view shall receive a factory applied coat of rust inhibiting primer, either air-dried or baked-on. The finish shall meet the requirements for acceptance stated in ANSI/SDI A250.10

PART 3 EXECUTION

3.1 INSTALLATION

Install frames plumb, level, rigid, and in true alignment in accordance with ANSI A250.11 and DHI A115.1G. Install fire rated doors and frames in accordance with NFPA 80.

END OF SECTION

SECTION 08710

DOOR HARDWARE

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

PART 1 - GENERAL

1.01 SUMMARY:

WORK INCLUDED:

Furnish and install all door hardware, including thresholds, weatherstripping, and accessories as shown on the Drawings or specified herein, or as required to complete the Work.

1.02 SYSTEM DESCRIPTION:

DESIGN INTENT: It is the intent of this Section to provide all necessary hardware for all doors in the Work, whether specifically included in the Hardware Schedule below or not. Notify the Architect of omissions or duplications prior to the bid date for clarifications or instructions. Adjustments to the Contract Sum will not be allowed for omissions not clarified prior to bid opening.

PERFORMANCE REQUIREMENTS: Provide UL-tested and approved hardware complying for fire-rated openings, in compliance with NFPA 80, NFPA 252, UL 10B, and local building code requirements.

1.03 SUBMITTALS (Submittals shall be for informational purposes only.)

PRODUCT DATA: Submit manufacturer's published product data and specifications describing materials, construction, and functions for all products specified herein.

SHOP SCHEDULE: Submit detailed shop schedule for all hardware items and accessories. Match supplier's tag numbers, marks, or other identification to Door and Hardware Schedules. Identify each item and finish, and include applicable fire ratings. Coordinate details as required by specific requirements of each opening.

KEYING SCHEDULE: Submit separate keying schedule indicating proposed lock grouping, master keying, and where applicable, grandmaster keying. Coordinate keying schedule with the Government, and with existing master or grandmaster keys.

TEMPLATES: Submit shop templates to door and frame manufacturers for proper preparation of doors and frames to receive hardware.

MANUFACTURER'S INSTRUCTIONS: Submit copies of manufacturer's installation instructions for all products specified herein.

OPERATION AND MAINTENANCE DATA: In accordance with the provisions of Section 01785, submit copies of operation and maintenance data, plus any special tools required for adjustment of hardware items incorporated in the Work.

1.04 QUALITY ASSURANCE:

REGULATORY REQUIREMENTS:
1. Comply with all applicable requirements of NFPA 80 and local building codes for fire-rated openings.
2. Comply with applicable requirements of Americans with Disabilities Act (ADA), Public Law 101-336, dated July 26, 1990; "ADA Accessibility Guidelines" (ADAAG), Appendix B to ADA Handbook, EEOC-BK-19, dated December 1991; American National Standards Institute/Council of American Building Officials (ANSI/CABO) A117.1-1992, "Accessible standards. In the event of conflict between the above accessibility codes and standards, the more stringent requirements shall govern.

CERTIFICATIONS: Provide written certification that all hardware used on fire-rated doors and frames complies with applicable UL or other nationally recognized testing agency and NFPA requirements.

1.05 WARRANTY:

Provide manufacturer's extended warranties on closers, panic devices, and other hardware items. Warrant door closers against mechanical failure for not less than five years, and all other hardware items, including cylinder locks, for not less than two years from date of final acceptance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

ACCEPTABLE MANUFACTURERS: Certain manufacturers are noted in the Hardware Schedule in order to establish a standard of material and quality for the individual hardware items.

2.02 MATERIALS:

GENERAL HARDWARE REQUIREMENTS:
1. Provide hardware materials and products of the best quality, free from imperfections and flaws in appearance, finish, or operational function.
2. Manufacturer's name or trade name shall not be visible on exposed portions of hardware except as follows:
   a. Where present as part of a required UL label
   b. Manufacturer's identification will be permitted on rim of cylinder locks only
3. Furnish all hardware of same type (all locksets, all hinges, etc.) from same manufacturer unless specifically noted otherwise.
4. Refer to Hardware Schedule below for specific hardware items, designs, functions, sizes, and finishes.

FASTENERS:
5. Furnish all required screws or other fasteners. Unless otherwise indicated, furnish flat head philips screws of same finish or closely matching finish as hardware item being fastened.
6. Provide machine screws for hardware installed on metal doors and frames, and wood screws for hardware installed on wood doors. Self-tapping sheet metal screws are not permitted.
7. Furnish concealed fasteners for items which are exposed to view when doors are closed, unless specified items are not available with concealed fasteners. Do not use through-bolts where bolt head or nut on opposite face is exposed to view except where required by code or where it is not feasible to adequately reinforce the work.

FINISH:
8. Unless otherwise indicated, finish for all hardware exposed to view shall be US10B/BHMA 613 satin bronze.
9. To the greatest extent possible, provide matching finishes for all hardware items at each door or opening.
10. Finish painted or coated items such as door closers with manufacturer's standard finish which most closely matches the finish specified for other hardware.

:T 3 - EXECUTION

EXAMINATION:

VERIFICATION OF CONDITIONS: Examine areas and conditions under which the work of this Section will be performed. Do not proceed with the work until unsatisfactory conditions have been corrected. Commencement of work implies acceptance of all areas and conditions.

PREPARATION:
SURFACE PREPARATION: Wherever cutting and fitting is required to install hardware on surfaces which will subsequently be painted or otherwise finished, coordinate the removal, storage, and application or re-application of surface mounted hardware items with work furnished or installed under other Sections of these Specifications.

3.03 INSTALLATION:

GENERAL: Install hardware in accordance with manufacturer's instructions and the recommendations of the Door and Hardware Institute (DHI).

MOUNTING HEIGHTS: Unless otherwise indicated or required by ADAAG or other accessibility requirements, mount hardware at the following heights, as measured from finish floor to centerline of hardware item:
1. Center of Knobs, Levers, or Latches: 40-5/16"
2. Center of Deadlock Cylinders: 60" (or lower as required for handicapped access)
3. Top Hinge: Max. 11-3/4" from top rabbet to centerline hinge
4. Bottom Hinge: Max. 13" to centerline of hinge
5. Center or Intermediate Hinge(s): Equally spaced between top and bottom hinges
6. Push Plates: 45" to centerline
7. Pull Plates: 42" to centerline of grip
8. Exit Devices: 40-5/16" to centerline of strike

FASTENERS: Attach hardware which fastens to metal doors or frames with machine screws into pre-drilled, tapped, and threaded holes. Attach hardware which fastens to wood doors or frames with full thread-to-head wood screws in pre-drilled pilot holes.

WEATHERSTRIPPING AND THRESHOLDS:
9. Weatherstripping and Sound Seals: Run full height at both jambs and full width at head.
10. Thresholds and Door Bottoms: Run full width of opening. Install thresholds with continuous threshold anchors cast into slab and set in continuous bead of sealant.

KEYING: Master key all locks [to existing keying system] as directed by the Contracting Officer. Furnish two (2) master keys and four (4) pass keys for each lock. Provide temporary construction keying during construction period; re-key or disable construction keys upon completion of the Work.

KEY DELIVERY: Properly account for all keys before final acceptance of the Work. Tag keys for identification, and deliver to the Contracting Officer prior to and as a condition of Final Payment.

3.04 CLEANING AND ADJUSTMENT:

CLEANING: Upon completion of hardware installation, clean all items as recommended by hardware manufacturer. Do not use abrasive or other harmful agents which might damage finish.

ADJUSTMENT: Adjust and lubricate all hardware items to ensure proper function and operation. Remove items which cannot be adjusted to operate freely and smoothly within manufacturers tolerances, and replace at no additional cost to the Government.

3.05 DEMONSTRATION:

OPERATION AND MAINTENANCE DEMONSTRATION: Demonstrate the proper operation, adjustment, and maintenance procedures for door closers, panic devices, and other mechanically-operated hardware items.

3.06 SCHEDULES:

HARDWARE SCHEDULE: Schedule of hardware sets is appended following this Section.

END OF SECTION

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 PERFORMANCE REQUIREMENTS

Provide materials and construction identical to those tested in fire-endurance rated assemblies by an independent testing agency acceptable to the authorities having jurisdiction. The material and construction shall comply with ASTM E 119 or UL 263.

1.2 SUBMITTALS

Provide manufacturer's data sheets on each product to be used, including preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods.

1.3 QUALITY ASSURANCE

Company specializing in performing Work shall have a minimum of three years experience.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

Georgia Pacific, US Gypsum Corp., National Gypsum.

2.2 INTERIOR GYPSUM MATERIALS

Type X Fire Rated Gypsum Board complying with ASTM C 1396 and ASTM C 36. 5/8 inch thickness, 48 inches wide, and in the longest length available.

2.3 GYPSUM JOINT TREATMENT AND FINISH PRODUCTS

Joint Treatment Tape shall comply with ASTM C 475 and GA-216. Joint Compound shall be all purpose white vinyl type pre-mixed compound complying with ASTM C 475.

2.4 ACCESSORY MATERIALS

Corner Bead shall be formed galvanized steel angle, min. base steel 0.014 in. thick, and complying with ASTM C 1047. Screws shall comply with ASTM C 954 or ASTM C 1002 or both with heads, threads, points, and finish as recommended by panel manufacturer. Insulation shall comply with ASTM C 665, Type I, mineral fiber (either glass, rock, or slag) insulation blankets without membrane facing.

PART 3 EXECUTION

3.1 PREPARATION

Clean and prepare surfaces thoroughly prior to installation using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.2 INSTALLATION

Apply and maintain conditions during installation in accordance with GA-216 and GA-238. Tape, fill, sand and finish joints in accordance with ASTM C840 and GA-214 for Level 5 gypsum board finishes.

END OF SECTION

SECTION 09510

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

Performance Requirements: Provide acoustical ceiling assembly designed and tested to provide surface burning characteristics (ASTM E84) with a flame spread of 25 or less and smoke development of 25 or less.

1.2 SUBMITTALS (Submittals shall be for informational purposes only.)

Provide manufacturer's data sheets on each product to be used, including preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods. Submit manufacturer's certificate that products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

Manufacturer will have a minimum of ten (10) years experience manufacturing acoustical ceilings. Installer will have a minimum of five (5) years experience successfully installing products from this section on projects of similar type and scope.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS FOR ACOUSTICAL PANELS & METAL SUSPENSION SYSTEM

Tectum Inc., USG interiors, Inc., Ecophon CertainTeed, Inc., Chicago Metallic Corporation, BPB USA.

2.2 ACOUSTICAL CEILING SYSTEM

Provide panels complying with ASTM E 1264 for Type III, Form 1 nodular, Pattern EI, mineral base with painted finish. The product is to be WHITE with a light reflectance (LR) of not less than 0.86 and a noise reduction coefficient (NRC) of not less than 0.60. The thickness shall be ¾ inch and the panel size shall be 24 inches by 48 inches. The edge/joint detail shall be the TRIM EDGE.

PART 3 EXECUTION

3.1 INSTALLATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders. Symmetrically locate grid layout in each space. Coordinate work with other trades so that lighting fixtures, grilles and other ceiling fixtures work with grid layout. Do not use universal splices or other splices which would obstruct passage of recessed lighting fixtures through grid openings or limit fixture relocation upon flanges of ceiling grids.

B. Support suspension system from structure above, not from ductwork, metal deck, equipment or piping. Space hangers not more than 6 inches from ends and not more than 4 feet on centers on runners.

C. Install wall moldings at the perimeter of each acoustical ceiling area and at locations where edge of units would otherwise be exposed.
   1. Secure moldings to supporting construction by fastening with screw anchors into the substrate, through holes drilled in vertical leg. Space holes not more than 3 inches (76mm) from each end and not more than 16 inches (406mm) on center along each molding.
   2. Level moldings with ceiling suspension system, to a level tolerance of 1/8 inch (3.2mm) in 12 feet (3658mm).
   3. Miter corners of moldings accurately to provide hairline joints, securely connected to prevent dislocation. Cope exposed flanges of intersecting suspension system members, so that flange faces will be flush.
   4. Furnish additional tees for supporting grilles, diffusers and light fixtures. Refer to reflected ceiling, HVAC and electrical plans for locations.
   5. Provide reveal edge at walls, other abutting vertical surfaces.

B. Field paint cut edges to match surface color and sheen.

END OF SECTION

SECTION 09910

PAINT

PART 1 GENERAL

1.1 SUBMITTALS (Submittals shall be for informational purposes only.)

Provide product data on all products to be used, with the manufacturer's name, product name and/or catalog number, and general product category. Provide maintenance data on cleaning, touch-up, and repair of painted and coated surfaces.

1.2 QUALITY ASSURANCE

All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience. All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

Benjamin Moore & Co, Kwall Paints, PP&G, Pratt & Lambert.

2.2 MATERIALS - GENERAL

Volatile Organic Compound (VOC) Content: Provide coatings that comply with the most stringent requirements specified in 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.

2.3 MIXING AND TINTING

Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency. Where paint is to be sprayed, thin according to manufacturer's current guidelines.

2.4 INTERIOR PRIMERS - NEW CONSTRUCTION

Gypsum Board: Latex: One (1) Coat - All Purpose 100% Acrylic Primer (MPI Listed Product Categories 6, 17, 39 and 137).

2.5 INTERIOR PRIMERS - PREVIOUSLY PAINTED SURFACES

Previously Painted Masonry: Latex: One (1) Coat - Fresh Start All Purpose 100% Acrylic Primer #023 (MPI Listed Product Categories 6, 17, 39 and 137).

2.6 INTERIOR FINISH COATS

Satin/Semi-Gloss Finish: Latex: Two (2) Coats - Premium Interior Satin Finish

PART 3 EXECUTION

3.1 PREPARATION

Clean surfaces thoroughly prior to coating application. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance. Remove or protect adjacent hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings. Move or protect equipment and fixtures adjacent to surfaces indicated to receive coatings to allow application of coatings. Protect adjacent surfaces not indicated to receive coatings.

3.2 APPLICATION

Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.

END OF SECTION


Client

STATE OF UTAH
DIVISION OF FACILITIES AND CONSTRUCTION MANAGEMENT

4110 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114
TEL: (801) 538-3018
FAX: (801) 538-3267

CONTACT: WAYNE SMITH


DFCM PROJECT #: 09081480


Prime Consultant

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS

Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231


Seal


Consultants

MICHAEL BAKER JR. CORP. (ENGINEERING)

6955 UNION PARK CENTER, SUITE 370
MIDVALE, UTAH 84047

CONTACTS:

MECHANICAL:
TODD DORIOUS
TEL: (801) 352-5971

ELECTRICAL:
RAY THOM
TEL: (801) 352-5985


Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 28-May 2009 | | ADDENDUM 1-PLAN CHK. COMMENTS |

| No. | Date | Apprd. | Description |
|---|---|---|---|

Revision

Notes


This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.


Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

UTAH NATIONAL GUARD ARMORY INTERIOR REMODEL

7602 AIRPORT ROAD, WEST JORDAN, UTAH

Sheet Title

SPECIFICATIONS

| | |
|---|---|
| Scale: N.T.S. | Date: 20 MAY, 2009 |
| Drawn: T.C. | Checked: J.G. |
| Cad File: G002-SPEC_1.DWG | Sheet No. G-002 |
| Project No. IBI-25946 | |

ARCH E1 - ADT 2007

PLOTTED DATE: Thursday, 28 May 2009 - 11:18am

SECTION 23 37 13 – DIFFUSERS, REGISTERS, AND GRILLES

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:

1. RECTANGULAR AND SQUARE CEILING DIFFUSERS.
2. FIXED FACE GRILLES.

PART 2 – PRODUCTS

2.1 CEILING DIFFUSERS

A. RECTANGULAR AND SQUARE CEILING DIFFUSERS:

1. MATCH EXISTING IN SIMILAR SPACES.

2.2 REGISTERS AND GRILLES

A. FIXED FACE GRILLE:

1. MATCH EXISTING IN SIMILAR SPACES.

2.3 SOURCE QUALITY CONTROL

A. VERIFICATION OF PERFORMANCE: RATE DIFFUSERS, REGISTERS, AND GRILLES ACCORDING TO ASHRAE 70, "METHOD OF TESTING FOR RATING THE PERFORMANCE OF AIR OUTLETS AND INLETS."

PART 3 – EXECUTION

3.1 EXAMINATION

A. EXAMINE AREAS WHERE DIFFUSERS, REGISTERS, AND GRILLES ARE TO BE INSTALLED FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF EQUIPMENT.

B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION

A. INSTALL DIFFUSERS, REGISTERS, AND GRILLES LEVEL AND PLUMB.

B. CEILING-MOUNTED OUTLETS AND INLETS: DRAWINGS INDICATE GENERAL ARRANGEMENT OF DUCTS, FITTINGS, AND ACCESSORIES. AIR OUTLET AND INLET LOCATIONS HAVE BEEN INDICATED TO ACHIEVE DESIGN REQUIREMENTS FOR AIR VOLUME, NOISE CRITERIA, AIRFLOW PATTERN, THROW, AND PRESSURE DROP. MAKE FINAL LOCATIONS WHERE INDICATED, AS MUCH AS PRACTICAL. FOR UNITS INSTALLED IN LAY-IN CEILING PANELS, LOCATE UNITS IN THE CENTER OF PANEL. WHERE ARCHITECTURAL FEATURES OR OTHER ITEMS CONFLICT WITH INSTALLATION, NOTIFY ARCHITECT FOR A DETERMINATION OF FINAL LOCATION.

C. INSTALL DIFFUSERS, REGISTERS, AND GRILLES WITH AIRTIGHT CONNECTIONS TO DUCTS AND TO ALLOW SERVICE AND MAINTENANCE OF DAMPERS, AIR EXTRACTORS, AND FIRE DAMPERS.

3.3 ADJUSTING

A. AFTER INSTALLATION, ADJUST DIFFUSERS, REGISTERS, AND GRILLES TO AIR PATTERNS INDICATED, OR AS DIRECTED, BEFORE STARTING AIR BALANCING.

SECTION 23 05 00 – COMMON WORK RESULTS FOR HVAC

PART 1 – GENERAL

1.1 SUMMARY

A. THIS SECTION INCLUDES THE FOLLOWING:

1. HVAC DEMOLITION.
2. EQUIPMENT INSTALLATION REQUIREMENTS COMMON TO EQUIPMENT SECTIONS.
3. PAINTING AND FINISHING.

PART 2 – PRODUCTS (NOT APPLICABLE)
PART 3 – EXECUTION

3.1 HVAC DEMOLITION

A. DISCONNECT, DEMOLISH, AND REMOVE HVAC SYSTEMS, EQUIPMENT, AND COMPONENTS INDICATED TO BE REMOVED.

1. DUCTS TO BE REMOVED: REMOVE PORTION OF DUCTS INDICATED TO BE REMOVED AND PLUG REMAINING DUCTS WITH SAME OR COMPATIBLE DUCTWORK MATERIAL.

3.2 PAINTING

A. DAMAGE AND TOUCHUP: REPAIR MARRED AND DAMAGED FACTORY-PAINTED FINISHES WITH MATERIALS AND PROCEDURES TO MATCH ORIGINAL FACTORY FINISH.

SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:

1. BALANCING AIR SYSTEMS:
   a. CONSTANT-VOLUME AIR SYSTEMS.
   b. VARIABLE-AIR-VOLUME SYSTEMS.

1.2 QUALITY ASSURANCE

A. TAB CONTRACTOR QUALIFICATIONS: ENGAGE A TAB ENTITY CERTIFIED BY NEBB OR TABB.

B. CERTIFY TAB FIELD DATA REPORTS AND PERFORM THE FOLLOWING:

1. REVIEW FIELD DATA REPORTS TO VALIDATE ACCURACY OF DATA AND TO PREPARE CERTIFIED TAB REPORTS.

C. TAB REPORT FORMS: USE STANDARD TAB CONTRACTOR'S FORMS APPROVED BY OWNER.

D. INSTRUMENTATION TYPE, QUANTITY, ACCURACY, AND CALIBRATION: AS DESCRIBED IN ASHRAE 111, SECTION 5, "INSTRUMENTATION."

1.3 PROJECT CONDITIONS

A. PARTIAL OWNER OCCUPANCY: OWNER MAY OCCUPY COMPLETED AREAS OF BUILDING BEFORE SUBSTANTIAL COMPLETION. COOPERATE WITH OWNER DURING TAB OPERATIONS TO MINIMIZE CONFLICTS WITH OWNER'S OPERATIONS.

1.4 COORDINATION

A. NOTICE: PROVIDE SEVEN DAYS' ADVANCE NOTICE FOR EACH TEST. INCLUDE SCHEDULED TEST DATES AND TIMES.

PART 2 – PRODUCTS (NOT APPLICABLE)
PART 3 – EXECUTION

3.1 EXAMINATION

A. EXAMINE THE CONTRACT DOCUMENTS TO BECOME FAMILIAR WITH PROJECT REQUIREMENTS AND TO DISCOVER CONDITIONS IN SYSTEMS' DESIGNS THAT MAY PRECLUDE PROPER TAB OF SYSTEMS AND EQUIPMENT.

B. EXAMINE DESIGN DATA INCLUDING HVAC SYSTEM DESCRIPTIONS, STATEMENTS OF DESIGN ASSUMPTIONS FOR ENVIRONMENTAL CONDITIONS AND SYSTEMS' OUTPUT, AND STATEMENTS OF PHILOSOPHIES AND ASSUMPTIONS ABOUT HVAC SYSTEM AND EQUIPMENT CONTROLS.

C. REPORT DEFICIENCIES DISCOVERED BEFORE AND DURING PERFORMANCE OF TAB PROCEDURES. OBSERVE AND RECORD SYSTEM REACTIONS TO CHANGES IN CONDITIONS. RECORD DEFAULT SET POINTS IF DIFFERENT FROM INDICATED VALUES.

3.2 PREPARATION

A. PREPARE A TAB PLAN THAT INCLUDES STRATEGIES AND STEP-BY-STEP PROCEDURES.

B. COMPLETE SYSTEM-READINESS CHECKS AND PREPARE REPORTS. VERIFY THE FOLLOWING:

1. PERMANENT ELECTRICAL-POWER WIRING IS COMPLETE.
2. AUTOMATIC TEMPERATURE-CONTROL SYSTEMS ARE OPERATIONAL.
3. EQUIPMENT AND DUCT ACCESS DOORS ARE SECURELY CLOSED.
4. BALANCE, SMOKE, AND FIRE DAMPERS ARE OPEN.
5. ISOLATING AND BALANCING VALVES ARE OPEN AND CONTROL VALVES ARE OPERATIONAL.
6. WINDOWS AND DOORS CAN BE CLOSED SO INDICATED CONDITIONS FOR SYSTEM OPERATIONS CAN BE MET.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM ACCORDING TO THE PROCEDURES CONTAINED IN SMACNA'S "HVAC SYSTEMS – TESTING, ADJUSTING, AND BALANCING" AND IN THIS SECTION.

1. COMPLY WITH REQUIREMENTS IN ASHRAE 62.1-2004, SECTION 7.2.2, "AIR BALANCING."

B. CUT INSULATION, DUCTS, PIPES, AND EQUIPMENT CABINETS FOR INSTALLATON OF TEST PROBES TO THE MINIMUM EXTENT NECESSARY FOR TAB PROCEDURES.

1. AFTER TESTING AND BALANCING, PATCH PROBE HOLES IN DUCTS WITH SAME MATERIAL AND THICKNESS AS USED TO CONSTRUCT DUCTS.
2. AFTER TESTING AND BALANCING, INSTALL TEST PORTS AND DUCT ACCESS DOORS THAT COMPLY WITH REQUIREMENTS IN DIVISION 23 SECTION "AIR DUCT ACCESSORIES."
3. INSTALL AND JOIN NEW INSULATION THAT MATCHES REMOVED MATERIALS. RESTORE INSULATION, COVERINGS, VAPOR BARRIER, AND FINISH ACCORDING TO DIVISION 23 SECTION "HVAC INSULATION."

C. MARK EQUIPMENT AND BALANCING DEVICES, INCLUDING DAMPER-CONTROL POSITIONS, VALVE POSITION INDICATORS, FAN-SPEED-CONTROL LEVERS, AND SIMILAR CONTROLS AND DEVICES, WITH PAINT OR OTHER SUITABLE, PERMANENT IDENTIFICATION MATERIAL TO SHOW FINAL SETTINGS.

D. TAKE AND REPORT TESTING AND BALANCING MEASUREMENTS IN INCH-POUND (IP) UNITS.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. PREPARE TEST REPORTS FOR BOTH FANS AND OUTLETS. OBTAIN MANUFACTURER'S OUTLET FACTORS AND RECOMMENDED TESTING PROCEDURES. CROSSCHECK THE SUMMATION OF REQUIRED OUTLET VOLUMES WITH REQUIRED FAN VOLUMES.

B. PREPARE SCHEMATIC DIAGRAMS OF SYSTEMS' "AS-BUILT" DUCT LAYOUTS.

C. FOR VARIABLE-AIR-VOLUME SYSTEMS, DEVELOP A PLAN TO SIMULATE DIVERSITY.

D. DETERMINE THE BEST LOCATIONS IN MAIN AND BRANCH DUCTS FOR ACCURATE DUCT-AIRFLOW MEASUREMENTS.

E. CHECK AIRFLOW PATTERNS FROM THE OUTDOOR-AIR LOUVERS AND DAMPERS AND THE RETURN- AND EXHAUST-AIR DAMPERS THROUGH THE SUPPLY-FAN DISCHARGE AND MIXING DAMPERS.

F. LOCATE START-STOP AND DISCONNECT SWITCHES, ELECTRICAL INTERLOCKS, AND MOTOR STARTERS.

G. VERIFY THAT MOTOR STARTERS ARE EQUIPPED WITH PROPERLY SIZED THERMAL PROTECTION.

H. CHECK DAMPERS FOR PROPER POSITION TO ACHIEVE DESIRED AIRFLOW PATH.

I. CHECK FOR AIRFLOW BLOCKAGES.

J. CHECK CONDENSATE DRAINS FOR PROPER CONNECTIONS AND FUNCTIONING.

K. CHECK FOR PROPER SEALING OF AIR-HANDLING-UNIT COMPONENTS.

L. VERIFY THAT AIR DUCT SYSTEM IS SEALED AS SPECIFIED IN DIVISION 23 SECTION "METAL DUCTS."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. ADJUST FANS TO DELIVER TOTAL INDICATED AIRFLOWS WITHIN THE MAXIMUM ALLOWABLE FAN SPEED LISTED BY FAN MANUFACTURER.

1. MEASURE TOTAL AIRFLOW.
   a. WHERE SUFFICIENT SPACE IN DUCTS IS UNAVAILABLE FOR PITOT-TUBE TRAVERSE MEASUREMENTS, MEASURE AIRFLOW AT TERMINAL OUTLETS AND INLETS THEN CALCULATE THE TOTAL AIRFLOW.
2. MEASURE FAN STATIC PRESSURES AS FOLLOWS TO DETERMINE ACTUAL STATIC PRESSURE:
   a. MEASURE OUTLET STATIC PRESSURE AS FAR DOWNSTREAM FROM THE FAN AS PRACTICAL AND UPSTREAM FROM RESTRICTIONS IN DUCTS SUCH AS ELBOWS AND TRANSITIONS.
   b. MEASURE STATIC PRESSURE DIRECTLY AT THE FAN OUTLET OR THROUGH THE FLEXIBLE CONNECTION.
   c. MEASURE INLET STATIC PRESSURE OF SINGLE-INLET FANS IN THE INLET DUCT AS NEAR THE FAN AS POSSIBLE, UPSTREAM FROM THE FLEXIBLE CONNECTION, AND DOWNSTREAM FROM DUCT RESTRICTIONS.
   d. MEASURE INLET STATIC PRESSURE OF DOUBLE-INLET FANS THROUGH THE WALL OF THE PLENUM THAT HOUSES THE FAN.
3. MEASURE STATIC PRESSURE ACROSS EACH COMPONENT THAT MAKES UP AN AIR-HANDLING UNIT, ROOFTOP UNIT, AND OTHER AIR-HANDLING AND -TREATING EQUIPMENT.
   a. REPORT THE CLEANLINESS STATUS OF FILTERS AND THE TIME STATIC PRESSURES ARE MEASURED.
4. REVIEW RECORD DOCUMENTS TO DETERMINE VARIATIONS IN DESIGN STATIC PRESSURES VERSUS ACTUAL STATIC PRESSURES. CALCULATE ACTUAL SYSTEM-EFFECT FACTORS. RECOMMEND ADJUSTMENTS TO ACCOMMODATE ACTUAL CONDITIONS.
5. OBTAIN APPROVAL FROM OWNER FOR ADJUSTMENT OF FAN SPEED HIGHER OR LOWER THAN INDICATED SPEED. COMPLY WITH REQUIREMENTS IN DIVISION 23 SECTIONS FOR AIR-HANDLING UNITS FOR ADJUSTMENT OF FANS, BELTS, AND PULLEY SIZES TO ACHIEVE INDICATED AIR-HANDLING-UNIT PERFORMANCE.
6. DO NOT MAKE FAN-SPEED ADJUSTMENTS THAT RESULT IN MOTOR OVERLOAD. CONSULT EQUIPMENT MANUFACTURERS ABOUT FAN-SPEED SAFETY FACTORS. MODULATE DAMPERS AND MEASURE FAN-MOTOR AMPERAGE TO ENSURE THAT NO OVERLOAD WILL OCCUR. MEASURE AMPERAGE IN FULL-COOLING, FULL-HEATING, ECONOMIZER, AND ANY OTHER OPERATING MODE TO DETERMINE THE MAXIMUM REQUIRED BRAKE HORSEPOWER.

B. ADJUST VOLUME DAMPERS FOR MAIN DUCT, SUB-MAIN DUCTS, AND MAJOR BRANCH DUCTS TO INDICATED AIRFLOWS WITHIN SPECIFIED TOLERANCES.

1. MEASURE AIRFLOW OF SUB-MAIN AND BRANCH DUCTS.
   a. WHERE SUFFICIENT SPACE IN SUB-MAIN AND BRANCH DUCTS IS UNAVAILABLE FOR PITOT TUBE TRAVERSE MEASUREMENTS, MEASURE AIRFLOW AT TERMINAL OUTLETS AND INLETS AND CALCULATE THE TOTAL AIRFLOW FOR THAT ZONE.
2. MEASURE STATIC PRESSURE AT A POINT DOWNSTREAM FROM THE BALANCING DAMPER, AND ADJUST VOLUME DAMPERS UNTIL THE PROPER STATIC PRESSURE IS ACHIEVED.
3. RE-MEASURE EACH SUB-MAIN AND BRANCH DUCT AFTER ALL HAVE BEEN ADJUSTED. CONTINUE TO ADJUST SUB-MAIN AND BRANCH DUCTS TO INDICATED AIRFLOWS WITHIN SPECIFIED TOLERANCES.

C. MEASURE AIR OUTLETS AND INLETS WITHOUT MAKING ADJUSTMENTS.

1. MEASURE TERMINAL OUTLETS USING A DIRECT-READING HOOD OR OUTLET MANUFACTURER'S WRITTEN INSTRUCTIONS AND CALCULATING FACTORS.

D. ADJUST AIR OUTLETS AND INLETS FOR EACH SPACE TO INDICATED AIRFLOWS WITHIN SPECIFIED TOLERANCES OF INDICATED VALUES. MAKE ADJUSTMENTS USING BRANCH VOLUME DAMPERS RATHER THAN EXTRACTORS AND THE DAMPERS AT AIR TERMINALS.

1. ADJUST EACH OUTLET IN SAME ROOM OR SPACE TO WITHIN SPECIFIED TOLERANCES OF INDICATED QUANTITIES WITHOUT GENERATING NOISE LEVELS ABOVE THE LIMITATIONS PRESCRIBED BY THE CONTRACT DOCUMENTS.
2. ADJUST PATTERNS OF ADJUSTABLE OUTLETS FOR PROPER DISTRIBUTION WITHOUT DRAFTS.

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. COMPENSATING FOR DIVERSITY: WHEN THE TOTAL AIRFLOW OF ALL TERMINAL UNITS IS MORE THAN THE INDICATED AIRFLOW OF THE FAN, PLACE A SELECTED NUMBER OF TERMINAL UNITS AT MINIMUM SET-POINT AIRFLOW WITH THE REMAINDER AT MAXIMUM-AIRFLOW CONDITION UNTIL THE TOTAL AIRFLOW OF THE TERMINAL UNITS EQUALS THE INDICATED AIRFLOW OF THE FAN. SELECT THE REDUCED-AIRFLOW TERMINAL UNITS SO THEY ARE DISTRIBUTED EVENLY AMONG THE BRANCH DUCTS.

B. PRESSURE-INDEPENDENT, VARIABLE-AIR-VOLUME SYSTEMS: AFTER THE FAN SYSTEMS HAVE BEEN ADJUSTED, ADJUST THE VARIABLE-AIR-VOLUME SYSTEMS AS FOLLOWS:

1. SET OUTDOOR-AIR DAMPERS AT MINIMUM, AND SET RETURN- AND EXHAUST-AIR DAMPERS AT A POSITION THAT SIMULATES FULL-COOLING LOAD.
2. SELECT THE TERMINAL UNIT THAT IS MOST CRITICAL TO THE SUPPLY-FAN AIRFLOW AND STATIC PRESSURE. MEASURE STATIC PRESSURE. ADJUST SYSTEM STATIC PRESSURE SO THE ENTERING STATIC PRESSURE FOR THE CRITICAL TERMINAL UNIT IS NOT LESS THAN THE SUM OF THE TERMINAL-UNIT MANUFACTURER'S RECOMMENDED MINIMUM INLET STATIC PRESSURE PLUS THE STATIC PRESSURE NEEDED TO OVERCOME TERMINAL-UNIT DISCHARGE SYSTEM LOSSES.
3. MEASURE TOTAL SYSTEM AIRFLOW. ADJUST TO WITHIN INDICATED AIRFLOW.
4. SET TERMINAL UNITS AT MAXIMUM AIRFLOW AND ADJUST CONTROLLER OR REGULATOR TO DELIVER THE DESIGNED MAXIMUM AIRFLOW. USE TERMINAL-UNIT MANUFACTURER'S WRITTEN INSTRUCTIONS TO MAKE THIS ADJUSTMENT. WHEN TOTAL AIRFLOW IS CORRECT, BALANCE THE AIR OUTLETS DOWNSTREAM FROM TERMINAL UNITS THE SAME AS DESCRIBED FOR CONSTANT-VOLUME AIR SYSTEMS.
5. SET TERMINAL UNITS AT MINIMUM AIRFLOW AND ADJUST CONTROLLER OR REGULATOR TO DELIVER THE DESIGNED MINIMUM AIRFLOW. CHECK AIR OUTLETS FOR A PROPORTIONAL REDUCTION IN AIRFLOW THE SAME AS DESCRIBED FOR CONSTANT-VOLUME AIR SYSTEMS.
   a. IF AIR OUTLETS ARE OUT OF BALANCE AT MINIMUM AIRFLOW, REPORT THE CONDITION BUT LEAVE OUTLETS BALANCED FOR MAXIMUM AIRFLOW.
6. REMEASURE THE RETURN AIRFLOW TO THE FAN WHILE OPERATING AT MAXIMUM RETURN AIRFLOW AND MINIMUM OUTDOOR AIRFLOW.
   a. ADJUST THE FAN AND BALANCE THE RETURN-AIR DUCTS AND INLETS THE SAME AS DESCRIBED FOR CONSTANT-VOLUME AIR SYSTEMS.
7. MEASURE STATIC PRESSURE AT THE MOST CRITICAL TERMINAL UNIT AND ADJUST THE STATIC-PRESSURE CONTROLLER AT THE MAIN SUPPLY-AIR SENSING STATION TO ENSURE THAT ADEQUATE STATIC PRESSURE IS MAINTAINED AT THE MOST CRITICAL UNIT.
8. RECORD FINAL FAN-PERFORMANCE DATA.

3.7 PROCEDURES FOR MOTORS

A. MOTORS, 1/2 HP AND LARGER: TEST AT FINAL BALANCED CONDITIONS AND RECORD THE FOLLOWING DATA:

1. MANUFACTURER'S NAME, MODEL NUMBER, AND SERIAL NUMBER.
2. MOTOR HORSEPOWER RATING.
3. MOTOR RPM.
4. EFFICIENCY RATING.
5. NAMEPLATE AND MEASURED VOLTAGE, EACH PHASE.
6. NAMEPLATE AND MEASURED AMPERAGE, EACH PHASE.
7. STARTER THERMAL-PROTECTION-ELEMENT RATING.

B. MOTORS DRIVEN BY VARIABLE-FREQUENCY CONTROLLERS: TEST FOR PROPER OPERATION AT SPEEDS VARYING FROM MINIMUM TO MAXIMUM. TEST THE MANUAL BYPASS OF THE CONTROLLER TO PROVE PROPER OPERATION. RECORD OBSERVATIONS INCLUDING NAME OF CONTROLLER MANUFACTURER, MODEL NUMBER, SERIAL NUMBER, AND NAMEPLATE DATA.

3.8 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. PERFORM A PRECONSTRUCTION INSPECTION OF EXISTING EQUIPMENT THAT IS TO REMAIN AND BE REUSED.

1. MEASURE AND RECORD THE OPERATING SPEED, AIRFLOW, AND STATIC PRESSURE OF EACH FAN.
2. MEASURE MOTOR VOLTAGE AND AMPERAGE. COMPARE THE VALUES TO MOTOR NAMEPLATE INFORMATION.
3. CHECK THE CONDITION OF FILTERS.
4. CHECK THE CONDITION OF COILS.
5. CHECK THE OPERATION OF THE DRAIN PAN AND CONDENSATE-DRAIN TRAP.
6. CHECK BEARINGS AND OTHER LUBRICATED PARTS FOR PROPER LUBRICATION.
7. REPORT ON THE OPERATING CONDITION OF THE EQUIPMENT AND THE RESULTS OF THE MEASUREMENTS TAKEN. REPORT DEFICIENCIES.

B. BEFORE PERFORMING TESTING AND BALANCING OF EXISTING SYSTEMS, INSPECT EXISTING EQUIPMENT THAT IS TO REMAIN AND BE REUSED TO VERIFY THAT EXISTING EQUIPMENT HAS BEEN CLEANED AND REFURBISHED. VERIFY THE FOLLOWING:

1. NEW FILTERS ARE INSTALLED.
2. COILS ARE CLEAN AND FINS COMBED.
3. DRAIN PANS ARE CLEAN.
4. FANS ARE CLEAN.
5. BEARINGS AND OTHER PARTS ARE PROPERLY LUBRICATED.
6. DEFICIENCIES NOTED IN THE PRECONSTRUCTION REPORT ARE CORRECTED.

C. PERFORM TESTING AND BALANCING OF EXISTING SYSTEMS TO THE EXTENT THAT EXISTING SYSTEMS ARE AFFECTED BY THE RENOVATION WORK.

1. COMPARE THE INDICATED AIRFLOW OF THE RENOVATED WORK TO THE MEASURED FAN AIRFLOWS, AND DETERMINE THE NEW FAN SPEED AND THE FACE VELOCITY OF FILTERS AND COILS.
2. VERIFY THAT THE INDICATED AIRFLOWS OF THE RENOVATED WORK RESULT IN FILTER AND COIL FACE VELOCITIES AND FAN SPEEDS THAT ARE WITHIN THE ACCEPTABLE LIMITS DEFINED BY EQUIPMENT MANUFACTURER.
3. IF CALCULATIONS INCREASE OR DECREASE THE AIR FLOW RATES AND WATER FLOW RATES BY MORE THAN 5 PERCENT, MAKE EQUIPMENT ADJUSTMENTS TO ACHIEVE THE CALCULATED RATES. IF INCREASE OR DECREASE IS 5 PERCENT OR LESS, EQUIPMENT ADJUSTMENTS ARE NOT REQUIRED.
4. BALANCE EACH AIR OUTLET.

3.9 TOLERANCES

A. SET HVAC SYSTEM'S AIR FLOW RATES AND WATER FLOW RATES WITHIN THE FOLLOWING TOLERANCES:

1. SUPPLY, RETURN, AND EXHAUST FANS AND EQUIPMENT WITH FANS: PLUS OR MINUS 10 PERCENT.
2. AIR OUTLETS AND INLETS: PLUS OR MINUS 10 PERCENT.

3.10 REPORTING

A. INITIAL CONSTRUCTION-PHASE REPORT: BASED ON EXAMINATION OF THE CONTRACT DOCUMENTS AS SPECIFIED IN "EXAMINATION" ARTICLE, PREPARE A REPORT ON THE ADEQUACY OF DESIGN FOR SYSTEMS' BALANCING DEVICES. RECOMMEND CHANGES AND ADDITIONS TO SYSTEMS' BALANCING DEVICES TO FACILITATE PROPER PERFORMANCE MEASURING AND BALANCING. RECOMMEND CHANGES AND ADDITIONS TO HVAC SYSTEMS AND GENERAL CONSTRUCTION TO ALLOW ACCESS FOR PERFORMANCE MEASURING AND BALANCING DEVICES.

3.11 FINAL REPORT

A. GENERAL: PREPARE A CERTIFIED WRITTEN REPORT; TABULATE AND DIVIDE THE REPORT INTO SEPARATE SECTIONS FOR TESTED SYSTEMS AND BALANCED SYSTEMS.

1. INCLUDE A CERTIFICATION SHEET AT THE FRONT OF THE REPORT'S BINDER, SIGNED AND SEALED BY THE CERTIFIED TESTING AND BALANCING ENGINEER.
2. INCLUDE A LIST OF INSTRUMENTS USED FOR PROCEDURES, ALONG WITH PROOF OF CALIBRATION.

B. FINAL REPORT CONTENTS: IN ADDITION TO CERTIFIED FIELD-REPORT DATA, INCLUDE THE FOLLOWING:

1. FIELD TEST REPORTS PREPARED BY SYSTEM AND EQUIPMENT INSTALLERS.

C. GENERAL REPORT DATA: IN ADDITION TO FORM TITLES AND ENTRIES, INCLUDE THE FOLLOWING DATA:

1. TITLE PAGE.
2. NAME AND ADDRESS OF THE TAB CONTRACTOR.
3. PROJECT NAME.
4. PROJECT LOCATION.
5. ARCHITECT'S NAME AND ADDRESS.
6. ENGINEER'S NAME AND ADDRESS.
7. CONTRACTOR'S NAME AND ADDRESS.
8. REPORT DATE.
9. SIGNATURE OF TAB SUPERVISOR WHO CERTIFIES THE REPORT.
10. TABLE OF CONTENTS WITH THE TOTAL NUMBER OF PAGES DEFINED FOR EACH SECTION OF THE REPORT. NUMBER EACH PAGE IN THE REPORT.
11. SUMMARY OF CONTENTS INCLUDING THE FOLLOWING:
    a. INDICATED VERSUS FINAL PERFORMANCE.
    b. NOTABLE CHARACTERISTICS OF SYSTEMS.
    c. DESCRIPTION OF SYSTEM OPERATION SEQUENCE IF IT VARIES FROM THE CONTRACT DOCUMENTS.
12. NOMENCLATURE SHEETS FOR EACH ITEM OF EQUIPMENT.
13. DATA FOR TERMINAL UNITS, INCLUDING MANUFACTURER'S NAME, TYPE, SIZE, AND FITTINGS.
14. NOTES TO EXPLAIN WHY CERTAIN FINAL DATA IN THE BODY OF REPORTS VARY FROM INDICATED VALUES.
15. TEST CONDITIONS FOR FANS AND PUMP PERFORMANCE FORMS INCLUDING THE FOLLOWING:
    a. SETTINGS FOR OUTDOOR-, RETURN-, AND EXHAUST-AIR DAMPERS.
    b. CONDITIONS OF FILTERS.
    c. COOLING COIL, WET- AND DRY-BULB CONDITIONS.
    d. FACE AND BYPASS DAMPER SETTINGS AT COILS.
    e. FAN DRIVE SETTINGS INCLUDING SETTINGS AND PERCENTAGE OF MAXIMUM PITCH DIAMETER.
    f. INLET VANE SETTINGS FOR VARIABLE-AIR-VOLUME SYSTEMS.
    g. SETTINGS FOR SUPPLY-AIR, STATIC-PRESSURE CONTROLLER.
    h. OTHER SYSTEM OPERATING CONDITIONS THAT AFFECT PERFORMANCE.

D. SYSTEM DIAGRAMS: INCLUDE SCHEMATIC LAYOUTS OF AIR AND HYDRONIC DISTRIBUTION SYSTEMS. PRESENT EACH SYSTEM WITH SINGLE-LINE DIAGRAM AND INCLUDE THE FOLLOWING:

1. QUANTITIES OF OUTDOOR, SUPPLY, RETURN, AND EXHAUST AIRFLOWS.
2. WATER AND STEAM FLOW RATES.
3. DUCT, OUTLET, AND INLET SIZES.
4. PIPE AND VALVE SIZES AND LOCATIONS.
5. TERMINAL UNITS.
6. BALANCING STATIONS.
7. POSITION OF BALANCING DEVICES.

E. AIR-HANDLING-UNIT TEST REPORTS: FOR AIR-HANDLING UNITS WITH COILS, INCLUDE THE FOLLOWING:

1. UNIT DATA:
   a. UNIT IDENTIFICATION.
   b. LOCATION.
   c. MAKE AND TYPE.
   d. MODEL NUMBER AND UNIT SIZE.
   e. MANUFACTURER'S SERIAL NUMBER.
   f. UNIT ARRANGEMENT AND CLASS.
   g. DISCHARGE ARRANGEMENT.
   h. SHEAVE MAKE, SIZE IN INCHES, AND BORE.
   i. CENTER-TO-CENTER DIMENSIONS OF SHEAVE, AND AMOUNT OF ADJUSTMENTS IN INCHES.
   j. NUMBER, MAKE, AND SIZE OF BELTS.
   k. NUMBER, TYPE, AND SIZE OF FILTERS.
2. MOTOR DATA:
   a. MOTOR MAKE, AND FRAME TYPE AND SIZE.
   b. HORSEPOWER AND RPM.
   c. VOLTS, PHASE, AND HERTZ.
   d. FULL-LOAD AMPERAGE AND SERVICE FACTOR.
   e. SHEAVE MAKE, SIZE IN INCHES, AND BORE.
   f. CENTER-TO-CENTER DIMENSIONS OF SHEAVE, AND AMOUNT OF ADJUSTMENTS IN INCHES.
3. TEST DATA (INDICATED AND ACTUAL VALUES):
   a. TOTAL AIR FLOW RATE IN CFM.
   b. TOTAL SYSTEM STATIC PRESSURE IN INCHES WG.
   c. FAN RPM.
   d. DISCHARGE STATIC PRESSURE IN INCHES WG.
   e. FILTER STATIC-PRESSURE DIFFERENTIAL IN INCHES WG.
   f. PREHEAT-COIL STATIC-PRESSURE DIFFERENTIAL IN INCHES WG.
   g. COOLING-COIL STATIC-PRESSURE DIFFERENTIAL IN INCHES WG.
   h. HEATING-COIL STATIC-PRESSURE DIFFERENTIAL IN INCHES WG.
   i. OUTDOOR AIRFLOW IN CFM.
   j. RETURN AIRFLOW IN CFM.
   k. OUTDOOR-AIR DAMPER POSITION.
   l. RETURN-AIR DAMPER POSITION.
   m. VORTEX DAMPER POSITION.

F. APPARATUS-COIL TEST REPORTS:

1. COIL DATA:
   a. SYSTEM IDENTIFICATION.
   b. LOCATION.
   c. COIL TYPE.
   d. NUMBER OF ROWS.
   e. FIN SPACING IN FINS PER INCH O.C.
   f. MAKE AND MODEL NUMBER.
   g. FACE AREA IN SQ. FT..
   h. TUBE SIZE IN NPS.
   i. TUBE AND FIN MATERIALS.
   j. CIRCUITING ARRANGEMENT.
2. TEST DATA (INDICATED AND ACTUAL VALUES):
   a. AIR FLOW RATE IN CFM.
   b. AVERAGE FACE VELOCITY IN FPM.
   c. AIR PRESSURE DROP IN INCHES WG.
   d. OUTDOOR-AIR, WET- AND DRY-BULB TEMPERATURES IN DEG F.
   e. RETURN-AIR, WET- AND DRY-BULB TEMPERATURES IN DEG F.
   f. ENTERING-AIR, WET- AND DRY-BULB TEMPERATURES IN DEG F.
   g. LEAVING-AIR, WET- AND DRY-BULB TEMPERATURES IN DEG F.
   h. WATER FLOW RATE IN GPM.
   i. WATER PRESSURE DIFFERENTIAL IN FEET OF HEAD OR PSIG.
   j. ENTERING-WATER TEMPERATURE IN DEG F.
   k. LEAVING-WATER TEMPERATURE IN DEG F.
   l. REFRIGERANT EXPANSION VALVE AND REFRIGERANT TYPES.
   m. REFRIGERANT SUCTION PRESSURE IN PSIG.
   n. REFRIGERANT SUCTION TEMPERATURE IN DEG F.
   o. INLET STEAM PRESSURE IN PSIG.

G. FAN TEST REPORTS: FOR SUPPLY, RETURN, AND EXHAUST FANS, INCLUDE THE FOLLOWING:

1. FAN DATA:
   a. SYSTEM IDENTIFICATION.
   b. LOCATION.
   c. MAKE AND TYPE.
   d. MODEL NUMBER AND SIZE.
   e. MANUFACTURER'S SERIAL NUMBER.
   f. ARRANGEMENT AND CLASS.
   g. SHEAVE MAKE, SIZE IN INCHES, AND BORE.
   h. CENTER-TO-CENTER DIMENSIONS OF SHEAVE, AND AMOUNT OF ADJUSTMENTS IN INCHES.
2. MOTOR DATA:
   a. MOTOR MAKE, AND FRAME TYPE AND SIZE.
   b. HORSEPOWER AND RPM.
   c. VOLTS, PHASE, AND HERTZ.
   d. FULL-LOAD AMPERAGE AND SERVICE FACTOR.
   e. SHEAVE MAKE, SIZE IN INCHES, AND BORE.
   f. CENTER-TO-CENTER DIMENSIONS OF SHEAVE, AND AMOUNT OF ADJUSTMENTS IN INCHES.
   g. NUMBER, MAKE, AND SIZE OF BELTS.
3. TEST DATA (INDICATED AND ACTUAL VALUES):
   a. TOTAL AIRFLOW RATE IN CFM.
   b. TOTAL SYSTEM STATIC PRESSURE IN INCHES WG.
   c. FAN RPM.
   d. DISCHARGE STATIC PRESSURE IN INCHES WG.
   e. SUCTION STATIC PRESSURE IN INCHES WG.

H. ROUND, FLAT-OVAL, AND RECTANGULAR DUCT TRAVERSE REPORTS: INCLUDE A DIAGRAM WITH A GRID REPRESENTING THE DUCT CROSS-SECTION AND RECORD THE FOLLOWING:

1. REPORT DATA:
   a. SYSTEM AND AIR-HANDLING-UNIT NUMBER.
   b. LOCATION AND ZONE.
   c. TRAVERSE AIR TEMPERATURE IN DEG F.
   d. DUCT STATIC PRESSURE IN INCHES WG.
   e. DUCT SIZE IN INCHES.
   f. DUCT AREA IN SQ. FT..
   g. INDICATED AIR FLOW RATE IN CFM.
   h. INDICATED VELOCITY IN FPM.
   i. ACTUAL AIR FLOW RATE IN CFM.
   j. ACTUAL AVERAGE VELOCITY IN FPM.
   k. BAROMETRIC PRESSURE IN PSIG.

I. AIR-TERMINAL-DEVICE REPORTS:

1. UNIT DATA:
   a. SYSTEM AND AIR-HANDLING UNIT IDENTIFICATION.
   b. LOCATION AND ZONE.
   c. APPARATUS USED FOR TEST.
   d. AREA SERVED.
   e. MAKE.
   f. NUMBER FROM SYSTEM DIAGRAM.
   g. TYPE AND MODEL NUMBER.
   h. SIZE.
   i. EFFECTIVE AREA IN SQ. FT..
2. TEST DATA (INDICATED AND ACTUAL VALUES):
   a. AIR FLOW RATE IN CFM.
   b. AIR VELOCITY IN FPM.
   c. PRELIMINARY AIR FLOW RATE AS NEEDED IN CFM.
   d. PRELIMINARY VELOCITY AS NEEDED IN FPM.
   e. FINAL AIR FLOW RATE IN CFM.
   f. FINAL VELOCITY IN FPM.
   g. SPACE TEMPERATURE IN DEG F.

3.12 INSPECTIONS

A. INITIAL INSPECTION:

1. AFTER TESTING AND BALANCING ARE COMPLETE, OPERATE EACH SYSTEM AND RANDOMLY CHECK MEASUREMENTS TO VERIFY THAT THE SYSTEM IS OPERATING ACCORDING TO THE FINAL TEST AND BALANCE READINGS DOCUMENTED IN THE FINAL REPORT.
2. CHECK THE FOLLOWING FOR EACH SYSTEM:
   a. MEASURE AIRFLOW OF AT LEAST 10 PERCENT OF AIR OUTLETS.
   b. MEASURE ROOM TEMPERATURE AT EACH THERMOSTAT/TEMPERATURE SENSOR. COMPARE THE READING TO THE SET POINT.
   c. VERIFY THAT BALANCING DEVICES ARE MARKED WITH FINAL BALANCE POSITION.
   d. NOTE DEVIATIONS FROM THE CONTRACT DOCUMENTS IN THE FINAL REPORT.

B. FINAL INSPECTION:

1. AFTER INITIAL INSPECTION IS COMPLETE AND DOCUMENTATION BY RANDOM CHECKS VERIFIES THAT TESTING AND BALANCING ARE COMPLETE AND ACCURATELY DOCUMENTED IN THE FINAL REPORT, REQUEST THAT A FINAL INSPECTION BE MADE BY OWNER.

C. PREPARE TEST AND INSPECTION REPORTS.

SECTION 23 31 13 – METAL DUCTS

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:

1. SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS.
2. SINGLE-WALL ROUND DUCTS AND FITTINGS.
3. SHEET METAL MATERIALS.
4. SEALANTS AND GASKETS.
5. HANGERS AND SUPPORTS.
6. SEISMIC-RESTRAINT DEVICES.

1.2 PERFORMANCE REQUIREMENTS

A. STRUCTURAL PERFORMANCE: DUCT HANGERS AND SUPPORTS AND SEISMIC RESTRAINTS SHALL WITHSTAND THE EFFECTS OF GRAVITY AND SEISMIC LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS DESCRIBED IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE"

B. AIRSTREAM SURFACES: SURFACES IN CONTACT WITH THE AIRSTREAM SHALL COMPLY WITH REQUIREMENTS IN ASHRAE 62.1-2004.

PART 2 – PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. GENERAL FABRICATION REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" BASED ON INDICATED STATIC-PRESSURE CLASS UNLESS OTHERWISE INDICATED.

B. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 1-4, "TRANSVERSE (GIRTH) JOINTS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."

C. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 1-5, "LONGITUDINAL SEAMS – RECTANGULAR DUCTS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."

D. ELBOWS, TRANSITIONS, OFFSETS, BRANCH CONNECTIONS, AND OTHER DUCT CONSTRUCTION: SELECT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," CHAPTER 2, "FITTINGS AND OTHER CONSTRUCTION," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. GENERAL FABRICATION REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," CHAPTER 3, "ROUND, OVAL, AND FLEXIBLE DUCT," BASED ON INDICATED STATIC-PRESSURE CLASS UNLESS OTHERWISE INDICATED.

1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
   a. LINDAB INC.
   b. MCGILL AIRFLOW LLC.
   c. SEMCO INCORPORATED.
   d. SHEET METAL CONNECTORS, INC.
   e. SPIRAL MANUFACTURING CO., INC.
   f. .

B. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-2, "TRANSVERSE JOINTS – ROUND DUCT," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."

1. TRANSVERSE JOINTS IN DUCTS LARGER THAN 60 INCHES IN DIAMETER: FLANGED.

C. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-1, "SEAMS – ROUND DUCT AND FITTINGS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."

1. FABRICATE ROUND DUCTS LARGER THAN 90 INCHES IN DIAMETER WITH BUTT-WELDED LONGITUDINAL SEAMS.
2. FABRICATE FLAT-OVAL DUCTS LARGER THAN 72 INCHES IN WIDTH (MAJOR DIMENSION) WITH BUTT-WELDED LONGITUDINAL SEAMS.

D. TEES AND LATERALS: SELECT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-4, "90 DEGREE TEES AND LATERALS," AND FIGURE 3-5, "CONICAL TEES," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."

2.3 SHEET METAL MATERIALS

A. GENERAL MATERIAL REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESSES, AND DUCT CONSTRUCTION METHODS UNLESS OTHERWISE INDICATED. SHEET METAL MATERIALS SHALL BE FREE OF PITTING, SEAM MARKS, ROLLER MARKS, STAINS, DISCOLORATIONS, AND OTHER IMPERFECTIONS.

B. GALVANIZED SHEET STEEL: COMPLY WITH ASTM A 653/A 653M.

1. GALVANIZED COATING DESIGNATION: G60.
2. FINISHES FOR SURFACES EXPOSED TO VIEW: MILL PHOSPHATIZED.

C. REINFORCEMENT SHAPES AND PLATES: ASTM A 36/A 36M, STEEL PLATES, SHAPES, AND BARS; BLACK AND GALVANIZED.

1. WHERE BLACK- AND GALVANIZED-STEEL SHAPES AND PLATES ARE USED TO REINFORCE ALUMINUM DUCTS, ISOLATE THE DIFFERENT METALS WITH BUTYL RUBBER, NEOPRENE, OR EPDM GASKET MATERIALS.

D. TIE RODS: GALVANIZED STEEL, 1/4-INCH MINIMUM DIAMETER FOR LENGTHS 36 INCHES OR LESS; 3/8-INCH MINIMUM DIAMETER FOR LENGTHS LONGER THAN 36 INCHES.

2.4 SEALANT AND GASKETS

A. GENERAL SEALANT AND GASKET REQUIREMENTS: SURFACE-BURNING CHARACTERISTICS FOR SEALANTS AND GASKETS SHALL BE A MAXIMUM FLAME-SPREAD INDEX OF 25 AND A MAXIMUM SMOKE-DEVELOPED INDEX OF 50 WHEN TESTED ACCORDING TO UL 723; CERTIFIED BY AN NRTL.

B. TWO-PART TAPE SEALING SYSTEM:

1. TAPE: WOVEN COTTON FIBER IMPREGNATED WITH MINERAL GYPSUM AND MODIFIED ACRYLIC/SILICONE ACTIVATOR TO REACT EXOTHERMICALLY WITH TAPE TO FORM HARD, DURABLE, AIRTIGHT SEAL.
2. TAPE WIDTH: 3 INCHES.
3. SEALANT: MODIFIED STYRENE ACRYLIC.
4. WATER RESISTANT.
5. MOLD AND MILDEW RESISTANT.
6. MAXIMUM STATIC-PRESSURE CLASS: 10-INCH WG, POSITIVE AND NEGATIVE.
7. SERVICE: INDOOR AND OUTDOOR.
8. SERVICE TEMPERATURE: MINUS 40 TO PLUS 200 DEG F.
9. SUBSTRATE: COMPATIBLE WITH GALVANIZED SHEET STEEL (BOTH PVC COATED AND BARE), STAINLESS STEEL, OR ALUMINUM.
10. FOR INDOOR APPLICATIONS, USE SEALANT THAT HAS A VOC CONTENT OF 250 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).

C. WATER-BASED JOINT AND SEAM SEALANT:

1. APPLICATION METHOD: BRUSH ON.
2. SOLIDS CONTENT: MINIMUM 65 PERCENT.
3. SHORE A HARDNESS: MINIMUM 20.
4. WATER RESISTANT.
5. MOLD AND MILDEW RESISTANT.
6. VOC: MAXIMUM 75 G/L (LESS WATER).
7. MAXIMUM STATIC-PRESSURE CLASS: 10-INCH WG, POSITIVE AND NEGATIVE.
8. SERVICE: INDOOR OR OUTDOOR.
9. SUBSTRATE: COMPATIBLE WITH GALVANIZED SHEET STEEL (BOTH PVC COATED AND BARE), STAINLESS STEEL, OR ALUMINUM SHEETS.

D. FLANGED JOINT SEALANT: COMPLY WITH ASTM C 920.

1. GENERAL: SINGLE-COMPONENT, ACID-CURING, SILICONE, ELASTOMERIC.
2. TYPE: S.
3. GRADE: NS.
4. CLASS: 25.
5. USE: O.
6. FOR INDOOR APPLICATIONS, USE SEALANT THAT HAS A VOC CONTENT OF 250 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).

E. FLANGE GASKETS: BUTYL RUBBER, NEOPRENE, OR EPDM POLYMER WITH POLYSOBUTYLENE PLASTICIZER.

F. ROUND DUCT JOINT O-RING SEALS:

1. SEAL SHALL PROVIDE MAXIMUM LEAKAGE CLASS OF 3 CFM/100 SQ. FT. AT 1-INCH WG AND SHALL BE RATED FOR 10-INCH WG STATIC-PRESSURE CLASS, POSITIVE OR NEGATIVE.
2. EPDM O-RING TO SEAL IN CONCAVE BEAD IN COUPLING OR FITTING SPIGOT.
3. DOUBLE-LIPPED, EPDM O-RING SEAL, MECHANICALLY FASTENED TO FACTORY-FABRICATED COUPLINGS AND FITTING SPIGOTS.

Client

PROJECT NORTH

Prime Consultant

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231

Seal

LICENSED PROFESSIONAL ENGINEER
No.189171-2202
TODD L. DORIUS
STATE of UTAH

Consultants

Baker
BAKER & ASSOCIATES
A unit of Michael Baker Corporation
Midvale Office
6955 Union Park Center, Suite 370
Midvale, Utah 84047
(801)-255-4400

Issues

| No. | Date | Appd. | Description |
|---|---|---|---|
| 1 | 05-28-09 | TD | ADDENDUM 1 |

Revision

| No. | Date | Appd. | Description |
|---|---|---|---|

Notes

This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

UTAH NATIONAL GAURD ARMORY INTERIOR REMODEL

7600 AIRPORT RD. WEST JORDAN UT

Sheet Title

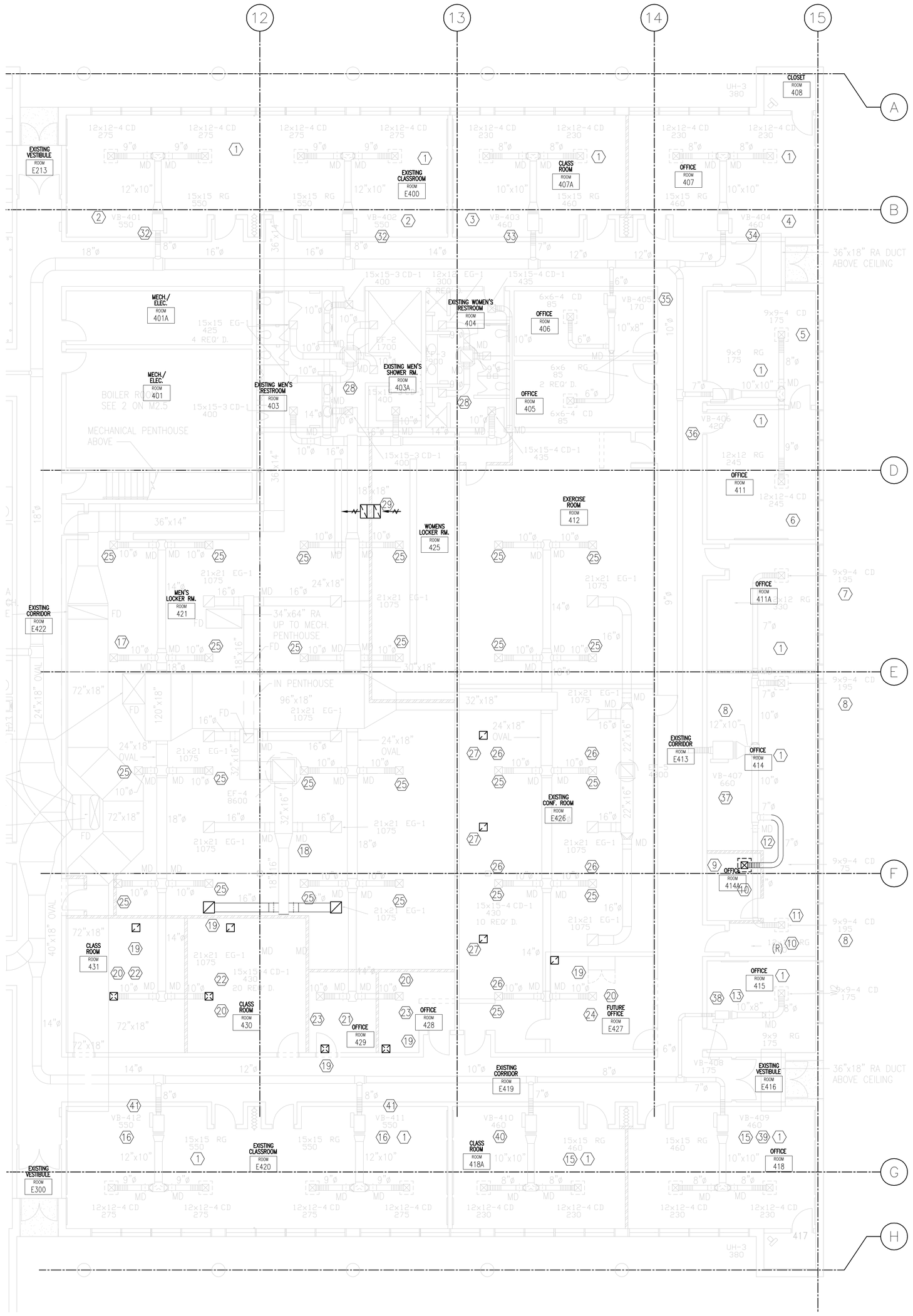
MECHANICAL SPECIFICATIONS

| Scale | Date |
|---|---|
| AS NOTED | 05-28-09 |
| Drawn | Checked |
| RBM | TD |
| Cad File | Sheet No. |
| M601.DWG | M601 |
| Project No. | |

ARCH E1 - ADT 2007

P:\proj\Jake Garn Army National Guard Armory\Drawings\Mechanical\M601.dwg, 5/28/2009 11:56:32 AM, PDF995.pc3

PLOTTED DATE:




1 M101 **MECHANICAL PLAN**

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

## GENERAL NOTES:

1) THE EXISTING HVAC SYSTEM IS BEING REUSED AND SLIGHTLY MODIFIED. IN MOST CASES, THE EXISTING IS INADEQUATE FOR THE NEW OCCUPANCY (MOSTLY COOLING).

2) EXISTING EQUIPMENT UNMODIFIED OR KEEPING THE SAME AIR BALANCE IS NOT NOTED THOUGH EACH DIFFUSER SHALL BE REBALANCED.

3) VAV MINIMUMS REPRESENT THE REQUIRED VENTILATION PER ASHRAE 62.1

## KEYNOTES:

1. EXISTING AIR SYSTEMS TO REMAIN. CONFIRM AND REPORT CONDITIONS WITH TEST AND BALANCE REPORT. CORRECT AIRFLOWS TO LISTED QUANTITIES WHERE NECESSARY.
2. ROOM HALF IS 1160 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM.
3. ROOM IS 880 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM.
4. ROOM IS 620 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM.
5. ROOM IS 55 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM.
6. ROOM IS 85 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM.
7. ROOM IS 120 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM. REBALANCE THE AIR TO THE NEW VALUE SHOWN.
8. ROOM IS 230 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM. REBALANCE THE AIR TO THE NEW VALUE SHOWN.
9. ROOM HAS ADEQUATE AIR WITH THE REMODEL.
10. RELOCATE EXISTING RETURN GRILLE OUT OF ROOM 414A INTO ROOM 414 AS SHOWN.
11. UNDERCUT DOOR BY 1" FOR RETURN
12. CONNECT NEW DUCT TO EXISTING TAKEOFF AND RELOCATE EXISTING DIFFUSER AS SHOWN. REBALANCE AIR AS INDICATED.
13. ROOM IS 40 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM.
14. ROOM IS 440 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM.
15. ROOM IS 800 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM.
16. ROOM HALF IS 850 CFM SHORT AT 47 DEG. F SUPPLY AIR TEMP. REUSING THE EXISTING SYSTEM.
17. EXISTING SYSTEM IS HEATING ONLY. SO AIRFLOW NUMBERS SHOWN REPRESENT COOLING NUMBERS FOR FUTURE MODIFICATION.
18. REMOVE SECTION OF RETURN DUCT AS SHOWN AND RELOCATE RETURN TAKEOFFS TO NEW LOCATION.
19. NEW 12 x 12 RETURN GRILLE TO MATCH EXISTING IN OFFICE 414 OPEN TO PLENUM ABOVE.
20. DIFFUSER AND BOX TO BE RELOCATED TO SPACE IN CEILING GRID. MODIFY FLEX DUCT AS NECESSARY LIMITING LENGTH TO 5'-0 MAX. DO NOT ALLOW KINKS.
21. DIFFUSER AND BOX TO BE RELOCATED INTO SPACE AND IN CEILING GRID. MODIFY FLEX DUCT AS NECESSARY LIMITING LENGTH TO 5'-0 MAX. DO NOT ALLOW KINKS.
22. REBALANCE AIR TO 375 CFM ON DIFFUSER.
23. REBALANCE AIR TO 100 CFM ON DIFFUSER.
24. REBALANCE AIR TO 200 CFM ON DIFFUSER.
25. REBALANCE EXISTING DIFFUSER TO 470 CFM.
26. EXISTING SYSTEM IS ABOVE LAY-IN CEILING. RELOCATE DIFFUSER TO CEILING GRID PER KEYNOTE 20.
27. NEW 24" x 24" RETURN GRILLES TO MATCH ROOM 414 STYLE. OPEN TO PLENUM ABOVE.
28. EXISTING EXHAUST SYSTEM TO REMAIN. REBALANCE TO ORIGINAL NUMBERS.
29. NEW 24 x 12 TRANSFER DUCT NEAR ROOF ABOVE CEILING FOR AIR TRANSFER.
30. EXISTING AH-1 SHALL REBALANCE FOR A VENTILATION (OUTSIDE AIR) MINIMUM OF 3565 CFM.
31. EXISTING AH-2 SHALL REBALANCE FOR A VENTILATION (OUTSIDE AIR) MINIMUM OF 2200 CFM.
32. EXISTING VAV BOX VB-401 AND VB-402 SHALL HAVE A MINIMUM FLOW OF 310 CFM EACH.
33. EXISTING VAV BOX VB-403 SHALL HAVE A MINIMUM FLOW OF 285 CFM.
34. EXISTING VAV BOX VB-404 SHALL HAVE A MINIMUM FLOW OF 60 CFM.
35. EXISTING VAV BOX VB-405 SHALL HAVE A MINIMUM FLOW OF 50 CFM.
36. EXISTING VAV BOX VB-406 SHALL HAVE A MINIMUM FLOW OF 75 CFM.
37. EXISTING VAV BOX VB-407 SHALL HAVE A MINIMUM FLOW OF 120 CFM.
38. EXISTING VAV BOX VB-408 SHALL HAVE A MINIMUM FLOW OF 30 CFM.
39. EXISTING VAV BOX VB-409 SHALL HAVE A MINIMUM FLOW OF 65 CFM.
40. EXISTING VAV BOX VB-410 SHALL HAVE A MINIMUM FLOW OF 285 CFM.
41. EXISTING VAV BOX VB-401 AND VB-402 SHALL HAVE A MINIMUM FLOW OF 310 CFM EACH.

## LEGEND:

AIR DISTRIBUTION — RG / A — CD

CD=CEILING DIFFUSER
RG=RETURN GRILL
A=AIR FLOW

VAV BOX — T / A

T=TAG NUMBER
AIR FLOW

(E)= EXISTING EQUIPMENT TO REMAIN
(R)= EXISTING EQUIPMENT FOR RELOCATION

Client

PROJECT NORTH

Prime Consultant

IBI GROUP
ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231

Seal

LICENSED PROFESSIONAL ENGINEER
No.189171-2202
TODD L. DORIUS
STATE of UTAH

Consultants

Baker
BAKER & ASSOCIATES
A unit of Michael Baker Corporation
Midvale Office
6955 Union Park Center, Suite 370
Midvale, Utah 84047
(801)-255-4400

Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 05-28-09 | TD | ADDENDUM 1 |

| No. | Date | Apprd. | Description |
|---|---|---|---|

Revision

Notes

This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

UTAH NATIONAL GAURD ARMORY INTERIOR REMODEL

7600 AIRPORT RD. WEST JORDAN UT

Sheet Title

MECHANICAL REMODEL PLAN

| Scale | Date |
|---|---|
| AS NOTED | 05-28-09 |
| Drawn: RBM | Checked: TD |
| Cad File: M101.DWG | Sheet No. M101 |
| Project No. | |

P:\proj\Jake Garn Army National Guard Armory\Drawings\Mechanical\M101.dwg, 5/28/2009 11:55:56 AM, PDF995.pc3

PLOTTED DATE

ARCH E1 - ADT 2007

P:\proj\Jake Garn Army National Guard Armory\Drawings\Mechanical\M602.dwg, 5/28/2009 11:55:49 AM, PDF995.pc3

PLOTTED DATE:

2.5 HANGERS AND SUPPORTS

A. HANGER RODS FOR NONCORROSIVE ENVIRONMENTS: CADMIUM-PLATED STEEL RODS AND NUTS.

B. HANGER RODS FOR CORROSIVE ENVIRONMENTS: ELECTROGALVANIZED, ALL-THREAD RODS OR GALVANIZED RODS WITH THREADS PAINTED WITH ZINC-CHROMATE PRIMER AFTER INSTALLATION.

C. STRAP AND ROD SIZES: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," TABLE 4-1, "RECTANGULAR DUCT HANGERS MINIMUM SIZE," AND TABLE 4-2, "MINIMUM HANGER SIZES FOR ROUND DUCT."

D. STEEL CABLES FOR GALVANIZED-STEEL DUCTS: GALVANIZED STEEL COMPLYING WITH ASTM A 603.

E. STEEL CABLE END CONNECTIONS: CADMIUM-PLATED STEEL ASSEMBLIES WITH BRACKETS, SWIVEL, AND BOLTS DESIGNED FOR DUCT HANGER SERVICE; WITH AN AUTOMATIC-LOCKING AND CLAMPING DEVICE.

F. DUCT ATTACHMENTS: SHEET METAL SCREWS, BLIND RIVETS, OR SELF-TAPPING METAL SCREWS; COMPATIBLE WITH DUCT MATERIALS.

G. TRAPEZE AND RISER SUPPORTS:

1. SUPPORTS FOR GALVANIZED-STEEL DUCTS: GALVANIZED-STEEL SHAPES AND PLATES.

2.6 SEISMIC-RESTRAINT DEVICES

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. COOPER B-LINE, INC.; A DIVISION OF COOPER INDUSTRIES.
2. DUCTMATE INDUSTRIES, INC.
3. HILTI CORP.
4. KINETICS NOISE CONTROL.
5. LOOS & CO.; CABLEWARE DIVISION.
6. MASON INDUSTRIES.
7. TOLCO; A BRAND OF NIBCO INC.
8. UNISTRUT CORPORATION; TYCO INTERNATIONAL, LTD.
9. .

B. GENERAL REQUIREMENTS FOR RESTRAINT COMPONENTS: RATED STRENGTHS, FEATURES, AND APPLICATIONS SHALL BE AS DEFINED IN REPORTS BY AN AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.

1. STRUCTURAL SAFETY FACTOR: ALLOWABLE STRENGTH IN TENSION, SHEAR, AND PULLOUT FORCE OF COMPONENTS SHALL BE AT LEAST FOUR TIMES THE MAXIMUM SEISMIC FORCES TO WHICH THEY WILL BE SUBJECTED.

C. CHANNEL SUPPORT SYSTEM: SHOP- OR FIELD-FABRICATED SUPPORT ASSEMBLY MADE OF SLOTTED STEEL CHANNELS RATED IN TENSION, COMPRESSION, AND TORSION FORCES AND WITH ACCESSORIES FOR ATTACHMENT TO BRACED COMPONENT AT ONE END AND TO BUILDING STRUCTURE AT THE OTHER END. INCLUDE MATCHING COMPONENTS AND CORROSION-RESISTANT COATING.

D. RESTRAINT CABLES: ASTM A 603, GALVANIZED-STEEL CABLES WITH END CONNECTIONS MADE OF CADMIUM-PLATED STEEL ASSEMBLIES WITH BRACKETS, SWIVEL, AND BOLTS DESIGNED FOR RESTRAINING CABLE SERVICE; AND WITH AN AUTOMATIC-LOCKING AND CLAMPING DEVICE OR DOUBLE-CABLE CLIPS.

E. HANGER ROD STIFFENER: STEEL TUBE OR STEEL SLOTTED-SUPPORT-SYSTEM SLEEVE WITH INTERNALLY BOLTED CONNECTIONS TO HANGER ROD.

F. MECHANICAL ANCHOR BOLTS: DRILLED-IN AND STUD-WEDGE OR FEMALE-WEDGE TYPE. SELECT ANCHOR BOLTS WITH STRENGTH REQUIRED FOR ANCHOR AND AS TESTED ACCORDING TO ASTM E 488.

PART 3 – EXECUTION

3.1 DUCT INSTALLATION

A. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF DUCT SYSTEM. INDICATED DUCT LOCATIONS, CONFIGURATIONS, AND ARRANGEMENTS WERE USED TO SIZE DUCTS AND CALCULATE FRICTION LOSS FOR AIR-HANDLING EQUIPMENT SIZING AND FOR OTHER DESIGN CONSIDERATIONS. INSTALL DUCT SYSTEMS AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON SHOP DRAWINGS AND COORDINATION DRAWINGS.

B. INSTALL DUCTS ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" UNLESS OTHERWISE INDICATED.

C. INSTALL ROUND DUCTS IN MAXIMUM PRACTICAL LENGTHS.

D. INSTALL DUCTS WITH FEWEST POSSIBLE JOINTS.

E. INSTALL FACTORY- OR SHOP-FABRICATED FITTINGS FOR CHANGES IN DIRECTION, SIZE, AND SHAPE AND FOR BRANCH CONNECTIONS.

F. UNLESS OTHERWISE INDICATED, INSTALL DUCTS VERTICALLY AND HORIZONTALLY, AND PARALLEL AND PERPENDICULAR TO BUILDING LINES.

G. INSTALL DUCTS CLOSE TO WALLS, OVERHEAD CONSTRUCTION, COLUMNS, AND OTHER STRUCTURAL AND PERMANENT ENCLOSURE ELEMENTS OF BUILDING.

H. INSTALL DUCTS WITH A CLEARANCE OF 1 INCH, PLUS ALLOWANCE FOR INSULATION THICKNESS.

I. ROUTE DUCTS TO AVOID PASSING THROUGH TRANSFORMER VAULTS AND ELECTRICAL EQUIPMENT ROOMS AND ENCLOSURES.

J. WHERE DUCTS PASS THROUGH NON-FIRE-RATED INTERIOR PARTITIONS AND EXTERIOR WALLS AND ARE EXPOSED TO VIEW, COVER THE OPENING BETWEEN THE PARTITION AND DUCT OR DUCT INSULATION WITH SHEET METAL FLANGES OF SAME METAL THICKNESS AS THE DUCT. OVERLAP OPENINGS ON FOUR SIDES BY AT LEAST 1-1/2 INCHES.

K. WHERE DUCTS PASS THROUGH FIRE-RATED INTERIOR PARTITIONS AND EXTERIOR WALLS, INSTALL FIRE DAMPERS. COMPLY WITH REQUIREMENTS IN DIVISION 23 SECTION "AIR DUCT ACCESSORIES" FOR FIRE AND SMOKE DAMPERS.

L. PROTECT DUCT INTERIORS FROM MOISTURE, CONSTRUCTION DEBRIS AND DUST, AND OTHER FOREIGN MATERIALS.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. PROTECT DUCTS EXPOSED IN FINISHED SPACES FROM BEING DENTED, SCRATCHED, OR DAMAGED.

B. TRIM DUCT SEALANTS FLUSH WITH METAL. CREATE A SMOOTH AND UNIFORM EXPOSED BEAD. DO NOT USE TWO-PART TAPE SEALING SYSTEM.

C. GRIND WELDS TO PROVIDE SMOOTH SURFACE FREE OF BURRS, SHARP EDGES, AND WELD SPLATTER. WHEN WELDING STAINLESS STEEL WITH A NO. 3 OR 4 FINISH, GRIND THE WELDS FLUSH, POLISH THE EXPOSED WELDS, AND TREAT THE WELDS TO REMOVE DISCOLORATION CAUSED BY WELDING.

D. MAINTAIN CONSISTENCY, SYMMETRY, AND UNIFORMITY IN THE ARRANGEMENT AND FABRICATION OF FITTINGS, HANGERS AND SUPPORTS, DUCT ACCESSORIES, AND AIR OUTLETS.

E. REPAIR OR REPLACE DAMAGED SECTIONS AND FINISHED WORK THAT DOES NOT COMPLY WITH THESE REQUIREMENTS.

3.3 DUCT SEALING

A. SEAL DUCTS FOR DUCT STATIC-PRESSURE, SEAL CLASSES, AND LEAKAGE CLASSES SPECIFIED IN "DUCT SCHEDULE" ARTICLE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."

B. SEAL DUCTS TO THE FOLLOWING SEAL CLASSES ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE":

1. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."
2. CONDITIONED SPACE, SUPPLY-AIR DUCTS IN PRESSURE CLASSES 2-INCH WG AND LOWER: SEAL CLASS C.
3. CONDITIONED SPACE, SUPPLY-AIR DUCTS IN PRESSURE CLASSES HIGHER THAN 2-INCH WG: SEAL CLASS B.
4. CONDITIONED SPACE, EXHAUST DUCTS: SEAL CLASS B.
5. CONDITIONED SPACE, RETURN-AIR DUCTS: SEAL CLASS C.

3.4 HANGER AND SUPPORT INSTALLATION

A. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," CHAPTER 4, "HANGERS AND SUPPORTS."

B. BUILDING ATTACHMENTS: CONCRETE INSERTS, POWDER-ACTUATED FASTENERS, OR STRUCTURAL-STEEL FASTENERS APPROPRIATE FOR CONSTRUCTION MATERIALS TO WHICH HANGERS ARE BEING ATTACHED.

1. WHERE PRACTICAL, INSTALL CONCRETE INSERTS BEFORE PLACING CONCRETE.
2. INSTALL POWDER-ACTUATED CONCRETE FASTENERS AFTER CONCRETE IS PLACED AND COMPLETELY CURED.
3. USE POWDER-ACTUATED CONCRETE FASTENERS FOR STANDARD-WEIGHT AGGREGATE CONCRETES OR FOR SLABS MORE THAN 4 INCHES THICK.
4. DO NOT USE POWDER-ACTUATED CONCRETE FASTENERS FOR LIGHTWEIGHT-AGGREGATE CONCRETES OR FOR SLABS LESS THAN 4 INCHES THICK.
5. DO NOT USE POWDER-ACTUATED CONCRETE FASTENERS FOR SEISMIC RESTRAINTS.

C. HANGER SPACING: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," TABLE 4-1, "RECTANGULAR DUCT HANGERS MINIMUM SIZE," AND TABLE 4-2, "MINIMUM HANGER SIZES FOR ROUND DUCT," FOR MAXIMUM HANGER SPACING; INSTALL HANGERS AND SUPPORTS WITHIN 24 INCHES OF EACH ELBOW AND WITHIN 48 INCHES OF EACH BRANCH INTERSECTION.

D. HANGERS EXPOSED TO VIEW: THREADED ROD AND ANGLE OR CHANNEL SUPPORTS.

E. SUPPORT VERTICAL DUCTS WITH STEEL ANGLES OR CHANNEL SECURED TO THE SIDES OF THE DUCT WITH WELDS, BOLTS, SHEET METAL SCREWS, OR BLIND RIVETS; SUPPORT AT EACH FLOOR AND AT A MAXIMUM INTERVALS OF 16 FEET.

F. INSTALL UPPER ATTACHMENTS TO STRUCTURES. SELECT AND SIZE UPPER ATTACHMENTS WITH PULL-OUT, TENSION, AND SHEAR CAPACITIES APPROPRIATE FOR SUPPORTED LOADS AND BUILDING MATERIALS WHERE USED.

3.5 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. INSTALL DUCTS WITH HANGERS AND BRACES DESIGNED TO SUPPORT THE DUCT AND TO RESTRAIN AGAINST SEISMIC FORCES REQUIRED BY APPLICABLE BUILDING CODES. COMPLY WITH SMACNA'S "SEISMIC RESTRAINT MANUAL: GUIDELINES FOR MECHANICAL SYSTEMS."

1. SPACE LATERAL SUPPORTS A MAXIMUM OF 40 FEET O.C., AND LONGITUDINAL SUPPORTS A MAXIMUM OF 80 FEET O.C.
2. BRACE A CHANGE OF DIRECTION LONGER THAN 12 FEET.

B. SELECT SEISMIC-RESTRAINT DEVICES WITH CAPACITIES ADEQUATE TO CARRY PRESENT AND FUTURE STATIC AND SEISMIC LOADS.

C. INSTALL CABLES SO THEY DO NOT BEND ACROSS EDGES OF ADJACENT EQUIPMENT OR BUILDING STRUCTURE.

D. INSTALL CABLE RESTRAINTS ON DUCTS THAT ARE SUSPENDED WITH VIBRATION ISOLATORS.

E. INSTALL SEISMIC-RESTRAINT DEVICES USING METHODS APPROVED BY AN AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.

F. ATTACHMENT TO STRUCTURE: IF SPECIFIC ATTACHMENT IS NOT INDICATED, ANCHOR BRACING AND RESTRAINTS TO STRUCTURE, TO FLANGES OF BEAMS, TO UPPER TRUSS CHORDS OF BAR JOISTS, OR TO CONCRETE MEMBERS.

G. DRILLING FOR AND SETTING ANCHORS:

1. IDENTIFY POSITION OF REINFORCING STEEL AND OTHER EMBEDDED ITEMS PRIOR TO DRILLING HOLES FOR ANCHORS. DO NOT DAMAGE EXISTING REINFORCEMENT OR EMBEDDED ITEMS DURING DRILLING. NOTIFY THE ARCHITECT IF REINFORCING STEEL OR OTHER EMBEDDED ITEMS ARE ENCOUNTERED DURING DRILLING. LOCATE AND AVOID PRESTRESSED TENDONS, ELECTRICAL AND TELECOMMUNICATIONS CONDUIT, AND GAS LINES.
2. DO NOT DRILL HOLES IN CONCRETE OR MASONRY UNTIL CONCRETE, MORTAR, OR GROUT HAS ACHIEVED FULL DESIGN STRENGTH.
3. WEDGE ANCHORS: PROTECT THREADS FROM DAMAGE DURING ANCHOR INSTALLATION. HEAVY-DUTY SLEEVE ANCHORS SHALL BE INSTALLED WITH SLEEVE FULLY ENGAGED IN THE STRUCTURAL ELEMENT TO WHICH ANCHOR IS TO BE FASTENED.
4. SET ANCHORS TO MANUFACTURER'S RECOMMENDED TORQUE, USING A TORQUE WRENCH.
5. INSTALL ZINC-COATED STEEL ANCHORS FOR INTERIOR APPLICATIONS AND STAINLESS-STEEL ANCHORS FOR APPLICATIONS EXPOSED TO WEATHER.

3.6 CONNECTIONS

A. MAKE CONNECTIONS TO EQUIPMENT WITH FLEXIBLE CONNECTORS COMPLYING WITH DIVISION 23 SECTION "AIR DUCT ACCESSORIES."

B. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" FOR BRANCH, OUTLET AND INLET, AND TERMINAL UNIT CONNECTIONS.

3.7 PAINTING

A. PAINT INTERIOR OF METAL DUCTS THAT ARE VISIBLE THROUGH REGISTERS AND GRILLES AND THAT DO NOT HAVE DUCT LINER. APPLY ONE COAT OF FLAT, BLACK, LATEX PAINT OVER A COMPATIBLE GALVANIZED-STEEL PRIMER. PAINT MATERIALS AND APPLICATION REQUIREMENTS ARE SPECIFIED IN DIVISION 09 PAINTING SECTIONS.

3.8 FIELD QUALITY CONTROL

A. PERFORM TESTS AND INSPECTIONS.

B. LEAKAGE TESTS:

1. COMPLY WITH SMACNA'S "HVAC AIR DUCT LEAKAGE TEST MANUAL." SUBMIT A TEST REPORT FOR EACH TEST.
2. TEST THE FOLLOWING SYSTEMS:
   a. DUCTS WITH A PRESSURE CLASS HIGHER THAN 3-INCH WG: TEST REPRESENTATIVE DUCT SECTIONS TOTALING NO LESS THAN 25 PERCENT OF TOTAL INSTALLED DUCT AREA FOR EACH DESIGNATED PRESSURE CLASS.
   b. SUPPLY DUCTS WITH A PRESSURE CLASS OF 2-INCH WG OR HIGHER: TEST REPRESENTATIVE DUCT SECTIONS TOTALING NO LESS THAN 50 PERCENT OF TOTAL INSTALLED DUCT AREA FOR EACH DESIGNATED PRESSURE CLASS.
   c. RETURN DUCTS WITH A PRESSURE CLASS OF 2-INCH WG OR HIGHER: TEST REPRESENTATIVE DUCT SECTIONS TOTALING NO LESS THAN 50 PERCENT OF TOTAL INSTALLED DUCT AREA FOR EACH DESIGNATED PRESSURE CLASS.
3. DISASSEMBLE, REASSEMBLE, AND SEAL SEGMENTS OF SYSTEMS TO ACCOMMODATE LEAKAGE TESTING AND FOR COMPLIANCE WITH TEST REQUIREMENTS.
4. TEST FOR LEAKS BEFORE APPLYING EXTERNAL INSULATION.
5. CONDUCT TESTS AT STATIC PRESSURES EQUAL TO MAXIMUM DESIGN PRESSURE OF SYSTEM OR SECTION BEING TESTED. IF STATIC-PRESSURE CLASSES ARE NOT INDICATED, TEST SYSTEM AT MAXIMUM SYSTEM DESIGN PRESSURE. DO NOT PRESSURIZE SYSTEMS ABOVE MAXIMUM DESIGN OPERATING PRESSURE.
6. GIVE SEVEN DAYS' ADVANCE NOTICE FOR TESTING.

C. DUCT SYSTEM CLEANLINESS TESTS:

1. VISUALLY INSPECT DUCT SYSTEM TO ENSURE THAT NO VISIBLE CONTAMINANTS ARE PRESENT.
2. TEST SECTIONS OF METAL DUCT SYSTEM, CHOSEN RANDOMLY BY OWNER, FOR CLEANLINESS ACCORDING TO "VACUUM TEST" IN NADCA ACR, "ASSESSMENT, CLEANING AND RESTORATION OF HVAC SYSTEMS."
   a. ACCEPTABLE CLEANLINESS LEVEL: NET WEIGHT OF DEBRIS COLLECTED ON THE FILTER MEDIA SHALL NOT EXCEED 0.75 MG/100 SQ. CM.

D. DUCT SYSTEM WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.

E. PREPARE TEST AND INSPECTION REPORTS.

3.9 DUCT CLEANING

A. CLEAN NEW AND EXISTING DUCT SYSTEM(S) BEFORE TESTING, ADJUSTING, AND BALANCING.

B. USE SERVICE OPENINGS FOR ENTRY AND INSPECTION.

1. CREATE NEW OPENINGS AND INSTALL ACCESS PANELS APPROPRIATE FOR DUCT STATIC-PRESSURE CLASS IF REQUIRED FOR CLEANING ACCESS. PROVIDE INSULATED PANELS FOR INSULATED OR LINED DUCT. PATCH INSULATION AND LINER AS RECOMMENDED BY DUCT LINER MANUFACTURER. COMPLY WITH DIVISION 23 SECTION "AIR DUCT ACCESSORIES" FOR ACCESS PANELS AND DOORS.
2. DISCONNECT AND RECONNECT FLEXIBLE DUCTS AS NEEDED FOR CLEANING AND INSPECTION.
3. REMOVE AND REINSTALL CEILING TO GAIN ACCESS DURING THE CLEANING PROCESS.

C. PARTICULATE COLLECTION AND ODOR CONTROL:

1. WHEN VENTING VACUUMING SYSTEM INSIDE THE BUILDING, USE HEPA FILTRATION WITH 99.97 PERCENT COLLECTION EFFICIENCY FOR 0.3-MICRON-SIZE (OR LARGER) PARTICLES.
2. WHEN VENTING VACUUMING SYSTEM TO OUTDOORS, USE FILTER TO COLLECT DEBRIS REMOVED FROM HVAC SYSTEM, AND LOCATE EXHAUST DOWNWIND AND AWAY FROM AIR INTAKES AND OTHER POINTS OF ENTRY INTO BUILDING.

D. CLEAN THE FOLLOWING COMPONENTS BY REMOVING SURFACE CONTAMINANTS AND DEPOSITS:

1. AIR OUTLETS AND INLETS (REGISTERS, GRILLES, AND DIFFUSERS).
2. SUPPLY, RETURN, AND EXHAUST FANS INCLUDING FAN HOUSINGS, PLENUMS (EXCEPT CEILING SUPPLY AND RETURN PLENUMS), SCROLLS, BLADES OR VANES, SHAFTS, BAFFLES, DAMPERS, AND DRIVE ASSEMBLIES.
3. AIR-HANDLING UNIT INTERNAL SURFACES AND COMPONENTS INCLUDING MIXING BOX, COIL SECTION, AIR WASH SYSTEMS, SPRAY ELIMINATORS, CONDENSATE DRAIN PANS, HUMIDIFIERS AND DEHUMIDIFIERS, FILTERS AND FILTER SECTIONS, AND CONDENSATE COLLECTORS AND DRAINS.
4. COILS AND RELATED COMPONENTS.
5. RETURN-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES EXCEPT IN CEILING PLENUMS AND MECHANICAL EQUIPMENT ROOMS.
6. SUPPLY-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
7. DEDICATED EXHAUST AND VENTILATION COMPONENTS AND MAKEUP AIR SYSTEMS.

E. MECHANICAL CLEANING METHODOLOGY:

1. CLEAN METAL DUCT SYSTEMS USING MECHANICAL CLEANING METHODS THAT EXTRACT CONTAMINANTS FROM WITHIN DUCT SYSTEMS AND REMOVE CONTAMINANTS FROM BUILDING.
2. USE VACUUM-COLLECTION DEVICES THAT ARE OPERATED CONTINUOUSLY DURING CLEANING. CONNECT VACUUM DEVICE TO DOWNSTREAM END OF DUCT SECTIONS SO AREAS BEING CLEANED ARE UNDER NEGATIVE PRESSURE.
3. USE MECHANICAL AGITATION TO DISLODGE DEBRIS ADHERED TO INTERIOR DUCT SURFACES WITHOUT DAMAGING INTEGRITY OF METAL DUCTS, DUCT LINER, OR DUCT ACCESSORIES.
4. CLEAN FIBROUS-GLASS DUCT LINER WITH HEPA VACUUMING EQUIPMENT; DO NOT PERMIT DUCT LINER TO GET WET. REPLACE FIBROUS-GLASS DUCT LINER THAT IS DAMAGED, DETERIORATED, OR DELAMINATED OR THAT HAS FRIABLE MATERIAL, MOLD, OR FUNGUS GROWTH.
5. CLEAN COILS AND COIL DRAIN PANS ACCORDING TO NADCA 1992. KEEP DRAIN PAN OPERATIONAL. RINSE COILS WITH CLEAN WATER TO REMOVE LATENT RESIDUES AND CLEANING MATERIALS; COMB AND STRAIGHTEN FINS.
6. PROVIDE DRAINAGE AND CLEANUP FOR WASH-DOWN PROCEDURES.
7. ANTIMICROBIAL AGENTS AND COATINGS: APPLY EPA-REGISTERED ANTIMICROBIAL AGENTS IF FUNGUS IS PRESENT. APPLY ANTIMICROBIAL AGENTS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AFTER REMOVAL OF SURFACE DEPOSITS AND DEBRIS.

3.10 START UP

A. AIR BALANCE: COMPLY WITH REQUIREMENTS IN DIVISION 23 SECTION "TESTING, ADJUSTING, AND BALANCING FOR HVAC."

3.11 DUCT SCHEDULE

A. FABRICATE DUCTS WITH GALVANIZED SHEET STEEL EXCEPT AS OTHERWISE INDICATED AND AS FOLLOWS:

1. UNDERGROUND DUCTS: CONCRETE-ENCASED, GALVANIZED SHEET STEEL.
2. .

B. INTERMEDIATE REINFORCEMENT:

1. GALVANIZED-STEEL DUCTS: GALVANIZED STEEL.

C. ELBOW CONFIGURATION:

1. RECTANGULAR DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 2-2, "RECTANGULAR ELBOWS."
   a. VELOCITY 1000 FPM OR LOWER:
      1) RADIUS TYPE RE 1 WITH MINIMUM 0.5 RADIUS-TO-DIAMETER RATIO.
      2) MITERED TYPE RE 4 WITHOUT VANES.
   b. VELOCITY 1000 TO 1500 FPM:
      1) RADIUS TYPE RE 1 WITH MINIMUM 1.0 RADIUS-TO-DIAMETER RATIO.
      2) RADIUS TYPE RE 3 WITH MINIMUM 0.5 RADIUS-TO-DIAMETER RATIO AND TWO VANES.
      3) MITERED TYPE RE 2 WITH VANES COMPLYING WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 2-3, "VANES AND VANE RUNNERS," AND FIGURE 2-4, "VANE SUPPORT IN ELBOWS."
   c. VELOCITY 1500 FPM OR HIGHER:
      1) RADIUS TYPE RE 1 WITH MINIMUM 1.5 RADIUS-TO-DIAMETER RATIO.
      2) RADIUS TYPE RE 3 WITH MINIMUM 1.0 RADIUS-TO-DIAMETER RATIO AND TWO VANES.
      3) MITERED TYPE RE 2 WITH VANES COMPLYING WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 2-3, "VANES AND VANE RUNNERS," AND FIGURE 2-4, "VANE SUPPORT IN ELBOWS."

2. RECTANGULAR DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 2-2, "RECTANGULAR ELBOWS."
   a. RADIUS TYPE RE 1 WITH MINIMUM 1.5 RADIUS-TO-DIAMETER RATIO.
   b. RADIUS TYPE RE 3 WITH MINIMUM 1.0 RADIUS-TO-DIAMETER RATIO AND TWO VANES.
   c. MITERED TYPE RE 2 WITH VANES COMPLYING WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 2-3, "VANES AND VANE RUNNERS," AND FIGURE 2-4, "VANE SUPPORT IN ELBOWS."
3. ROUND DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-3, "ROUND DUCT ELBOWS."
   a. MINIMUM RADIUS-TO-DIAMETER RATIO AND ELBOW SEGMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," TABLE 3-1, "MITERED ELBOWS." ELBOWS WITH LESS THAN 90-DEGREE CHANGE OF DIRECTION HAVE PROPORTIONATELY FEWER SEGMENTS.
      1) VELOCITY 1000 FPM OR LOWER: 0.5 RADIUS-TO-DIAMETER RATIO AND THREE SEGMENTS FOR 90-DEGREE ELBOW.
      2) VELOCITY 1000 TO 1500 FPM: 1.0 RADIUS-TO-DIAMETER RATIO AND FOUR SEGMENTS FOR 90-DEGREE ELBOW.
      3) VELOCITY 1500 FPM OR HIGHER: 1.5 RADIUS-TO-DIAMETER RATIO AND FIVE SEGMENTS FOR 90-DEGREE ELBOW.
      4) RADIUS-TO DIAMETER RATIO: 1.5.
   b. ROUND ELBOWS, 12 INCHES AND SMALLER IN DIAMETER: STAMPED OR PLEATED.
   c. ROUND ELBOWS, 14 INCHES AND LARGER IN DIAMETER: STANDING SEAM.

A. BRANCH CONFIGURATION:

1. RECTANGULAR DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 2-6, "BRANCH CONNECTIONS."
   a. RECTANGULAR MAIN TO RECTANGULAR BRANCH: 45-DEGREE ENTRY.
   b. RECTANGULAR MAIN TO ROUND BRANCH: SPIN IN.
2. ROUND AND FLAT OVAL: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-4, "90 DEGREE TEES AND LATERALS," AND FIGURE 3-5, "CONICAL TEES." SADDLE TAPS ARE PERMITTED IN EXISTING DUCT.
   a. VELOCITY 1000 FPM OR LOWER: 90-DEGREE TAP.
   b. VELOCITY 1000 TO 1500 FPM: CONICAL TAP.
   c. VELOCITY 1500 FPM OR HIGHER: 45-DEGREE LATERAL.

SECTION 23 33 00 – AIR DUCT ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:

1. MANUAL VOLUME DAMPERS.
2. FLANGE CONNECTORS.
3. TURNING VANES.
4. FLEXIBLE CONNECTORS.
5. FLEXIBLE DUCTS.
6. DUCT ACCESSORY HARDWARE.

PART 2 – PRODUCTS

2.1 MATERIALS

A. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESSES, AND DUCT CONSTRUCTION METHODS UNLESS OTHERWISE INDICATED. SHEET METAL MATERIALS SHALL BE FREE OF PITTING, SEAM MARKS, ROLLER MARKS, STAINS, DISCOLORATIONS, AND OTHER IMPERFECTIONS.

B. GALVANIZED SHEET STEEL: COMPLY WITH ASTM A 653/A 653M.

1. GALVANIZED COATING DESIGNATION: G60.
2. EXPOSED-SURFACE FINISH: MILL PHOSPHATIZED.

2.2 MANUAL VOLUME DAMPERS

A. STANDARD, STEEL, MANUAL VOLUME DAMPERS:

1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
   a. AIR BALANCE INC.; A DIVISION OF MESTEK, INC.
   b. AMERICAN WARMING AND VENTILATING; A DIVISION OF MESTEK, INC.
   c. FLEXMASTER U.S.A., INC.
   d. MCGILL AIRFLOW LLC.
   e. METALAIRE, INC.
   f. NAILOR INDUSTRIES INC.
   g. POTTORFF; A DIVISION OF PCI INDUSTRIES, INC.
   h. RUSKIN COMPANY.
   i. TROX USA INC.
   j. VENT PRODUCTS COMPANY, INC.
   k. .
2. STANDARD LEAKAGE RATING, WITH LINKAGE OUTSIDE AIRSTREAM.
3. SUITABLE FOR HORIZONTAL OR VERTICAL APPLICATIONS.
4. FRAMES:
   a. HAT-SHAPED, GALVANIZED-STEEL CHANNELS, 0.064-INCH MINIMUM THICKNESS.
   b. MITERED AND WELDED CORNERS.
   c. FLANGES FOR ATTACHING TO WALLS AND FLANGELESS FRAMES FOR INSTALLING IN DUCTS.
5. BLADES:
   a. MULTIPLE OR SINGLE BLADE.
   b. PARALLEL- OR OPPOSED-BLADE DESIGN.
   c. STIFFEN DAMPER BLADES FOR STABILITY.
   d. GALVANIZED-STEEL, 0.064 INCH THICK.
6. BLADE AXLES: GALVANIZED STEEL.
7. BEARINGS:
   a. MOLDED SYNTHETIC.
   b. DAMPERS IN DUCTS WITH PRESSURE CLASSES OF 3-INCH WG OR LESS SHALL HAVE AXLES FULL LENGTH OF DAMPER BLADES AND BEARINGS AT BOTH ENDS OF OPERATING SHAFT.
8. TIE BARS AND BRACKETS: GALVANIZED STEEL.

B. DAMPER HARDWARE:

1. ZINC-PLATED, DIE-CAST CORE WITH DIAL AND HANDLE MADE OF 3/32-INCH- THICK ZINC-PLATED STEEL, AND A 3/4-INCH HEXAGON LOCKING NUT.
2. INCLUDE CENTER HOLE TO SUIT DAMPER OPERATING-ROD SIZE.
3. INCLUDE ELEVATED PLATFORM FOR INSULATED DUCT MOUNTING.

2.3 FLANGE CONNECTORS

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. DUCTMATE INDUSTRIES, INC.
2. NEXUS PDQ; DIVISION OF SHILCO HOLDINGS INC.
3. WARD INDUSTRIES, INC.; A DIVISION OF HART & COOLEY, INC.
4. .

B. DESCRIPTION: ADD-ON OR ROLL-FORMED, FACTORY-FABRICATED, SLIDE-ON TRANSVERSE FLANGE CONNECTORS, GASKETS, AND COMPONENTS.

C. MATERIAL: GALVANIZED STEEL.

D. GAGE AND SHAPE: MATCH CONNECTING DUCTWORK.

2.4 TURNING VANES

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. DUCTMATE INDUSTRIES, INC.
2. DURO DYNE INC.
3. METALAIRE, INC.
4. SEMCO INCORPORATED.
5. WARD INDUSTRIES, INC.; A DIVISION OF HART & COOLEY, INC.
6. .

B. MANUFACTURED TURNING VANES FOR METAL DUCTS: CURVED BLADES OF GALVANIZED SHEET STEEL; SUPPORT WITH BARS PERPENDICULAR TO BLADES SET; SET INTO VANE RUNNERS SUITABLE FOR DUCT MOUNTING.

1. ACOUSTIC TURNING VANES: FABRICATE AIRFOIL-SHAPED ALUMINUM EXTRUSIONS WITH PERFORATED FACES AND FIBROUS-GLASS FILL.

C. GENERAL REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE"; FIGURES 2-3, "VANES AND VANE RUNNERS," AND 2-4, "VANE SUPPORT IN ELBOWS."

D. VANE CONSTRUCTION: SINGLE WALL.

E. VANE CONSTRUCTION: SINGLE WALL FOR DUCTS UP TO 48 INCHES WIDE AND DOUBLE WALL FOR LARGER DIMENSIONS.

2.5 FLEXIBLE CONNECTORS

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. DUCTMATE INDUSTRIES, INC.
2. DURO DYNE INC.
3. VENTFABRICS, INC.
4. WARD INDUSTRIES, INC.; A DIVISION OF HART & COOLEY, INC.
5. .

B. MATERIALS: FLAME-RETARDANT OR NONCOMBUSTIBLE FABRICS.

C. COATINGS AND ADHESIVES: COMPLY WITH UL 181, CLASS 1.

D. METAL-EDGED CONNECTORS: FACTORY FABRICATED WITH A FABRIC STRIP [3-1/2 INCHES] [5-3/4 INCHES] WIDE ATTACHED TO 2 STRIPS OF 2-3/4-INCH- WIDE, 0.028-INCH- THICK, GALVANIZED SHEET STEEL OR 0.032-INCH- THICK ALUMINUM SHEETS. PROVIDE METAL COMPATIBLE WITH CONNECTED DUCTS.

E. INDOOR SYSTEM, FLEXIBLE CONNECTOR FABRIC: GLASS FABRIC DOUBLE COATED WITH NEOPRENE.

1. MINIMUM WEIGHT: 26 OZ./SQ. YD..
2. TENSILE STRENGTH: 480 LBF/INCH IN THE WARP AND 360 LBF/INCH IN THE FILLING.
3. SERVICE TEMPERATURE: MINUS 40 TO PLUS 200 DEG F.

2.6 FLEXIBLE DUCTS

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

1. FLEXMASTER U.S.A., INC.
2. MCGILL AIRFLOW LLC.
3. WARD INDUSTRIES, INC.; A DIVISION OF HART & COOLEY, INC..

B. INSULATED, FLEXIBLE DUCT: UL 181, CLASS 1, 2-PLY VINYL FILM SUPPORTED BY HELICALLY WOUND, SPRING-STEEL WIRE; FIBROUS-GLASS INSULATION; POLYETHYLENE VAPOR-BARRIER FILM.

1. PRESSURE RATING: 10-INCH WG POSITIVE AND 1.0-INCH WG NEGATIVE.
2. MAXIMUM AIR VELOCITY: 4000 FPM.
3. TEMPERATURE RANGE: MINUS 10 TO PLUS 160 DEG F.

C. FLEXIBLE DUCT CONNECTORS:

1. CLAMPS: STAINLESS-STEEL BAND WITH CADMIUM-PLATED HEX SCREW TO TIGHTEN BAND WITH A WORM-GEAR ACTION IN SIZES 3 THROUGH 18 INCHES, TO SUIT DUCT SIZE.
2. NON-CLAMP CONNECTORS: ADHESIVE LIQUID ADHESIVE PLUS TAPE ADHESIVE PLUS SHEET METAL SCREWS.

2.7 DUCT ACCESSORY HARDWARE

A. INSTRUMENT TEST HOLES: CAST IRON OR CAST ALUMINUM TO SUIT DUCT MATERIAL, INCLUDING SCREW CAP AND GASKET. SIZE TO ALLOW INSERTION OF PITOT TUBE AND OTHER TESTING INSTRUMENTS AND OF LENGTH TO SUIT DUCT-INSULATION THICKNESS.

B. ADHESIVES: HIGH STRENGTH, QUICK SETTING, NEOPRENE BASED, WATERPROOF, AND RESISTANT TO GASOLINE AND GREASE.

PART 3 – EXECUTION

3.1 INSTALLATION

A. INSTALL DUCT ACCESSORIES ACCORDING TO APPLICABLE DETAILS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" FOR METAL DUCTS AND IN NAIMA AH116, "FIBROUS GLASS DUCT CONSTRUCTION STANDARDS," FOR FIBROUS-GLASS DUCTS.

B. INSTALL DUCT ACCESSORIES OF MATERIALS SUITED TO DUCT MATERIALS; USE GALVANIZED-STEEL ACCESSORIES IN GALVANIZED-STEEL AND FIBROUS-GLASS DUCTS, STAINLESS-STEEL ACCESSORIES IN STAINLESS-STEEL DUCTS, AND ALUMINUM ACCESSORIES IN ALUMINUM DUCTS.

C. INSTALL VOLUME DAMPERS AT POINTS ON SUPPLY, RETURN, AND EXHAUST SYSTEMS WHERE BRANCHES EXTEND FROM LARGER DUCTS. WHERE DAMPERS ARE INSTALLED IN DUCTS HAVING DUCT LINER, INSTALL DAMPERS WITH HAT CHANNELS OF SAME DEPTH AS LINER, AND TERMINATE LINER WITH NOSING AT HAT CHANNEL.

1. INSTALL STEEL VOLUME DAMPERS IN STEEL DUCTS.

D. SET DAMPERS TO FULLY OPEN POSITION BEFORE TESTING, ADJUSTING, AND BALANCING.

E. INSTALL TEST HOLES AT FAN INLETS AND OUTLETS AND ELSEWHERE AS INDICATED.

F. INSTALL FLEXIBLE CONNECTORS TO CONNECT DUCTS TO EQUIPMENT.

G. FOR FANS DEVELOPING STATIC PRESSURES OF 5-INCH WG AND MORE, COVER FLEXIBLE CONNECTORS WITH LOADED VINYL SHEET HELD IN PLACE WITH METAL STRAPS.

H. CONNECT TERMINAL UNITS TO SUPPLY DUCTS WITH MAXIMUM 12-INCH LENGTHS OF FLEXIBLE DUCT. DO NOT USE FLEXIBLE DUCTS TO CHANGE DIRECTIONS.

I. CONNECT DIFFUSERS OR LIGHT TROFFER BOOTS TO DUCTS WITH MAXIMUM 60-INCH LENGTHS OF FLEXIBLE DUCT CLAMPED OR STRAPPED IN PLACE.

J. CONNECT FLEXIBLE DUCTS TO METAL DUCTS WITH ADHESIVE PLUS SHEET METAL SCREWS.

K. INSTALL DUCT TEST HOLES WHERE REQUIRED FOR TESTING AND BALANCING PURPOSES.

L. INSTALL THRUST LIMITS AT CENTERLINE OF THRUST, SYMMETRICAL ON BOTH SIDES OF EQUIPMENT. ATTACH THRUST LIMITS AT CENTERLINE OF THRUST AND ADJUST TO A MAXIMUM OF 1/4-INCH MOVEMENT DURING START AND STOP OF FANS.

3.2 FIELD QUALITY CONTROL

A. TESTS AND INSPECTIONS:

1. OPERATE DAMPERS TO VERIFY FULL RANGE OF MOVEMENT.
2. INSPECT LOCATIONS OF ACCESS DOORS AND VERIFY THAT PURPOSE OF ACCESS DOOR CAN BE PERFORMED.
3. INSPECT TURNING VANES FOR PROPER AND SECURE INSTALLATION.

B.

Client

PROJECT NORTH

Prime Consultant

IBI GROUP

ARCHITECTS ENGINEERS PLANNERS
Suite 112 - 10 Exchange Place
Salt Lake City, Utah 84111
Phone: (801) 532-4233 Fax: (801) 532-4231

Seal

LICENSED PROFESSIONAL ENGINEER
No.189171-2202
TODD L. DORIUS
STATE of UTAH

Consultants

Baker

BAKER & ASSOCIATES
A unit of Michael Baker Corporation
Midvale Office
6955 Union Park Center, Suite 370
Midvale, Utah 84047
(801)-255-4400

Issues

| No. | Date | Apprd. | Description |
|---|---|---|---|
| 1 | 05-28-09 | TD | ADDENDUM 1 |

Revision

| No. | Date | Apprd. | Description |
|---|---|---|---|

Notes

This drawing, as an instrument of service, is the property of the Architect and may not be reproduced without their permission and unless the reproduction carries their name. All design and other information shown on this drawing are for the use on the specified project only and shall not be used otherwise without written permission of the Architect.

Written dimensions shall have precedence over scaled dimensions. Contractors shall verify and be responsible for all dimensions and conditions on the job and the Architect shall be informed of any variations from the dimensions and conditions shown on the drawing. Shop drawings shall be submitted to the Architect for approval before proceeding with fabrication.

Project Title

UTAH NATIONAL GAURD ARMORY INTERIOR REMODEL

7600 AIRPORT RD. WEST JORDAN UT

Sheet Title

MECHANICAL SPECIFICATIONS

| | |
|---|---|
| Scale: AS NOTED | Date: 05-28-09 |
| Drawn: RBM | Checked: TD |
| Cad File: M602.DWG | Sheet No. M602 |
| Project No. | |

ARCH E1 - ADT 2007