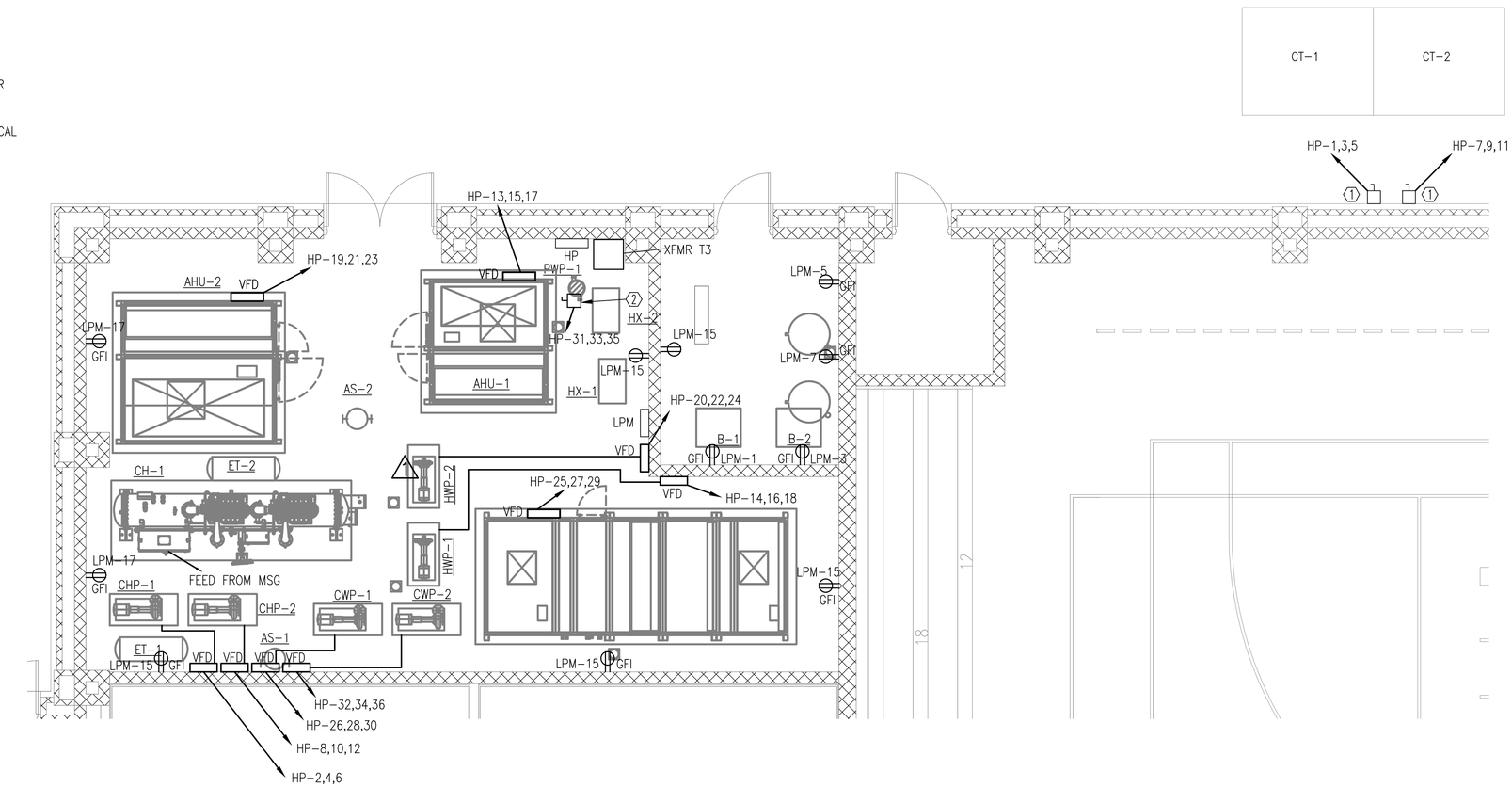
KEY NOTES

1. PROVIDE NEMA 4X, 30A, 480V, 3P DISCONNECT SWITCH FOR MECHANICAL EQUIPMENT.
2. PROVIDE 30A, 480V, 3P DISCONNECT SWITCH FOR MECHANICAL EQUIPMENT.




## ENLARGED POWER PLAN (A4)

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

| NUM | DESCRIPTION | DATE | APPR |
|---|---|---|---|
| 1 | AS BUILT ENERGY ENHANCEMENT #2 | 7/17/12 | |
| | | 6/17/11 | |

NAVFAC

RECORD DRAWINGS 08/13/2012
This record drawing is a compilation of information from the contract documents for this project including ASI's, RFI's, Change Orders, and information provided by the contractor, The Ross Group.

SEAL

LEO A DALY
PLANNING ARCHITECTURE ENGINEERING INTERIORS
EST. 1915


2925 Briarpark Drive
Houston, Texas 77042
Tel 713-821-2100
Fax 713-266-7182
A/E INFO


APPROVED

FOR COMMANDER NAVFAC / B.L.T.L.

ACTIVITY

SATISFACTORY TO DATE Oisin Courtney 11/7/11

DES SN DRW ECE CHK SN

PROJECT MANAGER

IPT TECH. BRANCH HEAD

CHIEF ENG/ARCH (CORE)

DEPARTMENT OF THE NAVY
IPT GULF COAST
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
NAVAL AIR STATION JACKSONVILLE
NAVAL AIR STATION KINGSVILLE
KINGSVILLE, TEXAS

# INDOOR PHYSICAL FITNESS FACILITY

ENLARGED MECHANICAL ROOM PLANS

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

EPROJECT NO.: 812380

CONSTR. CONTR. NO. N69450-10-D-0771

NAVFAC DRAWING NO. 15068058 – 15068165

SHEET OF

E-400

DRAWFORM REVISION: 7 AUGUST 2009

FILE NAME: L:\110-10137-000\4-0-Production\4-01-Drawings\Electrical\BLDGP279-812380-E400.dwg LAYOUT NAME: Layout1 PLOTTED: Wednesday, August 01, 2012 - 4:10pm USER: odshelton

## LIGHTING FIXTURE SCHEDULE

| TYPE | MANUFACTURER | CATALOG NUMBER | DESCRIPTION | VOLTS | LAMPS | MOUNTING | INPUT WATTAGE |
|---|---|---|---|---|---|---|---|
| A | METALUX | 2 RDI 3 32 FLS UNV EB8 | 2X4 RECESSED DIRECT/INDIRECT | MVOLT | 3 | RECESSED | 96 |
| A1 | METALUX | 2 RDI 3 32 FLS UNV HR8 DIM | 2X4 RECESSED DIRECT/INDIRECT W/ DIMMABLE BALLAST | MVOLT | 3 | RECESSED | 96 |
| AE | METALUX | 2 RDI 3 32 FLS UNV EM EB8 | 2X4 RECESSED DIRECT/INDIRECT W / EMERGENCY BACKUP | MVOLT | 3 | RECESSED | 96 |
| B | METALUX | 2 AC 2 32 UNV EB8 | 2X4 RECESSED TROFFER | MVOLT | 2 | RECESSED | 64 |
| B1 | METALUX | 2 AC 2 32 UNV HR8 DIM | 2X4 RECESSED TROFFER W/ DIMMABLE BALLAST | MVOLT | 2 | RECESSED | 64 |
| BE | METALUX | 2 AC 2 32 UNV EL EB8 | 2X4 RECESSED TROFFER W / EMERGENCY BACKUP | MVOLT | 2 | RECESSED | 64 |
| C | METALUX | 2 GC 2 32 A UNV EB8 | 2X4 RECESSED TROFFER | MVOLT | 2 | RECESSED | 69 |
| CE | METALUX | 2 GC 2 32 A UNV EL EB8 | 2X4 RECESSED TROFFER W / EMERGENCY BACKUP | MVOLT | 2 | RECESSED | 69 |
| D | METALUX | SSF 2 32 UNV EB8 | STANDARD STRIPLITE | MVOLT | 2 | SURFACE | 69 |
| DE | METALUX | SSF 2 32 UNV EL4 EB8 W/ AYC CHAIN/SET-U | STANDARD STRIPLITE | MVOLT | 2 | SURFACE | 69 |
| E | HALO | H285E 270P | COMPACT FLUORESCENT | MVOLT | 1 | RECESSED | 52 |
| F | FAIL-SAFE | MRM F 12 2 32 UNV IK12 | 1X4 RECESSED TROFFER | MVOLT | 2 | RECESSED | 96 |
| FE | FAIL-SAFE | MRM F 12 2 32 UNV IK12 EBP | 1X4 RECESSED TROFFER | MVOLT | 2 | RECESSED | 96 |
| G | CORELITE | AW W O 2 T8 UNV SU-WA 12 | WALL MOUNT SEMI DIRECT | MVOLT | 2 | WALL MOUNT | 58 |
| H | CORELITE | AW W O 2 T8 UNV SU-WA 16 | WALL MOUNT SEMI DIRECT | MVOLT | 2 | WALL MOUNT | 58 |
| HA | LITHONIA | 170S 1000M HPN 277 | AREA LIGHT POOL AREA | 277 | 1 | 20' POLE MOUNT | 1000 |
| HB | MUSCO | 1500WMZ | SPORT FIELD POLE LIGHT | 480 | | 70' POLE MOUNT | 1500 |
| HC | STREETWORKS | AVM 17 M 2 W W 3S BZ | AREA LIGHT PARKING AREA | 277 | 2 | 30' POLE MOUNT | 300 |
| I | FAIL-SAFE | F 24 3 32 UNV IK12 EB81 | 2X4 RECESSED TROFFER | MVOLT | 3 | RECESSED | 96 |
| IE | FAIL-SAFE | F 24 3 32 UNV IK12 EB81 EBP | 2X4 RECESSED TROFFER | MVOLT | 3 | RECESSED | 96 |
| J | CORELITE | AW W O 2 T8 UNV SU-WA 4 | 4" LENSED WALL INDIRECT WALL MOUNT | MVOLT | 2 | WALL MOUNT | 64 |
| K | COURT FIXTURES ARE PROVIDED WITH COURT (REFER TO SPECIFICATION 13 28 33) | | | | | | |
| L | METALUX | 2 AC 2 24T5 UNV EBT | 2X2 RECESSED TROFFER | MVOLT | 2 | RECESSED | 48 |
| LE | METALUX | 2 AC 2 24T5 UNV EL EBT | 2X2 RECESSED TROFFER | MVOLT | 2 | RECESSED | 48 |
| M | PORTFOLIO | C6 1 32 LI | 6" OPEN RECESSED DOWNLIGHT | 277 | 1 | RECESSED | 32 |
| N | METALUX | HBI 6 54T5 W WG 277 EHT 2 HBAYC-CHAIN/SET/U | HIGH BAY INDUSTRIAL LIGHTING W/ WIRE GUARD 2 BALLAST | 277 | 6 | PENDANT | 351 |
| NE | METALUX | HBI 6 54T5 W WG 277 EL EHT 2 HBAYC-CHAIN/SET/U | HIGH BAY INDUSTRIAL LIGHTING W / EMERGENCY BACKUP & WIRE GUARD, 2 BALLAST | 277 | 6 | PENDANT | 351 |
| O | SHAPER | 674-WP 43 T5/2/14 277 BM | EXTERIOR WALL LUMINAIRE LUMINOUS SCONCE | 277 | 2 | WALL MOUNT | 42 |
| P | MCGRAW-EDISON | ISC 50 277 MH 2S BZ | IMPACT ELITE CYLINDER | 277 | 1 | WALL MOUNT | 100 |
| Q | PORTFOLIO | LD413835D0104LS50LI | 4" LED RECESSED DOWNLIGHT | 277 | NA | RECESSED | 25 |
| S | ENVIROFAN | 48F-9 | CEILING FAN | 120 | NA | PENDANT | 74 |
| T | LDPI | 380 T8 2L 4 129 | EXPLOSION PROOF LIGHTING | 120 | 2 | CHAIN HUNG | 64 |
| TE | LDPI | 380 T8 2L 4 129 EM | EXPLOSION PROOF LIGHTING W / EMERGENCY BATTERY BACKUP | 120 | 2 | CHAIN HUNG | 64 |
| X | METALUX | CAR7 1 70 00 R 277 | WALL MOUNTED EXIT SIGN | 277 | NA | CEILING | 10 |

PANEL NO. HP
SERVICE VOLTAGE 480Y/277V,3PH,4W
MAIN BREAKER SIZE 400 AMP MCB
TYPE BRANCH CIRCUIT PANEL
PHASE BUS RATING 400 AMPS
NEUTRAL BUS RATING 400 AMPS
SHORT CIRCUIT RATING 14000 AIC
LOCATION MECHANICAL
MOUNTING SURFACE
DRAWING NO. E-103

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | BREAKER AMP | VOLT AMPS A | B | C | CKT. NO. | CKT. NO. | VOLT AMPS A | B | C | BREAKER POLE | BREAKER AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 2105 | | | 1 | 2 | 3878 | | | | | | | | | | |
| | #12 | | #12 | CT-1 | 7.6 | 3 | 20 | | 2105 | | 3 | 4 | | 3878 | | 3 | 20 | 14.0 | CHP-1 | | #12 | | #12 |
| | | | | | | | | | | 2105 | 5 | 6 | | | 3878 | | | | | | | | |
| | | | | | | | | 2105 | | | 7 | 8 | 3878 | | | | | | | | | | |
| | #12 | | #12 | CT-2 | 7.6 | 3 | 20 | | 2105 | | 9 | 10 | | 3878 | | 3 | 20 | 14.0 | CHP-2 | | #12 | | #12 |
| | | | | | | | | | | 2105 | 11 | 12 | | | 3878 | | | | | | | | |
| | | | | | | | | 3878 | | | 13 | 14 | 1329 | | | | | | | | | | |
| | #12 | | #12 | AHU-1 | 14.0 | 3 | 20 | | 3878 | | 15 | 16 | | 1329 | | 3 | 20 | 4.8 | HWP-1 | | #12 | | #12 |
| | | | | | | | | | | 3878 | 17 | 18 | | | 1329 | | | | | | | | |
| | | | | | | | | 5817 | | | 19 | 20 | 1329 | | | | | | | | | | |
| | #10 | | #10 | AHU-2 | 21.0 | 3 | 30 | | 5817 | | 21 | 22 | | 1329 | | 3 | 20 | 4.8 | HWP-2 | | #12 | | #12 |
| | | | | | | | | | | 5817 | 23 | 24 | | | 1329 | | | | | | | | |
| | | | | | | | | 3878 | | | 25 | 26 | 3047 | | | | | | | | | | |
| | #12 | | #12 | OAU-1 | 14.0 | 3 | 20 | | 3878 | | 27 | 28 | | 3047 | | 3 | 20 | 11.0 | CWP-1 | | #12 | | #12 |
| | | | | | | | | | | 3878 | 29 | 30 | | | 3047 | | | | | | | | |
| | | | | | | | | 2105 | | | 31 | 32 | 3047 | | | | | | | | | | |
| | #12 | | #12 | PWP-1 | 7.6 | 3 | 20 | | 2105 | | 33 | 34 | | 3047 | | 3 | 20 | 11.0 | CWP-2 | | #12 | | #12 |
| | | | | | | | | | | 2105 | 35 | 36 | | | 3047 | | | | | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 37 | 38 | 17999 | | | | | | | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 39 | 40 | | 16030 | | 3 | 125 | 57.8 | PANEL LPM | | #1 | | #6 |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 41 | 42 | | | 12961 | | | | | | | | |

TOTAL PHASE A: 54395 VOLT-AMPS
TOTAL PHASE B: 52426 VOLT-AMPS
TOTAL PHASE C: 49357 VOLT-AMPS
MAXIMUM PHASE CURRENT: 196.3 AMPS
TOTAL CONNECTED LOAD: 156.2 KVA
ESTIMATED DEMAND LOAD: 110.8 KVA
ESTIMATED DEMAND LOAD: 133.2 AMPS

PANEL NO. LPM
SERVICE VOLTAGE 208Y/120V,3PH,4W
MAIN BREAKER SIZE 250 AMP MCB
TYPE BRANCH CIRCUIT PANEL
PHASE BUS RATING 400 AMPS
NEUTRAL BUS RATING 400 AMPS
SHORT CIRCUIT RATING 10000 AIC
LOCATION MECHANICAL RM
MOUNTING SURFACE
DRAWING NO. E103

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | BREAKER AMP | VOLT AMPS A | B | C | CKT. NO. | CKT. NO. | VOLT AMPS A | B | C | BREAKER POLE | BREAKER AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | #12 | #12 | #12 | B-1 | 4.2 | 1 | 20 | 500 | | | 1 | 2 | 1656 | | | 1 | 20 | 13.8 | GOAL WINCH | | #12 | #12 | #12 |
| | #12 | #12 | #12 | B-2 | 4.2 | 1 | 20 | | 500 | | 3 | 4 | | 1656 | | 1 | 20 | 13.8 | GOAL WINCH | | #12 | #12 | #12 |
| | #12 | #12 | #12 | WATER HEATER #1 | 8.3 | 1 | 20 | | | 1000 | 5 | 6 | | | 1656 | 1 | 20 | 13.8 | GOAL WINCH | | #12 | #12 | #12 |
| | #12 | #12 | #12 | WATER HEATER #2 | 8.3 | 1 | 20 | 1000 | | | 7 | 8 | 1656 | | | 1 | 20 | 13.8 | GOAL WINCH | | #12 | #12 | #12 |
| | #12 | #12 | #12 | EF 1 | 9.8 | 1 | 20 | | 1176 | | 9 | 10 | | 1656 | | 1 | 20 | 13.8 | GOAL WINCH | | #12 | #12 | #12 |
| | #12 | #12 | #12 | EF 2 | 9.8 | 1 | 20 | | | 1176 | 11 | 12 | | | 1656 | 1 | 20 | 13.8 | GOAL WINCH | | #12 | #12 | #12 |
| | #12 | #12 | #12 | EF 3 | 9.8 | 1 | 20 | 1176 | | | 13 | 14 | 1656 | | | 1 | 20 | 13.8 | GOAL WINCH | | #12 | #12 | #12 |
| | #12 | #12 | #12 | GFI RECEPTACLE | 6.0 | 1 | 20 | | 720 | | 15 | 16 | | 1600 | | 1 | 20 | 13.3 | HAIR DRYER | | #12 | #12 | #12 |
| | #12 | #12 | #12 | GFI RECEPTACLE | 4.5 | 1 | 20 | | | 540 | 17 | 18 | | | 1600 | 1 | 20 | 13.3 | HAIR DRYER | | #12 | #12 | #12 |
| | | | | GENERATOR HEATER | 0.8 | 1 | 20 | 100 | | | 19 | 20 | 1600 | | | 1 | 20 | 13.3 | HAIR DRYER | | #12 | #12 | #12 |
| | | | | BATTERY CHARGER | 0.8 | 1 | 20 | | 100 | | 21 | 22 | | 1600 | | 1 | 20 | 13.3 | HAIR DRYER | | #12 | #12 | #12 |
| | | | | CONTROLS | 0.8 | 1 | 20 | | | 100 | 23 | 24 | | | 1600 | 1 | 20 | 13.3 | HAIR DRYER | | #12 | #12 | #12 |
| | #12 | #12 | #12 | VAV | 4.2 | 1 | 20 | 500 | | | 25 | 26 | 1600 | | | 1 | 20 | 13.3 | HAIR DRYER | | #12 | #12 | #12 |
| | #12 | #12 | #12 | VAV | 4.2 | 1 | 20 | | 500 | | 27 | 28 | | 1600 | | 1 | 20 | 13.3 | HAIR DRYER | | #12 | #12 | #12 |
| | #12 | #12 | #12 | FIRE ALARM PANEL | 3.3 | 1 | 20 | | | 400 | 29 | 30 | | | 1600 | 1 | 20 | 13.3 | HAIR DRYER | | #12 | #12 | #12 |
| | #6 | | #10 | CRAC-1 | 47.3 | 2 | 60 | 4922 | | | 31 | 32 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | | 4922 | | 33 | 34 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #10 | | #10 | CRCU-1 | 15.7 | 2 | 25 | | | 1633 | 35 | 36 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | 1633 | | | 37 | 38 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 39 | 40 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 41 | 42 | | | | 1 | 20 | 0.0 | SPARE | | | | |

TOTAL PHASE A: 17999 VOLT-AMPS
TOTAL PHASE B: 16030 VOLT-AMPS
TOTAL PHASE C: 12961 VOLT-AMPS
MAXIMUM PHASE CURRENT: 149.9 AMPS
TOTAL CONNECTED LOAD: 47.0 KVA
ESTIMATED DEMAND LOAD: 44.4 KVA
ESTIMATED DEMAND LOAD: 123.3 AMPS

PANEL NO. PP
SERVICE VOLTAGE 208Y/120V,3PH,4W
MAIN BREAKER SIZE 250 AMP MCB
TYPE BRANCH CIRCUIT PANEL
PHASE BUS RATING 400 AMPS
NEUTRAL BUS RATING 400 AMPS
SHORT CIRCUIT RATING 10000 AIC
LOCATION ELECTRICAL RM
MOUNTING SURFACE
DRAWING NO. E-103

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | BREAKER AMP | VOLT AMPS A | B | C | CKT. NO. | CKT. NO. | VOLT AMPS A | B | C | BREAKER POLE | BREAKER AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | #12 | #12 | #12 | EXTERIOR GFI | 7.5 | 1 | 20 | 900 | | | 1 | 2 | 540 | | | 1 | 20 | 4.5 | WAITING AREA REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | RESTROOM GFI | 7.5 | 1 | 20 | | 900 | | 3 | 4 | | 900 | | 1 | 20 | 7.5 | CNTRL CTR REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | EXT FOUNTAIN | 1.5 | 1 | 20 | | | 180 | 5 | 6 | | | 900 | 1 | 20 | 7.5 | CNTRL CTR REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | 900 | | | 7 | 8 | 900 | | | 1 | 20 | 7.5 | CONV. REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | | 900 | | 9 | 10 | | 540 | | 1 | 20 | 4.5 | LAUNDRY | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | | | 900 | 11 | 12 | | | 1000 | 1 | 20 | 8.3 | REFRIG REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | 900 | | | 13 | 14 | 180 | | | 1 | 20 | 1.5 | DRINK FOUNTAIN | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | | 900 | | 15 | 16 | | 900 | | 1 | 20 | 7.5 | CONV. REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | | | 900 | 17 | 18 | | | 1000 | 1 | 20 | 8.3 | TREADMILL | | #12 | #12 | #12 |
| | #12 | #12 | #12 | RESTROOM GFI | 7.5 | 1 | 20 | 900 | | | 19 | 20 | 540 | | | 1 | 20 | 4.5 | CONV. REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | VENDING | 9.2 | 1 | 20 | | 1100 | | 21 | 22 | | 900 | | 1 | 20 | 7.5 | GYM REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | VENDING | 9.2 | 1 | 20 | | | 1100 | 23 | 24 | | | 900 | 1 | 20 | 7.5 | GYM REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | DRINK FOUNTAIN | 1.5 | 1 | 20 | 180 | | | 25 | 26 | 900 | | | 1 | 20 | 7.5 | GYM REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | | 900 | | 27 | 28 | | 100 | | 1 | 20 | 0.8 | SCOREBOARD | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | | | 900 | 29 | 30 | | | 900 | 1 | 20 | 7.5 | GYM REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CEILING FAN | 6.0 | 1 | 20 | 720 | | | 31 | 32 | 1000 | | | 1 | 20 | 8.3 | SUITEMART | | #12 | #12 | #12 |
| | #12 | #12 | #12 | BLOODPRESSURE STATION | 0.8 | 1 | 20 | | 100 | | 33 | 34 | | 1000 | | 1 | 20 | 8.3 | SUITEMART | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | | | 900 | 35 | 36 | | | 800 | 1 | 20 | 6.7 | DOOR OPERATOR | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | 900 | | | 37 | 38 | 400 | | | 1 | 20 | 3.3 | DOOR OPERATOR | | #12 | #12 | #12 |
| | #12 | #12 | #12 | DRINK FOUNTAIN | 4.2 | 1 | 20 | | 500 | | 39 | 40 | | 500 | | 1 | 20 | 4.2 | SECURITY CAMERA | | #12 | #12 | #12 |
| | #12 | #12 | #12 | EXTERIOR GFI | 3.0 | 1 | 20 | | | 360 | 41 | 42 | | | | 1 | 20 | 0.0 | SPARE | | | | |

TOTAL PHASE A: 9860 VOLT-AMPS
TOTAL PHASE B: 10140 VOLT-AMPS
TOTAL PHASE C: 10740 VOLT-AMPS
MAXIMUM PHASE CURRENT: 89.4 AMPS
TOTAL CONNECTED LOAD: 30.7 KVA
ESTIMATED DEMAND LOAD: 24.7 KVA
ESTIMATED DEMAND LOAD: 68.6 AMPS

| CTM | DESCRIPTION | DATE | APPR |
|---|---|---|---|
| 1 | AS BUILT ENERGY ENHANCEMENT #2 | 7/17/12 6/17/11 | |

NAVFAC

RECORD DRAWINGS 08/13/2012
This record drawing is a compilation of information from the contract documents for this project including ASI's, RFI's, Change Orders, and information provided by the contractor, The Ross Group.

SEAL


LEO A DALY
PLANNING ARCHITECTURE ENGINEERING INTERIORS
EST. 1915
2925 Briarpark Drive
Houston, Texas 77042
Tel 713-821-2100
Fax 713-266-7182
A/E INFO


APPROVED
FOR COMMANDER NAVFAC / B.L.T.L.
ACTIVITY
SATISFACTORY TO DATE Osin Courtney 11/7/11
DES MFN DRW MFN CHK JRT
PROJECT MANAGER
RPT TECH. BRANCH HEAD
CHIEF ENG/ARCH (CORE)

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
NAVAL AIR STATION JACKSONVILLE
RPT GULF COAST
NAVAL AIR STATION KINGSVILLE
KINGSVILLE, TEXAS
INDOOR PHYSICAL FITNESS FACILITY
ELECTRICAL SCHEDULES

SCALE: NONE
EPROJECT NO.: 812380
CONSTR. CONTR. NO. N69450-10-D-0771
NAVFAC DRAWING NO. 15068065 – 15068165
SHEET OF
E-600

DRAWFORM REVISION: 7 AUGUST 2009

FILE NAME: L:\110-10137-000\4-D-Production\4-01-Drawings\Electrical\BLDGP279-812380-E600.dwg LAYOUT NAME: Layout1 PLOTTED: Wednesday, August 01, 2012 - 4:10pm USER: ddshelton

PANEL NO. PP2 | TYPE BRANCH CIRCUIT PANEL | LOCATION ROOM 148
SERVICE VOLTAGE 208Y/120V,3PH,4W | PHASE BUS RATING 225 AMPS | MOUNTING SURFACE
MAIN BREAKER SIZE 150 AMP MCB | NEUTRAL BUS RATING 225 AMPS | DRAWING NO. E-101
SHORT CIRCUIT RATING 10000 AIC

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | AMP | VOLT AMPS A | B | C | CKT. NO. | CKT. NO. | VOLT AMPS A | B | C | BREAKER POLE | AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | 1000 | | | 1 | 2 | 100 | | | 1 | 20 | 0.8 | PROJECTOR | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | | 1000 | | 3 | 4 | | 100 | | 1 | 20 | 0.8 | PROJ SCREEN | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | | | 1000 | 5 | 6 | | | 360 | 1 | 20 | 3.0 | WORKSTATION REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | 1000 | | | 7 | 8 | 900 | | | 1 | 20 | 7.5 | CONV. REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | | 1000 | | 9 | 10 | | 720 | | 1 | 20 | 6.0 | KITCHEN GFI | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | | | 1000 | 11 | 12 | | | 500 | 1 | 20 | 4.2 | REFRIG REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | 1000 | | | 13 | 14 | 100 | | | 1 | 20 | 0.8 | COFFEE MAKER | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | | 1000 | | 15 | 16 | | 500 | | 1 | 20 | 4.2 | MICROWAVE | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | | | 1000 | 17 | 18 | | | 500 | 1 | 20 | 4.2 | COPY MACHINE | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TREADMILL | 8.3 | 1 | 20 | 1000 | | | 19 | 20 | 720 | | | 1 | 20 | 6.0 | CONV. REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TV REC | 4.2 | 1 | 20 | | 500 | | 21 | 22 | | 540 | | 1 | 20 | 4.5 | WORKSTATION REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TV REC | 4.2 | 1 | 20 | | | 500 | 23 | 24 | | | 500 | 1 | 20 | 4.2 | TV REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TV REC | 4.2 | 1 | 20 | 500 | | | 25 | 26 | 360 | | | 1 | 20 | 3.0 | WORKSTATION REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | TV REC | 4.2 | 1 | 20 | | 500 | | 27 | 28 | | 360 | | 1 | 20 | 3.0 | FITNESS AREA REC | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 9.0 | 1 | 20 | | | 1080 | 29 | 30 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | CONV. REC | 9.0 | 1 | 20 | 1080 | | | 31 | 32 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | CONV. REC | 9.0 | 1 | 20 | | 1080 | | 33 | 34 | | | | 3 | 60 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | CLASSROOM REC | 6.0 | 1 | 20 | | | 720 | 35 | 36 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | CLASSROOM REC | 6.0 | 1 | 20 | 720 | | | 37 | 38 | 1176 | | | 1 | 20 | 9.8 | WASHER | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CLASSROOM REC | 6.0 | 1 | 20 | | 720 | | 39 | 40 | | 1176 | | 1 | 20 | 9.8 | DRYER | | #12 | #12 | #12 |
| | #12 | #12 | #12 | CONV. REC | 7.5 | 1 | 20 | | | 900 | 41 | 42 | | | 500 | 1 | 20 | 4.2 | TV REC | | #12 | #12 | #12 |

TOTAL PHASE A: 9656 VOLT-AMPS
TOTAL PHASE B: 9196 VOLT-AMPS
TOTAL PHASE C: 8560 VOLT-AMPS
MAXIMUM PHASE CURRENT: 80.4 AMPS
TOTAL CONNECTED LOAD: 27.4 KVA
ESTIMATED DEMAND LOAD: 26.6 KVA
ESTIMATED DEMAND LOAD: 73.9 AMPS

PANEL NO. PP3 | TYPE BRANCH CIRCUIT PANEL | LOCATION ROOM 148
SERVICE VOLTAGE 208Y/120V,3PH,4W | PHASE BUS RATING 225 AMPS | MOUNTING SURFACE
MAIN BREAKER SIZE 200 AMP MCB | NEUTRAL BUS RATING 225 AMPS | DRAWING NO. E-101
SHORT CIRCUIT RATING 10000 AIC

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | AMP | VOLT AMPS A | B | C | CKT. NO. | CKT. NO. | VOLT AMPS A | B | C | BREAKER POLE | AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | #12 | #12 | #12 | TELE BACKBOARD | 3.0 | 1 | 20 | 360 | | | 1 | 2 | 3600 | | | | | | | | | | |
| | #12 | #12 | #12 | SECURITY SYSTEM | 1.5 | 1 | 20 | | 180 | | 3 | 4 | | 3600 | | 3 | 40 | 30.0 | MENS SUANA HTR | | #8 | | #10 |
| | #12 | #12 | #12 | CABLE TV | 1.5 | 1 | 20 | | | 180 | 5 | 6 | | | 3600 | | | | | | | | |
| | #12 | #12 | #12 | NMCI | 0.8 | 1 | 20 | 100 | | | 7 | 8 | 3600 | | | | | | | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 9 | 10 | | 3600 | | 3 | 40 | 30.0 | WOMANS SUANA HTR | | #8 | | #10 |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 11 | 12 | | | 3600 | | | | | | | | |
| | #12 | #12 | #12 | CCTV MONITOR | 0.8 | 1 | 20 | 100 | | | 13 | 14 | 500 | | | 1 | 20 | 4.2 | MENS SAUNA LIGHTS | | #12 | #12 | #12 |
| | #12 | #12 | #12 | DVR | 0.8 | 1 | 20 | | 100 | | 15 | 16 | | 500 | | 1 | 20 | 4.2 | WOMENS SAUNA LIGHTS | | #12 | #12 | #12 |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 17 | 18 | | | | | | | SPACE | | | | |
| | #12 | #12 | #12 | CEILING FANS | 8.3 | 1 | 20 | 1000 | | | 19 | 20 | 900 | | | | | | | | | | |
| | #12 | #12 | #12 | CEILING FANS | 8.3 | 1 | 20 | | 1000 | | 21 | 22 | | 900 | | 3 | 20 | 7.0 | WASHING MACHINE | | #12 | | #12 |
| | #12 | #12 | #12 | CEILING FANS | 8.3 | 1 | 20 | | | 1000 | 23 | 24 | | | 900 | | | | | | | | |
| | #12 | #12 | #12 | CEILING FANS | 8.3 | 1 | 20 | 1000 | | | 25 | 26 | | | | | | | SPACE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 27 | 28 | | | | | | | SPACE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 29 | 30 | | | 1750 | 1 | 20 | 15.0 | DRYER | | #12 | #12 | #12 |

TOTAL PHASE A: 11160 VOLT-AMPS
TOTAL PHASE B: 9880 VOLT-AMPS
TOTAL PHASE C: 11030 VOLT-AMPS
MAXIMUM PHASE CURRENT: 92.9 AMPS
TOTAL CONNECTED LOAD: 32.1 KVA
ESTIMATED DEMAND LOAD: 32.6 KVA
ESTIMATED DEMAND LOAD: 90.4 AMPS

PANEL NO. SFP | TYPE BRANCH CIRCUIT PANEL | LOCATION KIOSK
SERVICE VOLTAGE 480Y/277V,3PH,4W | PHASE BUS RATING 100 AMPS | MOUNTING SURFACE
MAIN BREAKER SIZE 100 AMP MCB | NEUTRAL BUS RATING 100 AMPS | DRAWING NO.
SHORT CIRCUIT RATING 14000 AIC

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | AMP | VOLT AMPS A | B | C | CKT. NO. | CKT. NO. | VOLT AMPS A | B | C | BREAKER POLE | AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 7000 | | | 1 | 2 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SITE LIGHTS NORTH | 25.3 | 3 | 35 | | 7000 | | 3 | 4 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | | | 7000 | 5 | 6 | | | | 1 | 35 | 0.0 | SPARE | | | | |
| | | | | | | | | 7000 | | | 7 | 8 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SITE LIGHTS SOUTH | 25.3 | 3 | 35 | | 7000 | | 9 | 10 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | | | 7000 | 11 | 12 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 13 | 14 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 15 | 16 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 17 | 18 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 19 | 20 | 100 | | | | | | | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 21 | 22 | | 0 | | 3 | 30 | 0.0 | SFP2 | | #10 | | #10 |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 23 | 24 | | | 0 | | | | | | | | |

TOTAL PHASE A: 14100 VOLT-AMPS
TOTAL PHASE B: 14000 VOLT-AMPS
TOTAL PHASE C: 14000 VOLT-AMPS
MAXIMUM PHASE CURRENT: 50.9 AMPS
TOTAL CONNECTED LOAD: 42.1 KVA
ESTIMATED DEMAND LOAD: 26.3 KVA
ESTIMATED DEMAND LOAD: 31.6 AMPS

PANEL NO. SFP2 | TYPE MINI POWER ZONE | LOCATION KIOSK
SERVICE VOLTAGE 240/120V,1PH | PHASE BUS RATING 100 AMPS | MOUNTING SURFACE
MAIN BREAKER SIZE 40 AMP MCB | NEUTRAL BUS RATING 100 AMPS | DRAWING NO.
SHORT CIRCUIT RATING 10000 AIC

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | AMP | VOLT AMPS A | B | CKT. NO. | CKT. NO. | VOLT AMPS A | B | BREAKER POLE | AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | #12 | #12 | #12 | SCOREBOARD EQUIP | 0.8 | 1 | 20 | 100 | | 1 | 2 | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | 3 | 4 | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | 5 | 6 | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | 7 | 8 | | | 1 | 20 | 0.0 | SPARE | | | | |

TOTAL PHASE A: 100 VOLT-AMPS
TOTAL PHASE B: 0 VOLT-AMPS
MAXIMUM PHASE CURRENT: 0.8
TOTAL CONNECTED LOAD: 0.1 KVA
ESTIMATED DEMAND LOAD: 0.0 KVA
ESTIMATED DEMAND LOAD: 0.0 AMPS

PANEL NO. HPL | TYPE BRANCH CIRCUIT PANEL | LOCATION ELECTRICAL RM
SERVICE VOLTAGE 480Y/277V,3PH,4W | PHASE BUS RATING 400 AMPS | MOUNTING SURFACE
MAIN BREAKER SIZE 250 AMP MCB | NEUTRAL BUS RATING 400 AMPS | DRAWING NO. E-103
SHORT CIRCUIT RATING 14000 AIC

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | AMP | VOLT AMPS A | B | C | CKT. NO. | CKT. NO. | VOLT AMPS A | B | C | BREAKER POLE | AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | #12 | #12 | #12 | GYM LTG | 14.0 | 1 | 20 | 3888 | | | 1 | 2 | 4000 | | | 1 | 20 | 14.4 | POOL AREA LTG | | #12 | #12 | #12 |
| | #12 | #12 | #12 | GYM LTG | 15.2 | 1 | 20 | | 4212 | | 3 | 4 | | 3000 | | 1 | 20 | 10.8 | POOL AREA LTG | | #12 | #12 | #12 |
| | #12 | #12 | #12 | GYM LTG | 11.7 | 1 | 20 | | | 3240 | 5 | 6 | | | 3000 | 1 | 20 | 10.8 | POOL AREA LTG | | #12 | #12 | #12 |
| | #12 | #12 | #12 | GYM LTG | 12.9 | 1 | 20 | 3564 | | | 7 | 8 | 3000 | | | 1 | 20 | 10.8 | POOL AREA LTG | | #12 | #12 | #12 |
| | #12 | #12 | #12 | MECH/STORAGE | 2.2 | 1 | 20 | | 600 | | 9 | 10 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | RACQUETBALL LTG | 3.6 | 1 | 20 | | | 1000 | 11 | 12 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | RACQUETBALL LTG | 3.6 | 1 | 20 | 1000 | | | 13 | 14 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | FITNESS LTG | 10.7 | 1 | 20 | | 2958 | | 15 | 16 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | FITNESS LTG | 7.2 | 1 | 20 | | | 2000 | 17 | 18 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | FITNESS LTG | 7.2 | 1 | 20 | 2000 | | | 19 | 20 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | LOCKER ROOM LTG | 12.6 | 1 | 20 | | 3480 | | 21 | 22 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | FITNESS LTG | 7.2 | 1 | 20 | | | 2000 | 23 | 24 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | TROPHY CASE LTG | 5.2 | 1 | 20 | 1440 | | | 25 | 26 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | EXTERIOR BLDG LTG | 3.9 | 1 | 20 | | 1094 | | 27 | 28 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | EXTERIOR BLDG LTG | 3.9 | 1 | 20 | | | 1094 | 29 | 30 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | 1000 | | | 31 | 32 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | PARKING POLE LIGHTS | 3.6 | 3 | 20 | | 1000 | | 33 | 34 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | | | 1000 | 35 | 36 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | LIGHTING CONTROL | 1.1 | 1 | 20 | 300 | | | 37 | 38 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | GROUP EXERCISE LTG | 7.6 | 1 | 20 | | 2112 | | 39 | 40 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 41 | 42 | | | | 1 | 20 | 0.0 | SPARE | | | | |

TOTAL PHASE A: 20192 VOLT-AMPS
TOTAL PHASE B: 18456 VOLT-AMPS
TOTAL PHASE C: 13334 VOLT-AMPS
MAXIMUM PHASE CURRENT: 72.9 AMPS
TOTAL CONNECTED LOAD: 36.0 KVA
ESTIMATED DEMAND LOAD: 45.0 KVA
ESTIMATED DEMAND LOAD: 54.1 AMPS

PANEL NO. LB | TYPE BRANCH CIRCUIT PANEL NEMA 4 | LOCATION POOL HOUSE
SERVICE VOLTAGE 208Y/120V,3PH,4W | PHASE BUS RATING 225 AMPS | MOUNTING SURFACE
MAIN BREAKER SIZE 225 AMP MCB | NEUTRAL BUS RATING 225 AMPS | DRAWING NO.
SHORT CIRCUIT RATING 10000 AIC

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | AMP | VOLT AMPS A | B | C | CKT. NO. | CKT. NO. | VOLT AMPS A | B | C | BREAKER POLE | AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | #12 | #12 | #12 | GFI/WP RECEPTACLE | 7.5 | 1 | 20 | 900 | | | 1 | 2 | 7200 | | | 1 | 80 | 60.0 | WATER HEATER | | #4 | #4 | #8 |
| | #12 | #12 | #12 | GFI/WP RECEPTACLE | 6.0 | 1 | 20 | | 720 | | 3 | 4 | | 7200 | | | | | | | | | |
| | #12 | #12 | #12 | BACKWASH CONTROLLER | 7.0 | 1 | 20 | | | 840 | 5 | 6 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | BACKWASH CONTROLLER | 7.0 | 1 | 20 | 840 | | | 7 | 8 | 1260 | | | | | | | | | | |
| | #12 | #12 | #12 | POOL HEATER | 7.0 | 1 | 20 | | 840 | | 9 | 10 | | 1260 | | 3 | 20 | 10.5 | 7.5 hp PUMP | | #12 | | #12 |
| | #12 | #12 | #12 | UNDERWATER LIGHTS | 4.2 | 1 | 20 | | | 500 | 11 | 12 | | | 1260 | | | | | | | | |
| | #12 | #12 | #12 | UNDERWATER LIGHTS | 4.2 | 1 | 20 | 500 | | | 13 | 14 | 1260 | | | | | | | | | | |
| | #12 | #12 | #12 | UNDERWATER LIGHTS | 4.2 | 1 | 20 | | 500 | | 15 | 16 | | 1260 | | 3 | 20 | 10.5 | 7.5 hp PUMP | | #12 | | #12 |
| | #12 | #12 | #12 | UNDERWATER LIGHTS | 4.2 | 1 | 20 | | | 500 | 17 | 18 | | | 1260 | | | | | | | | |
| | #12 | #12 | #12 | CHEMICAL CONTROL | 10.0 | 1 | 20 | 1200 | | | 19 | 20 | 478 | | | 2 | 20 | 4.6 | 0.5 hp PUMP | | #12 | | #12 |
| | #12 | #12 | #12 | CHEMICAL FEED PUMP | 1.7 | 1 | 20 | | 204 | | 21 | 22 | | 478 | | | | | | | | | |
| | #12 | #12 | #12 | CHEMICAL FEED PUMP | 1.7 | 1 | 20 | | | 204 | 23 | 24 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 25 | 26 | 2904 | | | | | | | | | | |
| | #12 | #12 | #12 | INTERIOR LIGHTING | 2.9 | 1 | 20 | | 348 | | 27 | 28 | | 2904 | | 3 | 35 | 24.2 | VFD | | #8 | | #10 |
| | #12 | #12 | #12 | EXTERIOR LIGHTING | 2.5 | 1 | 20 | | | 300 | 29 | 30 | | | 2904 | | | | | | | | |
| | #12 | #12 | #12 | LIGHT POLE | 0.8 | 1 | 20 | 100 | | | 31 | 32 | 2904 | | | | | | | | | | |
| | #12 | #12 | #12 | SECURITY CAMERA | 0.8 | 1 | 20 | | 100 | | 33 | 34 | | 2904 | | 3 | 35 | 24.2 | VFD | | #8 | | #10 |
| | #12 | #12 | #12 | EF-3 | 5.8 | 1 | 20 | | | 696 | 35 | 36 | | | 2904 | | | | | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 37 | 38 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 39 | 40 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 41 | 42 | | | | 1 | 20 | 0.0 | SPARE | | | | |

TOTAL PHASE A: 19546 VOLT-AMPS
TOTAL PHASE B: 18718 VOLT-AMPS
TOTAL PHASE C: 11368 VOLT-AMPS
MAXIMUM PHASE CURRENT: 162.8 AMPS
TOTAL CONNECTED LOAD: 49.6 KVA
ESTIMATED DEMAND LOAD: 36.5 KVA
ESTIMATED DEMAND LOAD: 101.2 AMPS

PANEL NO. PK | TYPE BRANCH CIRCUIT PANEL | LOCATION FIELD LOCATE
SERVICE VOLTAGE 208Y/120V,3PH,4W | PHASE BUS RATING 400 AMPS | MOUNTING
MAIN BREAKER SIZE 250 AMP MCB | NEUTRAL BUS RATING 400 AMPS | DRAWING NO.
SHORT CIRCUIT RATING 10000 AIC

| CIRCUIT C | P | N | G | DESCRIPTION | LOAD AMP | BREAKER POLE | AMP | VOLT AMPS A | B | C | CKT. NO. | CKT. NO. | VOLT AMPS A | B | C | BREAKER POLE | AMP | LOAD AMP | DESCRIPTION | CIRCUIT C | P | N | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 14170 | | | 1 | 2 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #1/0 | | #6 | RAPID CHARGING | 118.0 | 3 | 150 | | 14170 | | 3 | 4 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | | | 14170 | 5 | 6 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #8 | | #10 | SLOW CHARGE 1 | 29.4 | 2 | 40 | 3062 | | | 7 | 8 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | | 3062 | | 9 | 10 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #8 | | #10 | SLOW CHARGE 2 | 29.4 | 2 | 40 | | | 3062 | 11 | 12 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | 3062 | | | 13 | 14 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #8 | | #10 | SLOW CHARGE 3 | 29.4 | 2 | 40 | | 3062 | | 15 | 16 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | | | | | | | 3062 | 17 | 18 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | #12 | #12 | #12 | CANOPY LIGHT | 12.5 | 1 | 20 | 1500 | | | 19 | 20 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 21 | 22 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 23 | 24 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 25 | 26 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 27 | 28 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 29 | 30 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 31 | 32 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 33 | 34 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 35 | 36 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 37 | 38 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 39 | 40 | | | | 1 | 20 | 0.0 | SPARE | | | | |
| | | | | SPARE | 0.0 | 1 | 20 | | | | 41 | 42 | | | | 1 | 20 | 0.0 | SPARE | | | | |

TOTAL PHASE A: 21794 VOLT-AMPS
TOTAL PHASE B: 20294 VOLT-AMPS
TOTAL PHASE C: 20294 VOLT-AMPS
MAXIMUM PHASE CURRENT: 181.5 AMPS
TOTAL CONNECTED LOAD: 62.4 KVA
ESTIMATED DEMAND LOAD: 28.3 KVA
ESTIMATED DEMAND LOAD: 78.7 AMPS

1

| SYM | DESCRIPTION | DATE | APPR |
|---|---|---|---|
| 1 | AS BUILT ENERGY ENHANCEMENT #2 | 6/17/11 | 7/17/12 |

NAVFAC

RECORD DRAWINGS 08/13/2012
This record drawing is a compilation of information from the contract documents for this project including ASI's, RFI's, Change Orders, and information provided by the contractor, The Ross Group.

SEAL


LEO A DALY
PLANNING ARCHITECTURE ENGINEERING INTERIORS
EST. 1915
2925 Briarpark Drive
Houston, Texas 77042
Tel 713-821-2100
Fax 713-266-7182
A/E INFO


APPROVED
FOR COMMANDER NAVFAC / B.L.T.L.
ACTIVITY
SATISFACTORY TO DATE Oisin Courtney 11/7/11
DES MFN DRW MFN CHK JRT
PROJECT MANAGER
IPT TECH. BRANCH HEAD
CHIEF ENG/ARCH (CORE)

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
NAVAL AIR STATION JACKSONVILLE
IPT GULF COAST
NAVAL AIR STATION KINGSVILLE
KINGSVILLE, TEXAS

# INDOOR PHYSICAL FITNESS FACILITY

ELECTRICAL SCHEDULES

SCALE: NONE
EPROJECT NO.: 812380
CONSTR. CONTR. NO. N69450-10-D-0771
NAVFAC DRAWING NO. 15068066 – 15068165
SHEET OF
E-601

DRAWFORM REVISION: 7 AUGUST 2009

FILE NAME: L:\110-10137-000\4-0-Production\4-01-Drawings\Electrical\BLDGP279-812380-E601.dwg LAYOUT NAME: Layout1 PLOTTED: Wednesday, August 01, 2012 - 4:11pm USER: odsheltson

SECTION TABLE OF CONTENTS

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING SECTION

UFGS 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

**08/09**

**Winter seasonal testing, duct air leakage testing and sound measurement work shall not be a part of the contract and specification requirements.**


PART 1 GENERAL

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SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC
**08/09**

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACOUSTICAL SOCIETY OF AMERICA (ASA)

| | |
|---|---|
| ASA S1.11 PART 1 | (2014) American National Standard Electroacoustics – Octave-Band and Fractional-Octave-Band Filters – Part 1: Specifications |
| ASA S1.4 | (1983; Amendment 1985; R 2006) Specification for Sound Level Meters (ASA 47) |

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA)

| | |
|---|---|
| AMCA 203 | (1990; R 2011) Field Performance Measurements of Fan Systems |

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

| | |
|---|---|
| ASHRAE 62.1 | (2010; Errata 2011; INT 3 2012; INT 4 2012; INT 5 2013) Ventilation for Acceptable Indoor Air Quality |
| ASHRAE HVAC APP IP HDBK | (2011) HVAC Applications Handbook, I-P Edition |
| ASHRAE HVAC APP SI HDBK | (2011) HVAC Applications Handbook, SI Edition ASSOCIATED |

AIR BALANCE COUNCIL (AABC)

| | |
|---|---|
| AABC MN-1 | (2002; 6th ed) National Standards for Total System Balance |
| AABC MN-4 | (1996) Test and Balance Procedures |

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

| | |
|---|---|
| RCBEA GUIDE | (2004) NASA Reliability Centered Building and Equipment Acceptance Guide |

NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)

| | |
|---|---|
| NEBB MASV | (2006) Procedural Standards for Measurements and Assessment of Sound and Vibration |
| NEBB PROCEDURAL STANDARDS | (2005) Procedural Standards for TAB |

(Testing, Adjusting and Balancing)
Environmental Systems

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

| | |
|---|---|
| SMACNA 1780 | (2002) HVAC Systems - Testing, Adjusting and Balancing, 3rd Edition |
| SMACNA 1858 | (2004) HVAC Sound And Vibration Manual - First Edition |
| SMACNA 1972 CD | (2012) HVAC Air Duct Leakage Test Manual - 2nd Edition |

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

| | |
|---|---|
| 40 CFR 82 | Protection of Stratospheric Ozone |

1.2 DEFINITIONS

a. AABC: Associated Air Balance Council.

b. COTR: Contracting Officer's Technical Representative.

c. DALT: Duct air leakage test

d. DALT'd: Duct air leakage tested

e. HVAC: Heating, ventilating, and air conditioning; or heating, ventilating, and cooling.

f. NEBB: National Environmental Balancing Bureau

g. Out-of-tolerance data: Pertains only to field acceptance testing of Final DALT or TAB report. When applied to DALT work, this phase means "a leakage rate measured during DALT field acceptance testing which exceeds the leakage rate allowed by SMACNA Leak Test Manual for an indicated duct construction and sealant class.""a leakage rate measured during DALT field acceptance testing which exceeds the leakage rate allowed by Appendix D REQUIREMENTS FOR DUCT AIR LEAK TESTING." When applied to TAB work this phase means "a measurement taken during TAB field acceptance testing which does not fall within the range of plus 5 to minus 5 percent of the original measurement reported on the TAB Report for a specific parameter."

h. Season of maximum heating load: The time of year when the outdoor temperature at the project site remains within plus or minus 17.5 degrees Celsius plus or minus 30 degrees Fahrenheit of the project site's winter outdoor design temperature, throughout the period of TAB data recording.

i. Season of maximum cooling load: The time of year when the outdoor temperature at the project site remains within plus or minus 3 degrees Celsius plus or minus 5 degrees Fahrenheit of the project site's summer outdoor design temperature, throughout the period of TAB data recording.

j. Season 1, Season 2: Depending upon when the project HVAC is completed and ready for TAB, Season 1 is defined, thereby defining Season 2. Season 1 could be the season of maximum heating load, or the season of maximum cooling load.

k. Sound measurements terminology: Defined in AABC MN-1, NEBB MASV, or SMACNA 1858 (TABB).

l. TAB: Testing, adjusting, and balancing (of HVAC systems).

m. TAB'd: HVAC Testing/Adjusting/Balancing procedures performed.

n. TAB Agency: TAB Firm

o. TAB team field leader: TAB team field leader

p. TAB team supervisor: TAB team engineer.

q. TAB team technicians: TAB team assistants.

r. TABB: Testing Adjusting and Balancing Bureau.

1.2.1 Similar Terms

In some instances, terminology differs between the Contract and the TAB Standard primarily because the intent of this Section is to use the industry standards specified, along with additional requirements listed herein to produce optimal results.

The following table of similar terms is provided for clarification only. Contract requirements take precedent over the corresponding AABC, NEBB, or TABB requirements where differences exist.

| SIMILAR TERMS | | | |
|---|---|---|---|
| Contract Term | AABC Term | NEBB Term | TABB Term |
| TAB Standard | National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems | Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems | International Standards for Environmental Systems Balance |
| TAB Specialist | TAB Engineer | TAB Supervisor | TAB Supervisor |
| Systems Readiness Check | Construction Phase Inspection | Field Readiness Check & Preliminary Field Procedures | Field Readiness Check & Prelim. Field Procedures |

1.3 WORK DESCRIPTION

The work includes duct air leakage testing (DALT) and testing, adjusting, and balancing (TAB) of [new][ and existing] heating, ventilating, and cooling (HVAC) air[ and water] distribution systems including equipment and performance data, ducts, and piping which are located within, on, under, between, and adjacent to buildings, including records of existing conditions.

Perform TAB in accordance with the requirements of the TAB procedural

standard recommended by the TAB trade association that approved the TAB Firm's qualifications. Comply with requirements of AABC MN-1, NEBB PROCEDURAL STANDARDS, or SMACNA 1780 (TABB) as supplemented and modified by this specification section. All recommendations and suggested practices contained in the TAB procedural standards are considered mandatory.

Conduct DALT and TAB of the indicated existing systems and equipment and submit the specified DALT and TAB reports for approval. Conduct DALT testing in compliance with the requirements specified in SMACNA 1972 CD, except as supplemented and modified by this section. Conduct DALT and TAB work in accordance with the requirements of this section.

1.3.1 Air Distribution Systems

Test, adjust, and balance system[s] (TAB) in compliance with this section. Obtain Contracting Officer's written approval before applying insulation to exterior of air distribution systems as specified under Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

1.3.2 Water Distribution Systems

TAB system[s] in compliance with this section. Obtain Contracting Officer's written approval before applying insulation to water distribution systems as specified under Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS. At Contractor's option and with Contracting Officer's written approval, the piping systems may be insulated before systems are TAB'd.

Terminate piping insulation immediately adjacent to each flow control valve, automatic control valve, or device. Seal the ends of pipe insulation and the space between ends of pipe insulation and piping, with waterproof vapor barrier coating.

After completion of work under this section, insulate the flow control valves and devices as specified under Section 23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS.

1.3.3 TAB SCHEMATIC DRAWINGS

Show the following information on TAB Schematic Drawings:

1. A unique number or mark for each piece of equipment or terminal.

2. Air quantities at air terminals.

3. Air quantities and temperatures in air handling unit schedules.

4. Water quantities and temperatures in thermal energy transfer equipment schedules.

5. Water quantities and heads in pump schedules.

6. Water flow measurement fittings and balancing fittings.

7. Ductwork Construction and Leakage Testing Table that defines the DALT test requirements, including each applicable HVAC duct system ID or mark, duct pressure class, duct seal class, and duct leakage test pressure. This table is included in the file for Graphics for Unified Facilities Guide Specifications: http://www.wbdg.org/ccb/NAVGRAPH/graphtoc.pdf

The Testing, Adjusting, and Balancing (TAB) Specialist must review the Contract Plans and Specifications and advise the Contracting Officer of any deficiencies that would prevent the effective and accurate TAB of the system, including records of existing conditions, and systems readiness check. The TAB Specialist must provide a Design Review Report individually listing each deficiency and the corresponding proposed corrective action necessary for proper system operation.

Submit [three][_____] copies of the TAB Schematic Drawings and Report Forms to the Contracting Officer, no later than [21][_____] days prior to the start of TAB field measurements.

1.3.4 Related Requirements (not used)

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Records of Existing Conditions; G

TAB Firm; G

Designation of TAB team assistants; G

Designation of TAB team engineer; G or TAB Specialist; G

Designation of TAB team field leader; G

SD-02 Shop Drawings

TAB Schematic Drawings and Report Forms; G

SD-03 Product Data

Equipment and Performance Data; G

TAB Related HVAC Submittals; G

A list of the TAB Related HVAC Submittals, no later than 7 days after the approval of the TAB team engineer.

TAB Procedures; G

Proposed procedures for TAB, submitted with the TAB Schematic Drawings and Report Forms.

Calibration; G

Systems Readiness Check; G

TAB Execution; G

TAB Verification; G

SD-06 Test Reports

DALT and TAB Work Execution Schedule; G

DALT and TAB Procedures Summary; G

Design review report; G

Pre-Final DALT report; G

Final DALT report; G

TAB report for Season 1; G

TAB report for Season 2; G

SD-07 Certificates

Independent TAB agency and personnel qualifications; G

Advance notice of Pre-Final DALT field work; G

Completed Pre-Final DALT Work Checklist; G

Advance Notice of Season 1 TAB Field Work; G

Completed Season 1 Pre-TAB Work Checklist

Advance Notice of Season 2 TAB Field Work; G

Completed Season 2 Pre-TAB Work Checklist

TAB Firm; G

Independent TAB Agency and Personnel Qualifications; G

DALT and TAB Submittal and Work Schedule; G

Design review report; G

Pre-field DALT preliminary notification; G

Pre-field TAB engineering report; G

Advanced notice for Season 1 TAB field work; G

Prerequisite HVAC Work Check Out List For Season 1; G

Advanced notice for Season 2 TAB field work; G

Prerequisite HVAC Work Check Out List For Season 2; G

## 1.5 QUALITY ASSURANCE

### 1.5.1 Independent TAB Agency and Personnel Qualifications

To secure approval for the proposed agency, submit information certifying that the TAB agency is a first tier subcontractor who is not affiliated with any other company participating in work on this contract, including design, furnishing equipment, or construction. Further, submit the following, for the agency, to Contracting Officer for approval:

a. Independent AABC or NEBB or TABB TAB agency:

TAB agency: AABC registration number and expiration date of current certification; or NEBB certification number and expiration date of current certification; or TABB certification number and expiration date of current certification.

TAB team supervisor: Name and copy of AABC or NEBB or TABB TAB supervisor certificate and expiration date of current certification.

TAB team field leader: Name and documented evidence that the team field leader has satisfactorily performed full-time supervision of TAB work in the field for not less than 3 years immediately preceding this contract's bid opening date.

TAB team field technicians: Names and documented evidence that each field technician has satisfactorily assisted a TAB team field leader in performance of TAB work in the field for not less than one year immediately preceding this contract's bid opening date.

Current certificates: Registrations and certifications are current, and valid for the duration of this contract. Renew Certifications which expire prior to completion of the TAB work, in a timely manner so that there is no lapse in registration or certification. TAB agency or TAB team personnel without a current registration or current certification are not to perform TAB work on this contract.

b. TAB Team Members: TAB team approved to accomplish work on this contract are full-time employees of the TAB agency. No other personnel is allowed to do TAB work on this contract.

c. Replacement of TAB team members: Replacement of members may occur if each new member complies with the applicable personnel qualifications and each is approved by the Contracting Officer.

1.5.2 TAB Standard

Perform TAB in accordance with the requirements of the standard under which the TAB Firm's qualifications are approved, i.e., AABC MN-1, NEBB PROCEDURAL STANDARDS, or SMACNA 1780 unless otherwise specified herein. All recommendations and suggested practices contained in the TAB Standard are considered mandatory. Use the provisions of the TAB Standard, including checklists, report forms, etc., as nearly as practical, to satisfy the Contract requirements. Use the TAB Standard for all aspects of TAB, including qualifications for the TAB Firm and Specialist and calibration of TAB instruments. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the TAB Standard, adhere to the manufacturer's recommendations.

All quality assurance provisions of the TAB Standard such as performance guarantees are part of this contract. For systems or system components not covered in the TAB Standard, TAB procedures must be developed by the TAB Specialist. Where new procedures, requirements, etc., applicable to the

Contract requirements have been published or adopted by the body responsible for the TAB Standard used (AABC, NEBB, or TABB), the requirements and recommendations contained in these procedures and requirements are considered mandatory, including the latest requirements of ASHRAE 62.1.

1.5.3 Sustainability

Contractor must submit the following as part of the Quality Control Plan for acceptance testing:

a. List all test equipment to be used, including its manufacturer, model number, calibration date, and serial number.

b. Certificates of test personnel qualifications and certifications. Provide certification of compliance with 40 CFR 82.

c. Proof of equivalency if the contractor desires to substitute a test requirement.

1.5.4 Qualifications

1.5.4.1 TAB Firm

The TAB Firm must be either a member of AABC or certified by the NEBB or the TABB and certified in all categories and functions where measurements or performance are specified on the plans and specifications, including [TAB of environmental systems] [the performance of clean rooms and clean air devices] [building systems commissioning] [and] [the measuring of sound and vibration in environmental systems].

Certification must be maintained for the entire duration of duties specified herein. If, for any reason, the firm loses subject certification during this period, the Contractor must immediately notify the Contracting Officer and submit another TAB Firm for approval. Any firm that has been the subject of disciplinary action by either the AABC, the NEBB, or the TABB within the five years preceding Contract Award is not be eligible to perform any duties related to the HVAC systems, including TAB. All work specified in this Section and in other related Sections to be performed by the TAB Firm will be considered invalid if the TAB Firm loses its certification prior to Contract completion and must be performed by an approved successor.

These TAB services are to assist the prime Contractor in performing the quality oversight for which it is responsible. The TAB Firm must be a prime subcontractor of the Contractor and be financially and corporately independent of the mechanical subcontractor, reporting directly to and paid by the Contractor.

1.5.4.2 TAB Specialist

The TAB Specialist must be either a member of AABC,an experienced technician of the Firm certified by the NEBB, or a Supervisor certified by the TABB. The certification must be maintained for the entire duration of duties specified herein. If, for any reason, the Specialist loses subject certification during this period, immediately notify the Contracting Officer and submit another TAB Specialist for approval. Any individual that has been the subject of disciplinary action by either the AABC, the NEBB, or the TABB within the five years preceding Contract Award is not eligible to perform any duties related to the HVAC systems, including TAB.

All work specified in this Section and in other related Sections performed by the TAB Specialist will be considered invalid if the TAB Specialist loses its certification prior to Contract completion and must be performed by the approved successor.

1.5.4.3 TAB Specialist Responsibilities

TAB Specialist responsibilities include all TAB work specified herein and in related sections under his direct guidance. The TAB specialist is required to be onsite on a daily basis to direct TAB efforts. The TAB Specialist must participate in the commissioning process[ specified in Section 23 08 00.00 10 COMMISSIONING OF HVAC SYSTEMS].

1.5.4.4 TAB Related HVAC Submittals

The TAB Specialist must prepare a list of the submittals from the Contract Submittal Register that relate to the successful accomplishment of all HVAC TAB. Accompany the submittals identified on this list with a letter of approval signed and dated by the TAB Specialist when submitted to the Government. Ensure that the location and details of ports, terminals, connections, etc., necessary to perform TAB are identified on the submittals.

1.5.5 Responsibilities

The Contractor is responsible for ensuring compliance with the requirements of this section. The following delineation of specific work responsibilities is specified to facilitate TAB execution of the various work efforts by personnel from separate organizations. This breakdown of specific duties is specified to facilitate adherence to the schedule listed in paragraph entitled "TAB Submittal and Work Schedule."

1.5.5.1 Contractor

a. TAB personnel: Ensure that the DALT work and the TAB work is accomplished by a group meeting the requirements specified in paragraph entitled "TAB Personnel Qualification Requirements."

b. Pre-DALT/TAB meeting: Attend the meeting with the TAB Supervisor, and ensure that a representative is present for the sheetmetal contractor, mechanical contractor, electrical contractor, and automatic temperature controls contractor.

c. HVAC documentation: Furnish one complete set of the following HVAC-related documentation to the TAB agency:

   (1) Contract drawings and specifications

   (2) Approved submittal data for equipment

   (3) Construction work schedule

   (4) Up-to-date revisions and change orders for the previously listed items

d. Submittal and work schedules: Ensure that the schedule for submittals and work required by this section and specified in paragraph entitled "TAB Submittal and Work Schedule," is met.

e. Coordination of supporting personnel:

Provide the technical personnel, such as factory representatives or HVAC controls installer required by the TAB field team to support the DALT and the TAB field measurement work.

Provide equipment mechanics to operate HVAC equipment and ductwork mechanics to provide the field designated test ports to enable TAB field team to accomplish the DALT and the TAB field measurement work. Ensure these support personnel are present at the times required by the TAB team, and cause no delay in the DALT and the TAB field work.

Conversely, ensure that the HVAC controls installer has required support from the TAB team field leader to complete the controls check out.

f. Deficiencies: Ensure that the TAB Agency supervisor submits all Design/Construction deficiency notifications directly to the Contracting officer within 3 days after the deficiency is encountered. Further, ensure that all such notification submittals are complete with explanation, including documentation, detailing deficiencies.

g. Prerequisite HVAC work: Complete check out and debugging of HVAC equipment, ducts, and controls prior to the TAB engineer arriving at the project site to begin the TAB work. Debugging includes searching for and eliminating malfunctioning elements in the HVAC system installations, and verifying all adjustable devices are functioning as designed. Include as prerequisite work items, the deficiencies pointed out by the TAB team supervisor in the design review report.

h. Prior to the TAB field team's arrival, ensure completion of the applicable inspections and work items listed in the TAB team supervisor's pre-field engineering report. Do not allow the TAB team to commence TAB field work until all of the following are completed.

(1) HVAC system installations are fully complete.

(2) HVAC prerequisite checkout work lists specified in the paragraph "Pre-Field TAB Engineering Report" are completed, submitted, and approved. Ensure that the TAB Agency gets a copy of the approved prerequisite HVAC work checklist.

(3) DALT field checks for all systems are completed.

(4) HVAC system filters are clean for both Season 1 and Season 2 TAB field work.

i. Advance notice: Furnish to the Contracting Officer with advance written notice for the commencement of the DALT field work and for the commencement of the TAB field work.

j. Insulation work: For required DALT work , ensure that insulation is not installed on ducts to be DALT'd until DALT work on the subject ducts is complete.Later, ensure that openings in duct and machinery insulation coverings for TAB test ports are marked, closed and sealed.

1.5.5.2 TAB Agency

Provide the services of a TAB team which complies with the requirements of

paragraph entitled "Independent TAB Agency Personnel Qualifications". The work to be performed by the TAB agency is limited to testing, adjusting, and balancing of HVAC air and water systems to satisfy the requirements of this specification section.

1.5.5.3 TAB Team Supervisor

a. Overall management: Supervise and manage the overall TAB team work effort, including preliminary and technical DALT and TAB procedures and TAB team field work.

b. Pre-DALT/TAB meeting: Attend meeting with Contractor.

c. Design review report: Review project specifications and accompanying drawings to verify that the air systems and water systems are designed in such a way that the TAB engineer can accomplish the work in compliance with the requirements of this section. Verify the presence and location of permanently installed test ports and other devices needed, including gauge cocks, thermometer wells, flow control devices, circuit setters, balancing valves, and manual volume dampers.

d. Support required: Specify the technical support personnel required from the Contractor other than the TAB agency; such as factory representatives for temperature controls or for complex equipment. Inform the Contractor in writing of the support personnel needed and when they are needed. Furnish the notice as soon as the need is anticipated, either with the design review report, or the pre-field engineering report, theduring the DALT or TAB field work.

e. Pre-field DALT preliminary notification: Monitor the completion of the duct installation of each system and provide the necessary written notification to the Contracting Officer.

f. Pre-field engineering report: Utilizing the following HVAC-related documentation; contract drawings and specifications, approved submittal data for equipment, up-to-date revisions and change orders; prepare this report.

g. Prerequisite HVAC work checklist: Ensure the Contractor gets a copy of this checklist at the same time as the pre-field engineering report is submitted.

h. Technical assistance for DALT work.

(1) Technical assistance: Provide immediate technical assistance to TAB field team.

(2) DALT field visit: Near the end of the DALT field work effort, visit the contract site to inspect the HVAC installation and the progress of the DALT field work. Conduct a site visit to the extent necessary to verify correct procedures are being implemented and to confirm the accuracy of the Pre-final DALT

Report data which has been reported. Also, perform sufficient evaluation to allow the TAB supervisor to issue certification of the final report. Conduct the site visit full-time for a minimum of [one] [two] [_____] 8 hour workday[s] duration.

i. Final DALT report: Certify the DALT report. This certification includes the following work:

(1) Review: Review the Pre-final DALT report data. From these field reports, prepare the Certified Final DALT report.

(2) TAB Verification: Verify adherence, by the TAB field team, to the procedures specified in this section.

j. Technical Assistance for TAB Work: Provide immediate technical assistance to the TAB field team for the TAB work.

[(1) TAB field visit: At the midpoint of the Season 1 and Season 2 TAB field work effort, visit the contract site to inspect the HVAC installation and the progress of the TAB field work. Conduct site visit full-time for a minimum of [one] [two] [_____] 8 hour workday[s] duration.]

[(2) TAB field visit: Near the end of the TAB field work effort, visit the contract site to inspect the HVAC installation and the progress of the TAB field work.Conduct site visit full-time for a minimum of [one] [two] [_____] 8 hour workday[s] duration. Review the TAB final report data and certify the TAB final report.]

(1) TAB field visit: Near the end of the TAB field work effort, visit the contract site to inspect the HVAC installation and the progress of the TAB field work.Conduct site visit full-time for a minimum of [one] [two] [_____] 8 hour workday[s] duration. Review the TAB final report data and certify the TAB final report.]

k. Certified TAB report: Certify the TAB report. This certification includes the following work:

(1) Review: Review the TAB field data report. From this field report, prepare the certified TAB report.

(2) Verification: Verify adherence, by the TAB field team, to the TAB plan prescribed by the pre-field engineering report and verify adherence to the procedures specified in this section.

l. Design/Construction deficiencies: Within 3 working days after the TAB Agency has encountered any design or construction deficiencies, the TAB Supervisor must submit written notification directly to the Contracting Officer, with a separate copy to the Contractor, of all such deficiencies. Provide in this submittal a complete explanation, including supporting documentation, detailing deficiencies. Where deficiencies are encountered that are believed to adversely impact successful completion of TAB, the TAB Agency must issue notice and request direction in the notification submittal.

m. TAB Field Check: The TAB team supervisor must attend and supervise [Season 1 ] [and Season 2 ] TAB field check.

1.5.5.4 TAB Team Field Leader

a. Field manager: Manage, in the field, the accomplishment of the work

specified in Part 3, "Execution."

b. Full time: Be present at the contract site when DALT field work or TAB field work is being performed by the TAB team; ensure day-to-day TAB team work accomplishments are in compliance with this section.

c. Prerequisite HVAC work: Do not bring the TAB team to the contract site until a copy of the prerequisite HVAC Checklist, with all work items certified by the Contractor to be working as designed, reaches the office of the TAB Agency.

1.5.6 Test Reports

1.5.6.1 Data from DALT Field Work

Report the data for the Pre-final DALT Report and Certified Final DALT Report in compliance the following requirements:

a. Report format: Submit report data on Air Duct Leakage Test Summary Report Forms as shown on Page 6-2 of SMACNA 1972 CD. In addition, submit in the report, a marked duct shop drawing which identifies each section of duct tested with assigned node numbers for each section. Include node numbers in the completed report forms to identify each duct section. The TAB supervisor must review and certify the report.

b. The TAB supervisor must include a copy of all calculations prepared in determining the duct surface area of each duct test section. In addition,provide the ductwork air leak testing (DALT) reports with a copy(s) of the calibration curve for each of the DALT test orifices used for testing.

c. Instruments: List the types of instruments actually used to measure the data. Include in the listing each instrument's unique identification number, calibration date, and calibration expiration date. Instruments must have been calibrated within one year of the date of use in the field. Instrument calibration must be traceable to the measuring standards of the National Institute of Standards and Technology.

d. Certification: Include the typed name of the TAB supervisor and the dated signature of the TAB supervisor.

1.5.6.2 Certified TAB Reports

Submit: TAB Report for Season 1 and TAB Report for Season 2 in the following manner:

a. Report format: Submit the completed pre-field data forms approved in the pre-field TAB Engineering Report completed by TAB field team, reviewed and certified by the TAB supervisor. Bind the report with a waterproof front and back cover. Include a table of contents identifying by page number the location of each report. Report forms and report data must be typewritten. Handwritten report forms or report data are not acceptable.

b. Temperatures: On each TAB report form reporting TAB work accomplished on HVAC thermal energy transfer equipment, include the indoor and outdoor dry bulb temperature range and indoor and outdoor wet bulb temperature range within which the TAB data was recorded. Include in the TAB report continuous time versus temperature recording data of wet and dry bulb temperatures for the rooms, or zones, as designated in the following list:

(1) [Specifier: List desired rooms and/or zones here]. Measure and compile data on a continuous basis for the period in which TAB work affecting those rooms is being done.

(2) Measure and record data only after the HVAC systems installations are complete, the systems fully balanced and the HVAC systems controls operating in fully automatic mode.

(3) Data may be compiled using direct digital controls trend logging where available. Otherwise, temporarily install calibrated time versus temperature/humidity recorders for this purpose. The HVAC systems and controls must be fully operational a minimum of 24 hours in advance of commencing data compilation. Include the specified data in the [Season I TAB Report] [Season I and Season 2 TAB Report].

[c. System Diagrams: Provide updated diagrams with final installed locations of all terminals and devices, any numbering changes, and actual test locations. Use a key numbering system on the diagram which identifies each outlet contained in the outlet airflow report sheets.]

[d. Static Pressure Profiles: Report static pressure profiles for air duct systems including: [_____]. Report static pressure data for all supply, return, relief, exhaust and outside air ducts for the systems listed. Include the following in the static pressure report data, in addition to AABC/NEBB/TABB required data:

(1) Report supply fan, return fan, relief fan, and exhaust fan inlet and discharge static pressures.

(2) Report static pressure drop across chilled water coils, DX coils, hot water coils, steam coils, electric resistance heating coils and heat reclaim devices installed in unit cabinetry or the system ductwork.

(3) Report static pressure drop across outside air, return air, and supply air automatic control dampers, both proportional and two-position, installed in unit cabinetry.

(4) Report static pressure drop across air filters, acoustic silencers, moisture eliminators, air flow straighteners, air flow measuring stations or other pressure drop producing specialty items installed in unit cabinetry, or in the system ductwork. Examples of these specialty items are smoke detectors, white sound generators, RF shielding, wave guides, security bars, blast valves, small pipes passing through ductwork, and duct mounted humidifiers.

Do not report static pressure drop across duct fittings provided for the sole purpose of conveying air, such as elbows, transitions, offsets, plenums, manual dampers, and branch takes-offs.

(5) Report static pressure drop across outside air and relief/exhaust air louvers.]

[ (6) Report static pressure readings of supply air, return air, exhaust/relief air, and outside air in duct at the point where these ducts connect to each air moving unit.[and also at the following locations:

Main Duct: Take readings at four locations along the full length of the main duct, 25 percent, 50 percent, 75 percent, and 100 percent of the total duct length.

Floor Branch Mains: Take readings at floor branch mains served by a main duct vertical riser.

Branch Main Ducts: Take readings at branch main ducts.

VAV Terminals: Take readings at inlet static pressure at VAV terminal box primary air branch ducts.

VAV Terminals, Fan Powered: Take readings at fan discharge and inlet static pressures for series and parallel fan powered VAV terminal boxes.]]

e. Duct Traverses: Report duct traverses for main [and branch main] supply, return, exhaust, relief and outside air ducts. This includes all ducts, including those which lack 7 1/2 duct diameters upstream and 2 1/2 duct diameters downstream of straight duct unobstructed by duct fittings/offsets/elbows. The TAB Agency must evaluate and report findings on the duct traverses taken. Evaluate the suitability of the duct traverse measurement based on satisfying the qualifications for a pilot traverse plane as defined by AMCA 203, "Field Measurements", Section 8, paragraph 8.3, "Location of Traverse Plane."

f. Instruments: List the types of instruments actually used to measure the tab data. Include in the listing each instrument's unique identification number, calibration date, and calibration expiration date.

   Instrumentation, used for taking wet bulb temperature readings must provide accuracy of plus or minus 5 percent at the measured face velocities. Submit instrument manufacturer's literature to document instrument accuracy performance is in compliance with that specified.

g. Certification: Include the typed name of the TAB supervisor and the dated signature of the TAB supervisor.

h. Performance Curves: The TAB Supervisor must include, in the TAB Reports, factory pump curves and fan curves for pumps and fans TAB'd on the job.

i. Calibration Curves: The TAB Supervisor must include, in the TAB Reports, a factory calibration curve for installed flow control balancing valves, flow venturi's and flow orifices TAB'd on the job.

[1.6 PROJECT/SITE CONDITIONS

1.6.1 DALT and TAB Services to Obtain Existing Conditions

Conduct DALT and TAB of the indicated existing systems and equipment and submit the specified DALT and TAB reports for approval. Conduct this DALT and TAB work in accordance with the requirements of this section.

]1.7 SEQUENCING AND SCHEDULING

1.7.1 DALT and TAB Submittal and Work Schedule

Comply with additional requirements specified in Appendix C: DALT AND TAB SUBMITTAL AND WORK SCHEDULE included at the end of this section

[1.7.2 Projects with Phased Construction

This specification section is structured as though the HVAC construction, and thereby the TAB work, will be completed in a single phase. When the construction is completed in phases, the DALT work and TAB work must be planned, completed, and accepted for each construction phase.

1.7.2.1 Phasing of Work

This specification section is structured as though the HVAC construction, and thereby the TAB work, is going to be completed in a single phase[ in spite of the fact that there will be two seasons]. All elements of the TAB work are addressed on this premise. When a contract is to be completed in construction phases, including the TAB work, and the DALT work, the TAB work and DALT work must be planned for, completed and approved by the Contracting Officer with each phase. An example of this case would be one contract that requires the rehabilitation of the HVAC in each of several separated buildings. At the completion of the final phase, compile all approved reports and submit as one document.

]1.7.3 DALT and TAB Submittal and Work Schedule

Submit this schedule,and TAB Schematic Drawings, adapted for this particular contract, to the Contracting Officer (CO) for review and approval. Include with the submittal the planned calendar dates for each submittal or work item. Resubmit an updated version for CO approval every 90 calendar days days. Compliance with the following schedule is the Contractor's responsibility.

Qualify TAB Personnel: Within [45] [_____] calendar days after date of contract award, submit TAB agency and personnel qualifications.

Pre-DALT/TAB Meeting: Within [30] [_____] calendar days after the date of approval of the TAB agency and personnel, meet with the COTR.

Design Review Report: Within [60] [ ] calendar days after the date of the TAB agency personnel qualifications approval, submit design review report.

Pre-Field DALT Preliminary Notification: On completion of the duct installation for each system, notify the Contracting Officer in writing within 5 days after completion.

Ductwork Selected for DALT: Within 7 calendar days of Pre-Field DALT Preliminary Notification, the COTR will select which of the project ductwork must be DALT'd.

DALT Field Work: Within 48 hours of COTR's selection, complete DALT field work on selected.

Submit Pre-final DALT Report: Within one working day after completion of DALT field work, submit Pre-final DALT Report. Separate Pre-final DALT reports may be submitted to allow phased testing from system to system.

DALT Work Field Check: Upon approval of the Pre-final DALT Report, schedule the COTR's DALT field check work with the Contracting Officer.

Submit Final DALT Report: Within [15] [_____] calendar days after completion of successful DALT Work Field Check, submit [Season 1 ] TAB report.

Pre-Field TAB Engineering Report: Within [_____] calendar days after

approval of the TAB agency Personnel Qualifications, submit the Pre-Field TAB Engineering Report.

Prerequisite HVAC Work Check Out List [For Season 1] and Advanced Notice For [Season 1 ] TAB Field Work: At a minimum of [115] [_____] calendar days prior to CCD, submit [Season 1 ] prerequisite HVAC work check out list certified as complete, and submit advance notice of commencement of [Season 1 ] TAB field work.

[[Season 1 ] TAB Field Work: At a minimum of [90] [_____] calendar days prior to CCD, [and when the ambient temperature is within Season 1 limits,] accomplish [Season 1 ] TAB field work.

Submit [Season 1 ] TAB Report: Within [15] [_____] calendar days after completion of [Season 1 ] TAB field work, submit [Season 1 ] TAB report.

[Season 1 ] TAB Field Check: [30] [_____] calendar days after Season 1 TAB report is approved by the Contracting Officer, conduct [Season 1 ] field check.

Complete [Season 1 ] TAB Work: Prior to CCD, complete all TAB work [except Season 2 TAB work].]

[[Season 1 ] TAB Field Work: At a minimum of [90] [_____] calendar days prior to CCD, [and when the ambient temperature is within Season 1 limits,] accomplish [Season 1 ] TAB field work; submit [Season 1 ] TAB report; and conduct [Season 1 ] field check.

Complete [Season 1 ] TAB Work: Prior to CCD, complete all TAB work [except Season 2 TAB work].]

[Prerequisite HVAC Work Check Out List For Season 2 and Advanced Notice For Season 2 TAB Field Work: Within [150] [ ] calendar days after date of the commencement of the Season 1 TAB field work, submit the Season 2 prerequisite HVAC work check out list certified as complete and submit advance notice of commencement of Season 2 TAB field work.]

[Season 2 TAB Field Work: Within [180] [_____] calendar days after date of commencement of the Season 1 TAB field work and when the ambient temperature is within Season 2 limits, accomplish Season 2 TAB field work.

Submit Season 2 TAB Report: Within [15] [_____] calendar days after completion of Season 2 TAB field work, submit Season 2 TAB report.

Season 2 TAB Field Check: [30] [_____] calendar days after the Season 2 TAB report is approved by the Contracting Officer, conduct Season 2 field check.

Complete Season 2 TAB Work: Within [15] [_____] calendar days after the completion of Season 2 TAB field data check, complete all TAB work.]

[Season 2 TAB Field Work: Within [180] [_____] calendar days after date of commencement of the Season 1 TAB field work and when the ambient temperature is within Season 2 limits, accomplish [Season 2 ] TAB field work; submit [Season 2 ] TAB report; and conduct Season 2 field check.

Complete Season 2 TAB Work: Within [15] [_____] calendar days after the completion of Season 2 field data check, complete TAB work.]

1.7.3.1 Design Review Report

Submit typed report describing omissions and deficiencies in the HVAC system's design that would preclude the TAB team from accomplishing the duct leakage testing work and the TAB work requirements of this section. Provide a complete explanation including supporting documentation detailing the design deficiency. State that no deficiencies are evident if that is the case.

1.7.3.2 Pre-Field DALT Preliminary Notification

Notification: On completion of the installation of each duct system indicated to be DALT'd, notify the Contracting Officer in writing within 7 calendar days after completion.

1.7.3.3 Pre-Field TAB Engineering Report

Submit report containing the following information:

a. Step-by-step TAB procedure:

(1) Strategy: Describe the method of approach to the TAB field work from start to finish. Include in this description a complete methodology for accomplishing each seasonal TAB field work session.

(2) Air System Diagrams: Use the contract drawings and duct fabrication drawings if available to provide air system diagrams in the report showing the location of all terminal outlet supply, return, exhaust and transfer registers, grilles and diffusers. Use a key numbering system on the diagrams which identifies each outlet contained in the outlet airflow report sheets. Show intended locations of all traverses and static pressure readings.

(3) Procedural steps: Delineate fully the intended procedural steps to be taken by the TAB field team to accomplish the required TAB work of each air distribution system and each water distribution system. Include intended procedural steps for TAB work for subsystems and system components.

b. Pre-field data: Submit AABC or NEBB or SMACNA 1780 data report forms with the following pre-field information filled in:

(1) Design data obtained from system drawings, specifications, and approved submittals.

(2) Notations detailing additional data to be obtained from the contract site by the TAB field team.

(3) Designate the actual data to be measured in the TAB field work.

(4) Provide a list of the types of instruments, and the measuring range of each, which are anticipated to be used for measuring in the TAB field work. By means of a keying scheme, specify on each TAB data report form submitted, which instruments will be used for measuring each item of TAB data. If the selection of which instrument to use, is to be made in the field, specify from which instruments the choice will be made. Place the instrument key number in the blank space where the measured data would be entered.

c. Prerequisite HVAC work checkout list: Provide a list of inspections and work items which are to be completed by the Contractor. This list

must be acted upon and completed by the Contractor and then submitted and approved by the Contracting Officer prior to the TAB team coming to the contract site.

At a minimum, a list of the applicable inspections and work items listed in the NEBB PROCEDURAL STANDARDS, Section III, "Preliminary TABm Procedures" under paragraphs titled, "Air Distribution System Inspection" and "Hydronic Distribution System Inspection" must be provided for each separate system to be TAB'd.

## 1.8 SUBCONTRACTOR SPECIAL REQUIREMENTS

[Perform all work in this section in accordance with the paragraph entitled "Subcontractor Special Requirements" in Section 01 30 00 ADMINISTRATIVE REQUIREMENTS, stating that all contract requirements of this section must be accomplished directly by a first tier subcontractor. No work may be performed by a second tier subcontractor.]

## 1.9 WARRANTY

Furnish workmanship and performance warranty for the [DALT and ] TAB system work performed for a period not less than 1 year from the date of Government acceptance of the work; issued directly to the Government. Include provisions that if within the warranty period the system shows evidence of major performance deterioration, or is significantly out of tolerance, resulting from defective TAB or DALT workmanship, the corrective repair or replacement of the defective materials and correction of the defective workmanship is the responsibility of the TAB firm. Perform corrective action that becomes necessary because of defective materials and workmanship while system TAB and DALT is under warranty 7 days after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within the specified period of time constitutes grounds for having the corrective action and repairs performed by others and the cost billed to the TAB firm. The Contractor must also provide a 1 year contractor installation warranty.

# PART 2 PRODUCTS

Not Used

# PART 3 EXECUTION

## 3.1 WORK DESCRIPTIONS OF PARTICIPANTS

Comply with requirements of this section as specified in Appendix A WORK DESCRIPTIONS OF PARTICIPANTS.

## 3.2 PRE-DALT/TAB MEETING

Meet with the Contracting Officer's technical representative (COTR)[and the designing engineer of the HVAC systems] to develop a mutual understanding relative to the details of the DALT work and TAB work requirements. Ensure that the TAB supervisor is present at this meeting. Requirements to be discussed include required submittals, work schedule, and field quality control.

## 3.3 DALT PROCEDURES

### 3.3.1 Instruments, Consumables and Personnel

Provide instruments, consumables and personnel required to accomplish the DALT field work. Follow the same basic procedure specified below for TAB

Field Work, including maintenance and calibration of instruments, accuracy of measurements, preliminary procedures, field work, workmanship and treatment of deficiencies. Calibrate and maintain instruments in accordance with manufacturer's written procedures.

3.3.2 Advance Notice of Pre-Final DALT Field Work

On completion of the installation of each duct system indicated to be DALT'd, notify the Contracting Officer in writing prior to the COTR's duct selection field visit.

3.3.3 Ductwork To Be DALT'd

From each duct system indicated as subject to DALT, the COTR will randomly select sections of each completed duct system for testing by the Contractor's TAB Firm. The sections selected will not exceed 20 percent of the total measured linear footage of duct systems indicated as subject to DALT. Sections of duct systems subject to DALT will include 20 percent of main ducts, branch main ducts, branch ducts and plenums for supply, return, exhaust, and plenum ductwork.

[ It is acceptable for an entire duct system to be DALT'd instead of disassembling that system in order to DALT only the 20 percent portion specified above.]

3.3.4 DALT Testing

Perform DALT on the HVAC duct sections of each system as selected by the COTR. Use the duct class, seal class, leakage class and the leak test pressure data indicated on the drawings, to comply with the procedures specified in SMACNA 1972 CD.

In spite of specifications of SMACNA 1972 CD to the contrary, DALT ductwork of construction class of 746 Pa 3-inch water gauge static pressure and below if indicated to be DALT'd. Complete DALT work on the COTR selected ductwork within 48 hours after the particular ductwork was selected for DALT. Separately conduct DALT work for large duct systems to enable the DALT work to be completed in 48 hours.

3.3.5 Pre-final DALT Report

After completion of the DALT work, prepare a Pre-final DALT Report meeting the additional requirements specified in Appendix B REPORTS - DALT and TAB. Data required by those data report forms shall be furnished by the TAB team. Prepare the report neatly and legibly; the Pre-final DALT report shall provide the basis for the Final DALT Report.

TAB supervisor shall review, approve and sign the Pre-Final DALT Report and submit this report within one day of completion of DALT field work. Verbally notify the COTR that the field check of the Pre-Final DALT Report data can commence.

After completion of the DALT work, prepare a Pre-final DALT Report using the reporting forms specified. TAB team to furnish data required by those data report forms. Prepare the report neatly and legibly; the Pre-final DALT report is the basis for the Final DALT Report. TAB supervisor must review and certify the Pre-final DALT Report and submit this report within one day of completion of DALT field work. Verbally notify the COTR that the field check of the Pre-final DALT Report data can commence.

3.3.6 Quality Assurance - COTR DALT Field Acceptance Testing

In the presence of the COTR and TAB team field leader, verify for accuracy Pre-final DALT Report data selected by the COTR. For each duct system, this acceptance testing shall be conducted on a maximum of 50 percent of the duct sections DALT'd.

Further, if any data on the Pre-final DALT report form for a given duct section is out-of-tolerance, then field acceptance testing shall be conducted on data for one additional duct section, preferably in the same duct system, in the presence of the COTR.

### 3.3.7 Additional COTR Field Acceptance Testing

If any of the duct sections checked for a given system are determined to have a leakage rate measured that exceeds the leakage rate allowed by SMACNA Leak Test Manual for an indicated duct construction class and sealant class, terminate data checking for that section. The associated Pre-final DALT Report data for the given duct system will be disapproved. Make the necessary corrections and prepare a revised Pre-final DALT Report. Reschedule a field check of the revised report data with the COTR.

### 3.3.8 Certified Final DALT Report

On successful completion of all field checks of the Pre-final DALT Report data for all systems, the TAB Supervisor is to assemble, review, certify and submit the Final DALT Report to the Contracting Officer for approval.

On successful completion of all field checks of the Pre-Final DALT Report data for all systems, the TAB Supervisor shall assemble, review, approve, sign and submit the Final DALT Report in compliance with Appendix B REPORTS - DALT and TAB to the Contracting Officer for approval.

### 3.3.9 Prerequisite for TAB Field Work

Do not commence TAB field work prior to the completion and approval, for all systems, of the Final DALT Report.

## 3.4 TAB PROCEDURES

### 3.4.1 TAB Field Work

Test, adjust, and balance the HVAC systems until measured flow rates (air and water flow) are within plus or minus 5 percent of the design flow rates as specified or indicated on the contract documents.

That is, comply with the the requirements of AABC MN-1 [and AABC MN-4],[ NEBB PROCEDURAL STANDARDS, NEBB MASV,] or SMACNA 1780 (TABB) and SMACNA 1858 (TABB),except as supplemented and modified by this section.

[ Provide instruments and consumables required to accomplish the TAB work. Calibrate and maintain instruments in accordance with manufacturer's written procedures.]

Test, adjust, and balance the HVAC systems until measured flow rates (air and water flow) are within plus or minus 5 percent of the design flow rates as specified or indicated on the contract documents. Conduct TAB work, including measurement accuracy, and sound measurement work in conformance with the AABC MN-1 and AABC MN-4, or NEBB TABES and NEBB MASV, or SMACNA
1780 (used by TABB) and SMACNA 1858 sound measurement procedures, except as supplemented and modified by this section.[ The only water flow and

air flow reporting which can be deferred until the Season 2 is that data which would be affected in terms of accuracy due to outside ambient conditions.]

3.4.2 Preliminary Procedures

Use the approved pre-field engineering report as instructions and procedures for accomplishing TAB field work. TAB engineer is to locate, in the field, test ports required for testing. It is the responsibility of the sheet metal contractor to provide and install test ports as required by the TAB engineer.

3.4.3 TAB Air Distribution Systems

3.4.3.1 Units With Coils

Report heating and cooling performance capacity tests for hot water, chilled water, DX and steam coils for the purpose of verifying that the coils meet the indicated design capacity. Submit the following data and calculations with the coil test reports:

a. For air handlers with capacities greater than 26,370 Watts 7.5 tons (90,000 Btu) cooling, such as factory manufactured units, central built-up units and rooftop units, conduct capacity tests in accordance with AABC MN-4, procedure 3.5, "Coil Capacity Testing."

   Do not determine entering and leaving wet and dry bulb temperatures by single point measurement, but by the average of multiple readings in compliance with paragraph 3.5-5, "Procedures", (in subparagraph d.) of AABC MN-4, Procedure 3.5, "Coil Capacity Testing."

   Submit part-load coil performance data from the coil manufacturer converting test conditions to design conditions; use the data for the purpose of verifying that the coils meet the indicated design capacity in compliance with AABC MN-4, Procedure 3.5, "Coil Capacity Testing," paragraph 3.5.7, "Actual Capacity Vs. Design Capacity" (in subparagraph c.).

b. For units with capacities of 26370 Watts 7.5 tons (90,000 Btu) or less, such as fan coil units, duct mounted reheat coils associated with VAV terminal units, and unitary units, such as through-the-wall heat pumps:

   Determine the apparent coil capacity by calculations using single point measurement of entering and leaving wet and dry bulb temperatures; submit the calculations with the coil reports.

3.4.3.2 Air Handling Units

Air handling unit systems including fans (air handling unit fans, exhaust fans and winter ventilation fans), coils, ducts, plenums, mixing boxes, terminal units, variable air volume boxes, and air distribution devices for supply air, return air, outside air, mixed air relief air, and makeup air.

[3.4.3.3 Rooftop Air Conditioning

Rooftop air conditioning systems including fans, coils, ducts, plenums, and air distribution devices for supply air, return air, and outside air.

For refrigeration compressors/condensers/condensing units/evaporators, report data as required by NEBB, AABC, and TABB standard procedures, including refrigeration operational data.

][3.4.3.4 Heating and Ventilating Units

Heating and ventilating unit systems including fans, coils, ducts, plenums, roof vents, registers, diffusers, grilles, and louvers for supply air, return air, outside air, and mixed air.

][3.4.3.5 Makeup Air Units

Makeup air unit systems including fans, coils, ducts, plenums, registers, diffusers, grilles, and louvers for supply air, return air, outside air, and mixed air.

][3.4.3.6 Return Air Fans

Return air fan system including fan ducts, plenums, registers, diffusers, grilles, and louvers for supply air, return air, outside air, and mixed air.

][3.4.3.7 Fan Coils

Fan coil unit systems including fans, coils, ducts, plenums, and air distribution devices for supply air, return air, and outside air.

][3.4.3.8 Exhaust Fans

Exhaust fan systems including fans, ducts, plenums, grilles, and hoods for exhaust air.

][3.4.3.9 Cabinet Heaters

][3.4.3.10 Cooling Units

][3.4.3.11 Door Heaters

Door heater systems, including fans, coils, and diffusers.

][3.4.3.12 Unit Heaters

][3.4.4 TAB Water Distribution Systems

3.4.4.1 Chilled Water

Chilled water systems including chillers, condensers, cooling towers, pumps, coils, system balance valves and flow measuring devices.

For water chillers, report data as required by AABC, NEBB and TABB standard procedures, including refrigeration operational data.

3.4.4.2 Heating Hot Water

Heating hot water systems including boilers, hot water converters (e.g., heat exchangers), pumps, coils, system balancing valves and flow measuring devices.

3.4.4.3 Dual Temperature Water

Dual temperature water systems including boilers, converters, chillers, condensers, cooling towers, pumps, coils, and system balancing valves, and flow measuring devices.

][3.4.5 Sound Measurement Work

3.4.5.1 Areas To Be Sound Measured

In the following spaces, measure and record the sound power level for each octave band listed in ASHRAE HVAC APP SI HDBK ASHRAE HVAC APP IP HDBK Noise Criteria:

a. All HVAC mechanical rooms, including machinery spaces and other spaces containing HVAC power drivers and power driven equipment.

b. All spaces sharing a common barrier with each mechanical room, including rooms overhead, rooms on the other side of side walls, and rooms beneath the mechanical room floor.

[c. AHU No. 1 System:Rooms: [_____]]

[d. [_____] System: Rooms: [_____]]

[e. [_____] System: Rooms: [_____]]

3.4.5.2 Procedure

Measure sound levels in each room, when unoccupied except for the TAB team, with all HVAC systems that would cause sound readings in the room operating in their noisiest mode. Record the sound level in each octave band. Attempt to mitigate the sound level and bring the level to within the specified ASHRAE HVAC APP SI HDBK ASHRAE HVAC APP IP HDBK noise criteria goals, if such mitigation is within the TAB team's control. State in the report the ASHRAE HVAC APP SI HDBK ASHRAE HVAC APP IP HDBK noise criteria goals. If sound level cannot be brought into compliance, provide written notice of the deficiency to the Contractor for resolution or correction.

3.4.5.3 Timing

Measure sound levels at times prescribed by AABC or NEBB or TABB.

3.4.5.4 Meters

Measure sound levels with a sound meter complying with ASA S1.4, Type 1 or 2, and an octave band filter set complying with ASA S1.11 PART 1. Use measurement methods for overall sound levels and for octave band sound levels as prescribed by NEBB.

3.4.5.5 Calibration

Calibrate sound levels as prescribed by AABC or NEBB or TABB, except that calibrators emitting a sound pressure level tone of 94 dB at 1000 hertz (Hz) are also acceptable.

3.4.5.6 Background Noise Correction

Determine background noise component of room sound (noise) levels for each (of eight) octave bands as prescribed by AABC or NEBB or TABB.

][3.4.6 TAB Work on Performance Tests Without Seasonal Limitations

3.4.6.1 Performance Tests

In addition to the TAB proportionate balancing work on the air distribution systems and the water distribution systems, accomplish TAB work on the HVAC systems which directly transfer thermal energy. TAB the operational performance of the [heating systems] [and] [cooling systems].

3.4.6.2 Ambient Temperatures

On each tab report form used for recording data, record the outdoor and indoor ambient dry bulb temperature range and the outdoor and indoor ambient wet bulb temperature range within which the report form's data was recorded. Record these temperatures at beginning and at the end of data taking.

[3.4.6.3 Sound Measurements

Comply with paragraph entitled "Sound Measurement Work," specifically, the requirement that a room must be operating in its noisiest mode at the time of sound measurements in the room. The maximum noise level measurements could depend on seasonally related heat or cooling transfer equipment.

][3.4.6.4 Water Chillers

For water chillers, report data as required by NEBB Form TAB 15-83, NEBB PROCEDURAL STANDARDS, including refrigeration operational data.

][3.4.6.5 Refrigeration Units

For refrigeration compressors/condensers/condensing units, report data as required by NEBB Form TAB 15-83, NEBB PROCEDURAL STANDARDS, including refrigeration operational data.

]3.4.6.6 Coils

Report heating and cooling performance capacity tests for [hot water], [chilled water], [DX] [and steam coils] for the purpose of verifying that the coils meet the indicated design capacity. Submit the following data and calculations with the coil test reports:

[a. For Central station air handlers with capacities greater than 26,370 Watts 7.5 tons (90,000 Btu) cooling, such as factory manufactured units, central built-up units and rooftop units, conduct capacity tests in accordance with AABC MN-4, procedure 3.5, "Coil Capacity Testing".

Entering and leaving wet and dry bulb temperatures are not determined by single point measurement, but the average of multiple readings in compliance with paragraph 3.5-5, "Procedures", (in subparagraph d.) of AABC MN-4, Procedure 3.5, "Coil Capacity Testing."

Submit part-load coil performance data from the coil manufacturer converting test conditions to design conditions; use the data for the purpose of verifying that the coils meet the indicated design capacity in compliance with AABC MN-4, Procedure 3.5, "Coil Capacity Testing," paragraph 3.5.7, "Actual Capacity Vs. Design Capacity" (in subparagraph c.).]

[b. For units with capacities of 26370 Watts 7.5 tons (90,000 Btu) or less, such as fan coil units, duct mounted reheat coils associated with VAV terminal units, and unitary units, such as through-the-wall heat pumps:

Determine the apparent coil capacity by calculations using single point measurement of entering and leaving wet and dry bulb temperatures; submit the calculations with the coil reports.]

][3.4.7 TAB Work on Performance Tests With Seasonal Limitations

3.4.7.1 Performance Tests

Accomplish proportionate balancing TAB work on the air distribution systems and water distribution systems, in other words, accomplish adjusting and balancing of the air flows and water flows, any time during the duration of this contract, subject to the limitations specified elsewhere in this section. However, accomplish, within the following seasonal limitations, TAB work on HVAC systems which directly transfer thermal energy.

3.4.7.2 Season Of Maximum Load

Visit the contract site for at least two TAB work sessions for TAB field measurements. [Visit the contract site during the season of maximum heating load] [and] [visit the contract site during the season of maximum cooling load], the goal being to TAB the operational performance of the [heating systems] [and] [cooling systems] under their respective maximum outdoor environment-caused loading. During the seasonal limitations, TAB the operational performance of the [heating systems] [and] [cooling systems].

3.4.7.3 Ambient Temperatures

On each tab report form used for recording data, record the outdoor and indoor ambient dry bulb temperature range and the outdoor and indoor ambient wet bulb temperature range within which the report form's data was recorded. Record these temperatures at beginning and at the end of data taking.

3.4.7.4 Sound Measurements

Comply with paragraph entitled "Sound Measurement Work," specifically, the requirement that a room must be operating in its noisiest mode at the time of sound measurements in the room. The maximum noise level measurements could depend on seasonally related heat or cooling transfer equipment.

[3.4.7.5 Water Chillers

Water chillers: For water chillers,report data as required by NEBB Form TAB 15-83, NEBB PROCEDURAL STANDARDS, including refrigeration operational data.

][3.4.7.6 Refrigeration Units

For refrigeration compressors/condensers/condensing units,report data as required by NEBB Form TAB 15-83, NEBB PROCEDURAL STANDARDS, including refrigeration operational data.

][3.4.7.7 Coils

Report heating and cooling performance capacity tests for [hot water], [chilled water], [DX] [and steam coils] for the purpose of verifying that the coils meet the indicated design capacity. Submit the following data and calculations with the coil test reports:

a. For Central station air handlers with capacities greater than 26,370 Watts 7.5 tons (90,000 Btu) cooling, such as factory manufactured units, central built-up units and rooftop units, conduct capacity tests in accordance with AABC MN-4, procedure 3.5, "Coil Capacity Testing."

Entering and leaving wet and dry bulb temperatures are not determined by single point measurement, but by the average of multiple readings in compliance with paragraph 3.5-5, "Procedures", (in subparagraph d.) of AABC MN-4, Procedure 3.5, "Coil Capacity Testing."

Submit part-load coil performance data from the coil manufacturer converting test conditions to design conditions; use the data for the purpose of verifying that the coils meet the indicated design capacity in compliance with AABC MN-4, Procedure 3.5, "Coil Capacity Testing," paragraph 3.5.7, "Actual Capacity Vs. Design Capacity" (in subparagraph c.).

b. For units with capacities of 26370 Watts 7.5 tons (90,000 Btu) or less, such as fan coil units, duct mounted reheat coils associated with VAV terminal units, and unitary units, such as through-the-wall heat pumps:

Determine the apparent coil capacity by calculations using single point measurement of entering and leaving wet and dry bulb temperatures; submit the calculations with the coil reports.

]][3.4.8 Workmanship

Conduct TAB work on the HVAC systems until measured flow rates are within plus or minus 5 percent of the design flow rates as specified or indicated on the contract documents. This TAB work includes adjustment of balancing valves, balancing dampers, and sheaves. Further, this TAB work includes changing out fan sheaves and pump impellers if required to obtain air and water flow rates specified or indicated. If, with these adjustments and equipment changes, the specified or indicated design flow rates cannot be attained, contact the Contracting Officer for direction.

]3.4.9 Deficiencies

Strive to meet the intent of this section to maximize the performance of the equipment as designed and installed. However, if deficiencies in equipment design or installation prevent TAB work from being accomplished within the range of design values specified in the paragraph entitled "Workmanship," provide written notice as soon as possible to the Contractor and the Contracting Officer describing the deficiency and recommended correction.

Responsibility for correction of installation deficiencies is the Contractor's. If a deficiency is in equipment design, call the TAB team supervisor for technical assistance. Responsibility for reporting design deficiencies to Contractor is the TAB team supervisor's.

3.4.10 TAB Reports

Additional requirements for TAB Reports are specified in Appendix B REPORTS - DALT and TAB

[After completion of the TAB field work, prepare the TAB field data for TAB supervisor's review and certification, using the reporting forms approved in the pre-field engineering report. Data required by those approved data report forms is to be furnished by the TAB team. Except as approved otherwise in writing by the Contracting Officer, the TAB work

and thereby the TAB report is considered incomplete until the TAB work is accomplished to within the accuracy range specified in the paragraph entitled "Workmanship."]

[After completion of the TAB work, prepare a pre-final TAB report using the reporting forms approved in the pre-field engineering report. Data required by those approved data report forms is to be furnished by the TAB team. Except as approved otherwise in writing by the Contracting Officer, the TAB work and the TAB report is considered incomplete until the TAB work is accomplished to within the accuracy range specified in the paragraph entitled "Workmanship" of this section.

Prepare the report neatly and legibly; the pre-final TAB report is the final TAB report minus the TAB supervisor's review and certification. Obtain, at the contract site, the TAB supervisor's review and certification of the TAB report.

Verbally notify the COTR that the field check of the TAB report data can commence; give this verbal notice 48 hours in advance of field check commencement. Do not schedule field check of the TAB report until the specified workmanship requirements have been met or written approval of the deviations from the requirements have been received from the Contracting Officer.]

3.4.11 Quality Assurance - COTR TAB Field Acceptance Testing

3.4.11.1 TAB Field Acceptance Testing

During the field acceptance testing, verify, in the presence of the COTR, random selections of data (water, air quantities, air motion, [sound level readings]) recorded in the TAB Report. Points and areas for field acceptance testing are to be selected by the COTR. Measurement and test procedures are the same as approved for TAB work for the TAB Report.

Field acceptance testing includes verification of TAB Report data recorded for the following equipment groups:

Group 1: All chillers, boilers, return fans, computer room units, and air handling units (rooftop and central stations).

Group 2: 25 percent of the VAV terminal boxes and associated diffusers and registers.

Group 3: 25 percent of the supply diffusers, registers, grilles associated with constant volume air handling units.

Group 4: 25 percent of the return grilles, return registers, exhaust grilles and exhaust registers.

Group 5: 25 percent of the supply fans, exhaust fans, and pumps.

Further, if any data on the TAB Report for Groups 2 through 5 is found not to fall within the range of plus 5 to minus 5 percent of the TAB Report data, additional group data verification is required in the presence of the COTR. Verify TAB Report data for one additional piece of equipment in that group. Continue this additional group data verification until
out-of-tolerance data ceases to be found.

3.4.11.2 Additional COTR TAB Field Acceptance Testing

If any of the acceptance testing measurements for a given equipment group is found not to fall within the range of plus 5 to minus 5 percent of the TAB Report data, terminate data verification for all affected data for that group. The affected data for the given group will be disapproved. Make the necessary corrections and prepare a revised TAB Report. Reschedule acceptance testing of the revised report data with the COTR. Further, if any data on the TAB Report for a given field acceptance test group is out-of-tolerance, then field test data for one additional field test group as specified herein. Continue this increase field test work until out-of-tolerance data ceases to to be found. This additional field testing is up and above the original 25 percent of the of reported data entries to be field tested.

If there are no more similar field test groups from which to choose, additional field testing from another, but different, type of field testing group must be tested.

3.4.11.3 Prerequisite for Approval

Compliance with the field acceptance testing requirements of this section is a prerequisite for the final Contracting Officer approval of the TAB Report submitted.

3.5 MARKING OF SETTINGS

Upon the final TAB work approval, permanently mark the settings of HVAC adjustment devices including valves, gauges, splitters, and dampers so that adjustment can be restored if disturbed at any time. Provide permanent markings clearly indicating the settings on the adjustment devices which result in the data reported on the submitted TAB report.

3.6 MARKING OF TEST PORTS

The TAB team is to permanently and legibly mark and identify the location points of the duct test ports. If the ducts have exterior insulation, make these markings on the exterior side of the duct insulation. Show the location of test ports on the as-built mechanical drawings with dimensions given where the test port is covered by exterior insulation.

3.7 APPENDICES

Appendix A WORK DESCRIPTIONS OF PARTICIPANTS
Appendix B REPORTS - DALT and TAB
Appendix C DALT AND TAB SUBMITTAL AND WORK SCHEDULE
Appendix D REQUIREMENTS FOR DUCT AIR LEAK TESTING

## Appendix A

## WORK DESCRIPTIONS OF PARTICIPANTS

The Contractor is responsible for ensuring compliance with all requirements of this specification section. However, the following delineation of specific work items is provided to facilitate and co-ordinate execution of the various work efforts by personnel from separate organizations.

1. Contractor

a. HVAC documentation: Provide pertinent contract documentation to the TAB Firm, to include the following: the contract drawings and specifications; copies of the approved submittal data for all HVAC equipment, air distribution devices, and air/water measuring/balancing devices; the construction work schedule; and other applicable documents requested by the TAB Firm. Provide the TAB Firm copies of contract revisions and modifications as they occur.

b. Schedules: Ensure the requirements specified under the paragraph "DALT and TAB Schedule" are met.

c. Pre-DALT and TAB meeting: Arrange and conduct the Pre-DALT and TAB meeting. Ensure that a representative is present for the sheet metal contractor, the mechanical contractor, the electrical contractor, and the automatic temperature controls contractor.

d. Coordinate Support: Provide and coordinate support personnel required by the TAB Firm in order to accomplish the DALT and TAB field work. Support personnel may include factory representatives, HVAC controls installers, HVAC equipment mechanics, sheet metal workers, pipe fitters, and insulators. Ensure support personnel are present at the work site at the times required.

e. Correct Deficiencies: Ensure the notifications of Construction Deficiencies are provided as specified herein. Refer to the paragraph entitled "Construction Deficiencies." Correct each deficiency as soon as practical with the Contracting Officer, and submit revised schedules and other required documentation.

f. Pre-TAB Work Checklists: Complete check out and debugging of HVAC equipment, ducts, and controls prior to the TAB engineer arriving at the project site to begin the TAB work. Debugging includes searching for and eliminating malfunctioning elements in the HVAC system installations, and verifying all adjustable devices are functioning as designed. Include as pre-TAB work checklist items, the deficiencies pointed out by the TAB team supervisor in the design review report.

Prior to the TAB field team's arrival, ensure completion of the applicable inspections and work items listed in the TAB team supervisor's DALT and TAB Work Procedures Summary. Do not allow the TAB team to commence TAB field work until all of the following are completed.

g. Give Notice of Testing: Submit advance notice of TAB field work accompanied by completed prerequisite HVAC Work List

h. Insulation work: Ensure that no insulation is shall not be installed on ducts to be DALT'd until DALT work on the subject ducts is complete.

Ensure the duct and piping systems are properly insulated and vapor sealed upon the successful completion and acceptance of the DALT and TAB work.

2. TAB Team Supervisor

a. Overall management: Supervise and manage the overall TAB team work effort, including preliminary and technical DALT and TAB procedures and TAB team field work.

b. Schedule: Ensure the requirements specified under the paragraph "DALT and TAB Schedule" are met.

c. Submittals: Provide the submittals specified herein.

d. Pre-DALT/TAB meeting: Attend meeting with Contractor. Ensure TAB personnel that will be involved in the TAB work under this contract attend the meeting.

e. Design Review Report: Submit typed report describing omissions and deficiencies in the HVAC system's design that would preclude the TAB team from accomplishing the duct leakage testing work and the TAB work requirements of this section. Provide a complete explanation including supporting documentation detailing the design deficiency. State that no deficiencies are evident if that is the case.

f. Support required: Specify the technical support personnel required from the Contractor other than the TAB agency; such as factory representatives for temperature controls or for complex equipment. Inform the Contractor in writing of the support personnel needed and when they are needed. Furnish the notice as soon as the need is anticipated, either with the design review report, or the DALT and TAB Procedures Summary, the during the DALT or TAB field work.

Ensure the Contractor is properly notified and aware of all support personnel needed to perform the TAB work. Maintain communication with the Contractor regarding support personnel throughout the duration of the TAB field work, including the TAB field acceptance testing checking.

Ensure all inspections and verifications for the Pre-Final DALT and Pre-TAB Checklists are completely and successfully conducted before DALT and TAB field work is performed.

g. Advance Notice: Monitor the completion of the duct system installations and provide the Advance Notice for Pre-Final DALT field work as specified herein.

h. Technical Assistance: Provide technical assistance to the DALT and TAB field work.

i. Deficiencies Notification: Ensure the notifications of Construction Deficiencies are provided as specified herein. Comply with requirements of the paragraph entitled "Construction Deficiencies." Resolve each deficiency as soon as practical and submit revised schedules and other required documentation.

j. Procedures: Develop the required TAB procedures for systems or system components not covered in the TAB Standard.

3. TAB Team Field Leader

a. Field manager: Manage, in the field, the accomplishment of the work specified in Part 3, "Execution."

b. Full time: Be present at the contract site when DALT field work or TAB field work is being performed by the TAB team; ensure day-to-day TAB team work accomplishments are in compliance with this section.

c. Prerequisite HVAC work: Do not bring the TAB team to the contract site until a copy of the prerequisite HVAC work list, with all work items certified by the Contractor to be working as designed, reaches the office of the TAB Agency.

Appendix B

REPORTS - DALT and TAB

All submitted documentation must be typed, neat, and organized. All reports must have a waterproof front and back cover, a title page, a certification page, sequentially numbered pages throughout, and a table of contents. Tables, lists, and diagrams must be titled. Generate and submit for approval the following documentation:

1. DALT and TAB Work Execution Schedule

Submit a detailed schedule indicating the anticipated calendar date for each submittal and each portion of work required under this section. For each work entry, indicate the support personnel (such as controls provider, HVAC mechanic, etc.) that are needed to accomplish the work. Arrange schedule entries chronologically.

2. DALT and TAB Procedures Summary

Submit a detailed narrative describing all aspects of the DALT and TAB field work to be performed. Clearly distinguish between DALT information and TAB information. Include the following:

a. A list of the intended procedural steps for the DALT and TAB field work from start to finish. Indicate how each type of data measurement will be obtained. Include what Contractor support personnel are required for each step, and the tasks they need to perform.

b. A list of the project's submittals that are needed by the TAB Firm in order to meet this Contract's requirements.

c. The schematic drawings to be used in the required reports, which may include building floor plans, mechanical room plans, duct system plans, and equipment elevations. Indicate intended TAB measurement locations, including where test ports need to be provided by the Contractor.

d. The data presentation forms to be used in the report, with the preliminary information and initial design values filled in.

e. A list of DALT and TAB instruments to be used, edited for this project, to include the instrument name and description, manufacturer, model number, scale range, published accuracy, most recent calibration date, and what the instrument will be used for on this project.

f. A thorough checklist of the work items and inspections that need to be accomplished before DALT field work can be performed. The Contractor must complete, submit, and receive approval of the Completed Pre-Final DALT Work Checklist before DALT field work can be accomplished.

g. A thorough checklist of the work items and inspections that need to be accomplished before the [Season 1 ]TAB field work can be performed. The Contractor must complete, submit, and receive approval of the Completed [Season 1 ]Pre-TAB Work Checklist before the [Season 1 ]TAB field work can be accomplished.

[h. A thorough checklist of the work items and inspections that need to be

accomplished before the Season 2 TAB field work can be performed. The Contractor must complete, submit, and receive approval of the Completed Season 2 Pre-TAB Work Checklist before the Season 2 TAB field work can be accomplished.]

i. The checklists specified above shall be individually developed and tailored specifically for the work under this contract. Refer to NEBB PROCEDURAL STANDARDS, Section III, "Preliminary TAB Procedures" under the paragraphs titled, "Air Distribution System Inspection" and "Hydronic Distribution System Inspection" for examples of items to include in the checklists.

3. Design Review Report

Submit report containing the following information:

a. Review the contract specifications and drawings to verify that the TAB work can be successfully accomplished in compliance with the requirements of this section. Verify the presence and location of permanently installed test ports and other devices needed, including gauge cocks, thermometer wells, flow control devices, circuit setters, balancing valves, and manual volume dampers.

b. Submit a typed report describing omissions and deficiencies in the HVAC system's design that would preclude the TAB team from accomplishing the DALT work and the TAB work requirements of this section. Provide a complete explanation including supporting documentation detailing the design deficiency. If no deficiencies are evident, state so in the report.

4. Pre-Final DALT Report for COTR DALT Field Checks

Report the data for the Pre-Final DALT Report meeting the following requirements:

a. Submit a copy of the approved DALT and TAB Procedures Summary: Provide notations describing how actual field procedures differed from the procedures listed.

b. Report format: Submit a comprehensive report for the DALT field work data using data presentation forms equivalent to the "Air Duct Leakage Test Summary Report Forms" located in the SMACNA 1972 CD. In addition, submit in the report, a marked duct shop drawing which identifies each section of duct tested with assigned node numbers for each section. Node numbers shall be included in the completed report forms to identify each duct section.

c. Calculations: Include a copy of all calculations prepared in determining the duct surface area of each duct test section. Include in the DALT reports copy(s) of the calibration curve for each of the DALT test orifices used for testing.

d. Instruments: List the types of instruments actually used to measure the data. Include in the listing each instrument's unique identification number, calibration date, and calibration expiration date. Instruments are to be calibrated within one year of the date of use in the field; instrument calibration is to be traceable to the measuring standards of the National Institute of Standards and Technology.

e. TAB Supervisor Approval: Include on the submitted report the typed name of the TAB supervisor and the dated signature of the TAB supervisor.

5. Final DALT Report

On successful completion of all COTR field checks of the Pre-final DALT Report data for all systems, the TABS Supervisor shall assemble, review, sign and submit the Final DALT Report to the Contracting Officer for approval.

6. TAB Reports: Submit TAB Report for Season 1 and TAB Report for Season 2 in the following manner:

a. Procedure Summary: Submit a copy of the approved DALT and TAB Procedures Summary. When applicable, provide notations describing how actual field procedures differed from the procedures listed.

b. Report format: Submit the completed data forms approved in the pre-field TAB Engineering Report completed by TAB field team, reviewed, approved and signed by the TAB supervisor. Bind the report with a waterproof front and back cover. Include a table of contents identifying by page number the location of each report. Report forms and report data shall be typewritten. Handwritten report forms or report data are not acceptable.

c. Temperatures: On each TAB report form reporting TAB work accomplished on HVAC thermal energy transfer equipment, include the indoor and outdoor dry bulb temperature range and indoor and outdoor wet bulb temperature range within which the TAB data was recorded. Include in the TAB report continuous time versus temperature recording data of wet and dry bulb temperatures for the rooms, or zones, as designated in the following list:

(1) Data shall be measured and compiled on a continuous basis for the period in which TAB work affecting those rooms is being done.

(2) Data shall be measured/recorded only after the HVAC systems installations are complete, the systems fully balanced and the HVAC systems controls operating in fully automatic mode. Provide a detailed explanation wherever a final measurement did not achieve the required value.

(3) Data may be compiled using direct digital controls trend logging where available. Otherwise, the Contractor shall temporarily install calibrated time versus temperature/humidity recorders for

this purpose. The HVAC systems and controls shall have been fully operational a minimum of 24 hours in advance of commencing data compilation. The specified data shall be included in the [Season I TAB Report] [Season I and Season 2 TAB Report].

d. Air System Diagrams: Provided updated diagrams with final installed locations of all terminals and devices, any numbering changes, and actual test locations.

e. Air Static Pressure Profiles: Report static pressure profiles for air duct systems including: [AHU-1][RTAC-1][MUA-1][_____]. Report static pressure data for all supply, return, relief, exhaust and outside air ducts for the systems listed. The static pressure report data shall include, in addition to AABC or NEBB or TABB required data, the following:

(1) Report supply fan, return fan, relief fan, and exhaust fan inlet and discharge static pressures.

(2) Report static pressure drop across chilled water coils, DX coils, hot water coils, steam coils, electric resistance heating coils and heat reclaim devices installed in unit cabinetry or the system ductwork.

(3) Report static pressure drop across outside air, return air, and supply air automatic control dampers, both proportional and two-position, installed in unit cabinetry.

(4) Report static pressure drop across air filters, acoustic silencers, moisture eliminators, air flow straighteners, air flow measuring stations or other pressure drop producing specialty items installed in unit cabinetry, or in the system ductwork. Examples of these specialty items are smoke detectors, white sound generators, RF shielding, wave guides, security bars, blast valves, small pipes passing through ductwork, and duct mounted humidifiers.

Do not report static pressure drop across duct fittings provided for the sole purpose of conveying air, such as elbows, transitions, offsets, plenums, manual dampers, and branch takes-offs.

(5) Report static pressure drop across outside air and relief/exhaust air louvers.

(6) Report static pressure readings of supply air, return air, exhaust/relief air, and outside air in duct at the point where these ducts connect to each air moving unit.

[f. Duct Transverses: Report duct traverses for main [and branch main] supply, return[, exhaust, relief and outside air] ducts. [This shall include all ducts, including those which lack 7 1/2 duct diameters upstream and 2 1/2 duct diameters downstream of straight duct

unobstructed by duct fittings/offsets/elbows.] The TAB Agency shall evaluate and report findings on the duct traverses taken. Evaluate the suitability of the duct traverse measurement based on satisfying the qualifications for a pitot traverse plane as defined by AMCA 203, "Field Measurements", Section 8, paragraph 8.3, "Location of Traverse Plane".]

g. Instruments: List the types of instruments actually used to measure the tab data. Include in the listing each instrument's unique identification number, calibration date, and calibration expiration date.

Instrumentation, used for taking wet bulb temperature readings shall provide accuracy of plus or minus 5 percent at the measured face velocities. Submit instrument manufacturer's literature to document instrument accuracy performance is in compliance with that specified.

h. Performance Curves: The TAB Supervisor shall include, in the TAB Reports, factory pump curves and fan curves for pumps and fans TAB'd on the job.

i. Calibration Curves: The TAB Supervisor shall include, in the TAB Reports, a factory calibration curve for installed flow control balancing valves, flow venturis and flow orifices TAB'd on the job.

j. Data From TAB Field Work: After completion of the TAB field work, prepare the TAB field data for TAB supervisor's review and approval signature, using the reporting forms approved in the pre-field engineering report. Data required by those approved data report forms shall be furnished by the TAB team. Except as approved otherwise in writing by the Contracting Officer, the TAB work and thereby the TAB report shall be considered incomplete until the TAB work is accomplished to within the accuracy range specified in the paragraph entitled "Workmanship."

Appendix C

DALT AND TAB SUBMITTAL AND WORK SCHEDULE

Perform the following items of work in the order listed adhering to the dates schedule specified below. Include the major items listed in this schedule in the project network analysis schedule required by Section 01 32 17.00 20 COST-LOADED NETWORK ANALYSIS SCHEDULES (NAS).

Submit TAB Agency and TAB Personnel Qualifications: Within [42] [_____] calendar days after date of contract award.

Submit the DALT and TAB Work Execution Schedule: within [14] [_____] days after receipt of the TAB agency and TAB personnel qualifications approval. Revise and re-submit this schedule 28 days prior to commencement of DALT work and 28 days prior to the commencement of TAB Season 1 work and TAB Season 2 work.

Submit the DALT and TAB Work Procedures Summary: within [14] [_____] days after receipt of the initial approved DALT and TAB Work Execution Schedule.

Meet with the COTR at the Pre-DALT/TAB Meeting: Within [28] [_____] calendar days after receipt of the approved initial DALT/TAB Execution Schedule.

Submit Design Review Report: Within [56] [_____] calendar days after the receipt of the approved initial DALT and TAB Work Execution Schedule.

[Conduct measurements and submit the Record of Existing Facility Conditions: within [28] [_____] days after receipt of approved DALT and TAB Work Procedures Summary.]

Advance Notice of Pre-Final DALT Field Work: After the completed installation of the HVAC duct system to be DALT'd, submit to the Contracting Officer an Advance Notice of Pre-Final DALT Field Work accompanied by the completed Pre-Final DALT Work Checklistchecklist for the subject duct system.

Ductwork Selected for DALT: Within 14 calendar days after receiving an acceptable completed Pre-Final DALT Work Checklist, the Contracting Officer's technical representative (COTR) will select the project ductwork sections to be DALT'd.

DALT Field Work: Within 48 hours of COTR's selection, complete DALT field work on selected project ductwork.

Submit Pre-Final DALT Report: Within two working days after completion of DALT field work, submit Pre-final DALT Report. Separate Pre-final DALT reports may be submitted to allow phased testing from system to system.

Quality Assurance - COTR DALT Field Checks: Upon approval of the Pre-final DALT Report, the COTR's DALT field check work shall be scheduled with the Contracting Officer.

Submit Final DALT Report: Within [14] [_____] calendar days after completion of successful DALT Work Field Check, submit [Season 1 ]TAB report.

Advance Notice of [Season 1 ]TAB Field Work: At a minimum of [14][_____] calendar days prior to [Season 1 ]TAB Field Work, submit advance notice of TAB field work accompanied by completed [Season 1 ]Pre-TAB Work Checklist.

[Season 1 ]TAB Field Work: At a minimum of [84][_____] calendar days prior to CCD, [and when the ambient temperature is within Season 1 limits,] accomplish [Season 1 ]TAB field work.

Submit [Season 1 ]TAB Report: Within [14] [_____] calendar days after completion of [Season 1 ]TAB field work, submit initial [Season 1 ]TAB report.

[Season 1 ]Quality Assurance - COTR TAB Field Check: [30] [ ] calendar days after initial [Season 1 ]TAB report is approved by the Contracting Officer, conduct [Season 1 ]field check.

Complete [Season 1 ]TAB Work: Prior to CCD, complete all TAB work [except Season 2 TAB work] and submit final.

Receive the approved TAB report: Within 21 calendar days, receive the report from Contracting Officer approved TAB report.

Advance Notice of Season 2 TAB Field Work: At a minimum of [126] [_____]calendar days after CCD, submit advance notice of Season 2 TAB field work accompanied by completed Season 2 Pre-TAB Work Checklist.

[Season 2 TAB Field Work: Within [14] [_____] calendar days after date of advance notice of Season 2 TAB field work and when the ambient temperature is within Season 2 limits, accomplish Season 2 TAB field work.

Submit Season 2 TAB Report: Within [14] [_____] calendar days after completion of Season 2 TAB field work, submit Season 2 TAB report.

Season 2 Quality Assurance - COTR TAB Field Checks: [28] [_____] calendar days after the Season 2 TAB report is approved by the Contracting Officer, conduct Season 2 field check.

Complete Season 2 TAB Work: Within [14] [_____] calendar days after the completion of Season 2 TAB field data check, complete all TAB work.]

Receive the approved TAB report: Within calendar 21 days, receive the report from Contracting Officer.

| Appendix D | | | | | |
|---|---|---|---|---|---|
| REQUIREMENTS FOR DUCT AIR LEAK TESTING | | | | | |
| | | SYSTEMS | | | |
| | | [Package Rooftop w/VAV Unit No. [1] [_____]] | [Package Rooftop w/VAV Unit No. [2] [_____]] | [Package Rooftop w/CV Unit No. [1] [_____]] | [Package Rooftop w/CV Unit No. [2] [_____]] |
| Duct System Static Pressure, in millimeters W.C. | for Supply | [100] [_____] | [100] [_____] | [50] [_____] | [50] [_____] |
| | for Return | [50] [_____] | [50] [_____] | [25] [_____] | [25] [_____] |
| | for Exhaust | [_____] | [_____] | [_____] | [_____] |
| | for Outside Air | [50] [_____] | [50] [_____] | [25] [_____] | [25] [_____] |
| System Oval/Round Duct and Rectangular Duct SMACNA Seal Class | for Supply | A | A | A | A |
| | for Return | A | A | A | A |
| | for Exhaust | A | A | A | A |
| | for Outside Air | A | A | A | A |
| System Oval/Round Duct SMACNA Leak Class | for Supply | [3] [_____] | [3] [_____] | [6] [_____] | [6] [_____] |
| | for Return | [6] [_____] | [6] [_____] | [12] [_____] | [12] [_____] |
| | for Exhaust | [_____] | [_____] | [_____] | [_____] |
| | for Outside Air | [6] [_____] | [6] [_____] | [12] [_____] | [12] [_____] |

| Appendix D | | | | | |
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| REQUIREMENTS FOR DUCT AIR LEAK TESTING | | | | | |
| | | SYSTEMS | | | |
| | | [Package Rooftop w/VAV Unit No. [1] [_____]] | [Package Rooftop w/VAV Unit No. [2] [_____]] | [Package Rooftop w/CV Unit No. [1] [_____]] | [Package Rooftop w/CV Unit No. [2] [_____]] |
| System Rectangular Duct SMACNA Leak Class | for Supply | [6] [_____] | [6] [_____] | [12] [_____] | [12] [_____] |
| | for Return | [12] [_____] | [12] [_____] | [24][_____] | [24][_____] |
| | for Exhaust | [_____] | [_____] | [_____] | [_____] |
| | for Outside Air | [12] [_____] | [12] [_____] | [24] [_____] | [24] [_____] |
| Duct Test Pressure, in millimeters W.C. | for Supply | [100] [_____] | [100] [_____] | [50] [_____] | [50] [_____] |
| | for Return | [50] [_____] | [50] [_____] | [25] [_____] | [25] [_____] |
| | for Exhaust | [_____] | [_____] | [_____] | [_____] |
| | for Outside Air | [50] [_____] | [50] [_____] | [25] [_____] | [25] [_____] |

| Appendix D | | | | | |
|---|---|---|---|---|---|
| REQUIREMENTS FOR DUCT AIR LEAK TESTING | | | | | |
| | | SYSTEMS | | | |
| | | [AHU w/ Economizer & CV Unit No. [1] [_____]] | [AHU w/ Economizer & CV Unit No. [2] [_____]] | [Series VAV Terminal Boxes Unit No. [1] [_____]] | [Exhaust Systems Unit No. [1] [_____]] |
| Duct System Static Pressure, in millimeters W.C. | for Supply | [50] [_____] | [50] [_____] | [13] [_____] | n/a |
| | for Return | [25] [_____] | [25] [_____] | [13] [_____] | n/a |
| | for Exhaust | [13] [_____] | [13] [_____] | n/a | [25] [_____] |
| | for Outside Air | [25] [_____] | [25] [_____] | n/a | n/a |
| System Oval/Round Duct and Rectangular Duct SMACNA Seal Class | for Supply | A | A | A | A |
| | for Return | A | A | A | A |
| | for Exhaust | A | A | A | A |
| | for Outside Air | A | A | A | A |
| System Oval/Round Duct SMACNA Leak Class | for Supply | [6] [_____] | [6] [_____] | 12 | n/a |
| | for Return | [12] [_____] | [12] [_____] | 12 | n/a |
| | for Exhaust | [12] [_____] | [12] [_____] | n/a | [12] [_____] |
| | for Outside Air | [12] [_____] | [12] [_____] | n/a | n/a |

| Appendix D | | | | | |
|---|---|---|---|---|---|
| REQUIREMENTS FOR DUCT AIR LEAK TESTING | | | | | |
| | | SYSTEMS | | | |
| | | [AHU w/ Economizer & CV Unit No. [1] [_____]] | [AHU w/ Economizer & CV Unit No. [2] [_____]] | [Series VAV Terminal Boxes Unit No. [1] [_____]] | [Exhaust Systems Unit No. [1] [_____]] |
| System Rectangular Duct SMACNA Leak Class | for Supply | [12] [_____] | [12] [_____] | 24 | n/a |
| | for Return | [24] [_____] | [24] [_____] | 24 | n/a |
| | for Exhaust | [24] [_____] | [24] [_____] | n/a | [24] [_____] |
| | for Outside Air | [24] [_____] | [24] [_____] | n/a | n/a |
| Duct Test Pressure, in millimeters W.C. | for Supply | [50] [_____] | [25] [_____] | [13] [_____] | n/a |
| | for Return | [25] [_____] | [25] [_____] | [13] [_____] | n/a |
| | for Exhaust | [13] [_____] | [13] [_____] | n/a | [25] [_____] |
| | for Outside Air | [25] [_____] | [25] [_____] | n/a | n/a |

| Appendix D | | | | | |
|---|---|---|---|---|---|
| REQUIREMENTS FOR DUCT AIR LEAK TESTING | | | | | |
| | | SYSTEMS | | | |
| | | [Package Rooftop w/VAV Unit No. [1] [_____]] | [Package Rooftop w/VAV Unit No. [2] [_____]] | [Package Rooftop w/CV Unit No. [1] [_____]] | [Package Rooftop w/CV Unit No. [2] [_____]] |

| | | | | | |
|---|---|---|---|---|---|
| Duct System Static Pressure, in inches W.C. | for Supply | [4] [_____] | [4] [_____] | [2] [_____] | [2] [_____] |
| | for Return | [2] [_____] | [2] [_____] | [1] [_____] | [1] [_____] |
| | for Exhaust | [_____] | [_____] | [_____] | [_____] |
| | for Outside Air | [2] [_____] | [2] [_____] | [1] [_____] | [1] [_____] |
| System Oval/Round Duct and Rectangular Duct SMACNA Seal Class | for Supply | A | A | A | A |
| | for Return | A | A | A | A |
| | for Exhaust | A | A | A | A |
| | for Outside Air | A | A | A | A |

| Appendix D | | | | | |
|---|---|---|---|---|---|
| REQUIREMENTS FOR DUCT AIR LEAK TESTING | | | | | |
| | | SYSTEMS | | | |
| | | [Package Rooftop w/VAV Unit No. [1] [_____]] | [Package Rooftop w/VAV Unit No. [2] [_____]] | [Package Rooftop w/CV Unit No. [1] [_____]] | [Package Rooftop w/CV Unit No. [2] [_____]] |
| System Oval/Round Duct SMACNA Leak Class | for Supply | [3] [_____] | [3] [_____] | [6] [_____] | [6] [_____] |
| | for Return | [6] [_____] | [6] [_____] | [12] [_____] | [12] [_____] |
| | for Exhaust | [_____] | [_____] | [_____] | [_____] |
| | for Outside Air | [6] [_____] | [6] [_____] | [12] [_____] | [12] [_____] |
| System Rectangular Duct SMACNA Leak Class | for Supply | [6] [_____] | [6] [_____] | [12] [_____] | [12] [_____] |
| | for Return | [12] [_____] | [12] [_____] | [24][_____] | [24][_____] |
| | for Exhaust | [_____] | [_____] | [_____] | [_____] |
| | for Outside Air | [12] [_____] | [12] [_____] | [24] [_____] | [24] [_____] |
| Duct Test Pressure, in inches W.C. | for Supply | [4] [_____] | [2] [_____] | [50] [_____] | [2] [_____] |
| | for Return | [2] [_____] | [2] [_____] | [1] [_____] | [1] [_____] |
| | for Exhaust | [_____] | [_____] | [_____] | [_____] |
| | for Outside Air | [2] [_____] | [2] [_____] | [1] [_____] | [1] [_____] |

| Appendix D | | | | | |
|---|---|---|---|---|---|
| REQUIREMENTS FOR DUCT AIR LEAK TESTING | | | | | |
| | | SYSTEMS | | | |
| | | [AHU w/ Economizer & CV Unit No. [1] [_____]] | [AHU w/ Economizer & CV Unit No. [2] [_____]] | [Series VAV Terminal Boxes Unit No. [1] [_____]] | [Exhaust Systems Unit No. [1] [_____]] |
| Duct System Static Pressure, in millimeters W.C. | for Supply | [2] [_____] | [2] [_____] | [0.5] [_____] | n/a |
| | for Return | [1] [_____] | [1] [_____] | [0.5] [_____] | n/a |
| | for Exhaust | [0.5] [_____] | [0.5] [_____] | n/a | [1] [_____] |
| | for Outside Air | [1] [_____] | [1] [_____] | n/a | n/a |
| System Oval/Round Duct and Rectangular Duct SMACNA Seal Class | for Supply | A | A | A | A |
| | for Return | A | A | A | A |
| | for Exhaust | A | A | A | A |
| | for Outside Air | A | A | A | A |
| System Oval/Round Duct SMACNA Leak Class | for Supply | [6] [_____] | [6] [_____] | 12 | n/a |
| | for Return | [12] [_____] | [12] [_____] | 12 | n/a |
| | for Exhaust | [12] [_____] | [12] [_____] | n/a | [12] [_____] |
| | for Outside Air | [12] [_____] | [12] [_____] | n/a | n/a |

| Appendix D | | | | | |
|---|---|---|---|---|---|
| REQUIREMENTS FOR DUCT AIR LEAK TESTING | | | | | |
| | | SYSTEMS | | | |
| | | [AHU w/ Economizer & CV Unit No. [1] [_____]] | [AHU w/ Economizer & CV Unit No. [2] [_____]] | [Series VAV Terminal Boxes Unit No. [1] [_____]] | [Exhaust Systems Unit No. [1] [_____]] |
| System Rectangular Duct SMACNA Leak Class | for Supply | [12] [_____] | [12] [_____] | 24 | n/a |
| | for Return | [24] [_____] | [24] [_____] | 24 | n/a |
| | for Exhaust | [24] [_____] | [24] [_____] | n/a | [24] [_____] |
| | for Outside Air | [24] [_____] | [24] [_____] | n/a | n/a |
| Duct Test Pressure, in inches W.C. | for Supply | [2] [_____] | [2] [_____] | [0.5] [_____] | n/a |
| | for Return | [1] [_____] | [1] [_____] | [0.5] [_____] | n/a |
| | for Exhaust | [0.5] [_____] | [0.5] [_____] | n/a | [1] [_____] |
| | for Outside Air | [1] [_____] | [1] [_____] | n/a | n/a |

-- End of Section --